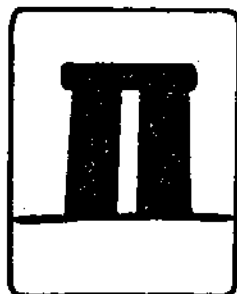


S. RANGE ARTIFACTS



A SOURCEBOOK ON ANCIENT MAN

Compiled by
WILLIAM R. CORLISS

VOLUME M-1

Published by

The Sourcebook Project

Glen Arm, Maryland 21057

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Library of Congress Catalog Number: 74-75256

ISBN 0-9600712-2-9

First Printing: March 1974
Second Printing: April 1975

PREFACE

I have always been intrigued with the tailings from the mine of science. I mean those facts that do not fit the mold, those anomalies that should not exist, those sports, those wild points that lie far off the curve. One of my hobbies is collecting and organizing these homeless facts. These waifs are curious and most intriguing. Either they are false or science still has much fundamental work to do. But I leave such problems to the reader. All I have done is collect, categorize, and reprint this anomalous information. The result is this first volume of archeological curiosities. Perhaps you can make something out of them. At the very least, I hope you will be excited by the unknown territory that still lies ahead of us.

I have devoted a great deal of thought to the organization of this volume. The format is flexible. More material may be added within the framework of categories from any source and any period. Seemingly disparate data are correlated through the indexes and annotations. Whole new categories can be added if it appears necessary.

The literature dealing with mysterious archeological items has been merely scratched. Volume M1, the present volume, represents only a small portion of my collection. Volume M2 is well along in preparation, as are volumes in the fields of geophysics, astronomy, and unresolved geological problems.

The data included have been filtered only slightly. Doubtless some hoaxes and honest misinterpretations will be found in the pages that follow. This is unavoidable in a project of this scope. Indeed, it is unavoidable in all phases of inquiry, especially those relying heavily upon observational evidence. Data were selected for inclusion according to their "strangeness" and their tendency to contradict current scientific hypotheses or stretch them beyond their present bounds. There has also been a deliberate effort to gather in observations from the 19th Century that have gathered dust too long on library shelves. Anomalous artifacts are too rare to let them be discarded merely because they are old or money cannot be found to put them into computerized data systems.

The collecting net I flung into the literature was a broad one. It had to be because: (1) valid data and interesting theories are often published outside the mainstream of scientific thought; and (2) people were just as observant a century or two ago as they are today. Quotations in this volume will demonstrate that they viewed the world with great curiosity and if they sometimes misinterpreted things perhaps they also saw the cosmos through less biased eyes.

Some of the material included here will be labelled "pseudoscience," but some of the data so castigated will be legitimate science a decade hence. The antiquity of man is, of course, a case in point. The reader should bear in mind that many items are inserted with the express purpose of "rocking the boat."

I should also add that I have deliberately introduced data---perhaps 25% of the whole---from outside the scientific literature. This was not done because of any lack of material but rather to insure the widest possible spectrum of observations.

Being that this is a sourcebook, I must acknowledge the many writers of papers, books, letters-to-the-editor, and sundry publications that form the foundation of the

book. Where lengthy quotations are taken from publications still protected by copyright, permission has been obtained from the copyright holder.

William R. Corliss

Glen Arm, Maryland
December 28, 1973.

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*A breakdown of the subsections within these categories follows. Use the headings at the tops of the pages to locate specific subsections and entries.

<u>Section Code and Title</u>		<u>Subsection Code and Title</u>	
MA	Anthropological evidence	MAD	Physical characteristics
		*MAS	Social structure.
ME	Geological artifacts	MEF	Fossil footprints
		MES	Skeletons
MG	Graphic artifacts	MGM	Macroforms
		*MGP	Pictographs
		MGS	Symbols and notation
		MGT	Statues, images
		MGW	Writing

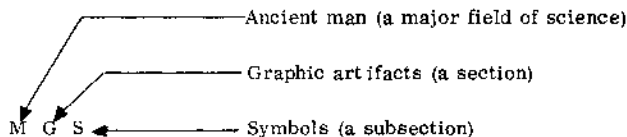
ML	Legends, myths, concepts	*MLD	Dwarfs
		*MLE	Elementals
		MLG	Gods, messiahs
		MLM	Giants
		*MLO	Origin of man
		MLW	Cosmology, world history
MM	Manufactured artifacts	MMC	Coins, metallic items
		MMF	Flints, celts, etc.
		*MMP	Pottery, seals, etc.
		MMT	High technology
MS	Structural artifacts	MSB	Buildings
		MSC	Canals and waterworks
		MSD	Dolmens and standing stones
		MSF	Forts
		MSG	Graves and mounds
		MSH	Henges, organized structures
		*MSO	Obelisks and stellae
		MSP	Pyramids
		MSS	Systems of structures
		MST	Tunnels, mines
		*MSW	Walls

*This subsection not represented in Volume M1.

ORGANIZATION OF THE SOURCEBOOKS

All sourcebook entries are labeled with three letters and a number; viz., MGS-012. The three letters indicate a category of artifacts. MGS, for example, designates a subsection of the book containing accounts of symbols, such as cupmarks. The number following the letters is simply an acquisition number within that subsection. Thus, entry MGS-012 is the 12th entry in the symbol category. The indexes at the back of each sourcebook and all cross references are keyed to the entry number rather than page number.

There is a plan to the assignment of letter codes. The first letter indicates a broad, general field of science, such as ancient man, M. The second and third letters are assigned to sections and subsections within this general field, as illustrated below:



The sections denoted by the second letters are based upon the character of the artifact at hand. Symbols are graphic in essence and thus bear the MG label.

The subsections (third letters) are narrower in scope than the sections. Experience, however, has shown that subsections must be broad to encompass the great variety of artifacts in a reasonable number of categories. They cannot be too broad, though, or a structureless hodgepodge results. The subsections have been selected and named with great care to avoid suggesting specific hypotheses. A complete list of sections and subsections now in use precedes this page and also functions as a Table of Contents. Detailed descriptions of the subsections are placed at the beginnings of the sections.

When searching for a specific entry, scan the running heads at the tops of the pages; they give the entry numbers as well as the subsection titles. The person who reads for curiosity's sake will find that each subsection is much like a chapter, with many related items grouped together.

The loose-leaf format of the sourcebooks makes it possible to combine material subsection by subsection as new volumes are issued.

Each volume is indexed by subject, by author, and by data source. Each volume is self-contained. With the issuance of future volumes, cumulative indexes will be compiled. There will be no necessity to hunt through several indexes to find something. Because some major fields are interrelated, it will doubtless prove useful to cumulate indexes from the different series on geophysics, earth science, ancient man, and so on.

References, annotations, and Compiler's Summaries are printed full-width, while all direct quotes are indented.

ORGANIZATION OF THE SOURCEBOOKS

Being a sourcebook, the core of this volume consists of direct quotations from eye-witnesses and key investigators. The text herein faithfully retains the old spellings (except for the disconcerting f-for-s), punctuations, and even a few typos. After all, only the eye-witness' own words convey the facts as he perceived them. Regurgitations and surveys, so common these days, are already once or twice removed from the situation. The whole object of these sourcebooks is to give the reader and researcher an organized collection of original writings on the more unusual facets of the natural world. Much of this unique information is being lost as libraries become more highly computerized. Data selected for data banks must have current relevance and be acceptable to the science of the day. Hopefully, these sourcebooks will preserve something of value and help focus the diverse, widely dispersed anomalies on the frontiers of science. They should also be interesting reading.

SECTION MA: ANTHROPOLOGICAL EVIDENCE

Modern man retains "memories" of ancient man in his physical and social makeup. Our holidays and festivals, for example, seem to be derived from very ancient celebrations and possess strong astronomical overtones. Blood types, bone structure, and other physical attributes may also tell us something about our ancestors. While not artifacts in the sense that social characteristics are, the M series of sourcebooks seems the appropriate place to locate such material. As with all sections in this volume, the emphasis is on evidence that seems unusual or anomalous, such as that which tends to indicate that the human race has degenerated rather than evolved upward. Even though such radical hypotheses may turn out to be false, the data that stimulated their formulation may be significant.

MAD Physical characteristics. Brain size, blood types, physical and mental capabilities.

*MAS Social structure. Religions, forms of government, social customs, etc.

*This subsection not represented in Volume M1.

ANTHROPOLOGICAL EVIDENCE

IAD-001 THE DEGENERACY OF MAN

Ylor, Edward B.; Nature, 10:146-147, June 25, 1874.

A modern dogma asserts that life has, in the main at least, evolved ever upward. Humanity, too, is supposed to fit this mold. Some, however, feel steady improvement has not been our lot. Perhaps some prehistoric cultures, the megalithic culture, for example, knew better how to cope with the natural world. In any case, here are some century-old thoughts on the subject.

Dr. Oscar Peschel, in his recently published "Volkerkunde" (p. 137), calls attention to a remark by the late Dr. von Martius, of much interest to anthropologists. It is well known that this distinguished naturalist avowed in the strongest terms his belief that the savage tribes of Brazil were the fallen descendants of more cultured nations. In 1838 he said:- "Every day I spent among the Indians of Brazil increased my conviction that they had once been in quite another state, but that in the lapse of dark ages there had broken in upon them manifold catastrophes, which had brought them down to their actual condition, that of a peculiar decline and degeneration. The Americans are not a wild race, they are a race run wild and degraded." To students of civilisation (myself for example) Dr. Martius' views have been most embarrassing. It was not strange that the theory of savages being the degraded offspring of primeval civilised men should have been advocated by Archbishop Whately, who did not even take the trouble to examine his own evidence. Nor is it surprising that the Bishop of Ely, in the "Speaker's Commentary," should still appeal to Whately as an unrefuted authority, for one hardly expects an orthodox commentator to test the arguments on his own side. But the case with Dr. Martius was quite different. Here was an eminent ethnologist, intimately acquainted with savage thought and life, declaring that it seemed to him not to indicate natural wildness, but to show traces of decay from an ancient higher culture. What made the matter more puzzling, was that Dr. Martius, in his researches, had come upon facts which he acknowledged to be evidence of progress taking place from savage toward civilised institutions. Thus, among the forest tribes of Brazil he found the rudest form of the "village community," with its tribe-land common to all, but the huts and patches of tilled ground treated as acquired private property, not indeed of individuals, but of families. It was manifest that these tribes were passing through stages of that very development of the law of real property which is so clearly shown in the history of European law. This is a strong argument in favour of the development-theory of civilisation, but how could an ethnologist who understood the force of such arguments, remain an upholder of the degeneration-theory?

Dr. Peschel considers that he did not so remain, but had changed his opinion when, nearly thirty years later, he wrote as follows as to the tribes of the vast region of the Amazons. "There are as yet no grounds for considering that the present barbaric condition in these districts is secondary, that any other higher social condition had ever here preceded it, that this swarming-ground of ephemeral unsubstantial hordes had ever been the theatre of a cultured nation." It is to be noticed, however, that this passage does not seem necessarily to involve a recantation by Dr. Martius of his former opinion. He leaves it quite open that the tribes of the Amazons, though they did not degenerate in this region from civilised ancestors, might have done so elsewhere, and then migrated as savages into the forest regions where as savages they remain. The context may on the whole favour this view of his meaning. Now this matter quite deserves further looking into. It would be well worth while if Dr. Peschel, from personal or published sources available to him, would settle once for all the question whether the great Bavarian ethnologist continued through life the degenerationist that we in England

MAD-002 PHYSICAL CHARACTERISTICS

suppose him to have been. Some twenty years ago, Dr. Prichard ("Natural History of Man," 1843, p. 497), citing Martius as to this very matter of the supposed fall of the South American tribes from an original higher state, remarked that "had he taken a more extensive survey of the nations of the whole continent, his opinion might have been somewhat modified." As Dr. Martius did take the more extensive survey thus recommended, it would be particularly curious to ascertain whether it did have the effect thus foretold on his mind.

MAD-002 THE DEGENERACY OF MAN

Tylor, Edward B.; Nature, 10:204-205, July 16, 1874.

Dr. Martius found the rude natives of Brazil treating the hunting-ground of each tribe as common to all the tribesmen, but allowing each family to hold as its own freehold the ground which it had built huts on, or brought under tillage. It is not surprising that this ethnologist, comparing such a rudimentary form of the "village community" with its more artificial arrangements in ancient Europe, should have considered the Brazilian tribes to have arrived at an intermediate stage of the development of land-laws, above that of the lowest savages, and on the way to that of more civilised nations. Mr. Edkins, however, in his letter to Nature, vol. x. p. 163, thinks that Dr. Martius should not have explained the origin of the Brazilian land-law in this obvious way. The suggestion which he offers in its place is, that inasmuch as the Chinese had in old times a highly artificial system of partitioning their village-lands among the heads of families, some of these Chinese are to be supposed to have emigrated to the Brazilian forests and introduced this system, which in course of ages decayed till nothing was left but the simple rule found by Dr. Martius. But is not the word "far-fetched" applicable to this argument? Sooner than allow the rude people of Brazil to have been human beings capable of adopting the simplest social regulation for their own evident benefit, Mr. Edkins sends half-way round the world for imaginary Chinese emigrants, to introduce, not the savage law itself, but a civilised law which, if broken down to its last remnant, might be reduced to the Brazilian level. And, one may go on to ask, where is it likely that the Chinese themselves got their law of village-lands, if it was not developed out of lower stages of the law of property, belonging to lower stages of civilisation? If Mr. Edkins would turn his great knowledge of Chinese matters to investigating the origin of Chinese institutions, I think he would contribute new evidence to the development-theory of culture. Mr. Edkins next brings forward the evidence of numerals in Polynesia as proof of degeneracy in civilisation. The fact that the word mano means 10,000 in the Tonga Islands, 4,000 in the Sandwich Islands, and 1,000 in New Zealand, he accounts for on the supposition that the highest number was the original meaning, but that it was lowered with a fall in civilisation. But he will, I think, on further examination be satisfied that the real reason has nothing to do with degeneration, but with the curious Polynesian habit of counting by twos, fours, and even tens. Thus rau and mano, which in New Zealand mean 100 and 1,000, come to mean in Hawaii so

PHYSICAL CHARACTERISTICS MAD-003

many fours, viz. 400 and 4,000; Mr. Edkins' own example from Ponape shows the same done with tens (see Hale's "Ethnography of Wilkes' Expedition"). Mr. Edkins also remarks that "the Polynesians formerly had a decimal arithmetic; now it has sunk in Australia to quaternary or quinary arithmetic." But the Australians are not of the same race as the Polynesians, nor is there the least reason to suppose that they were ever at a Polynesian level of culture. As the evidence of numerals has been introduced, it may be mentioned that both Australians and Polynesians use numerals derived from counting on the fingers. Thus the Polynesian lima, i. e. "hand," is the ordinary numeral for five, while the West Australian will say "the hand on either side and half the feet," meaning by this long expression the number 15. I may add that I have been trying for years to get any degenerationist to answer the argument from numerals of this very common class, which can only have arisen by development from the lower stage of counting on the fingers, and which therefore prove savage tribes to be capable of independent intellectual development.

The Quarterly Review argument from the recent discoveries of Dr. Schliemann in the ruins he considers to be of Troy, merely shows that low barbarians may build on the ruins of towns previously inhabited by more civilised nations. This often happens, and can hardly be held to prove that the higher civilisation existed in the world before the lower.

MAD-003 THE DEGENERACY OF MAN

Whitmer, S. J.; Nature, 12:47, May 20, 1875.

The numbers of Nature for June and July last, which have lately reached me (vol. x. pp. 146, 164, 204 and 205), contain a correspondence on the subject of the degeneracy of man, in connection with which I wish to contribute a few remarks.

I have nothing to say on the original point introduced by Mr. E. B. Tylor. But, during my residence in the islands of the Pacific, I have given some attention to the general question of degradation or progression, as exhibited in the Polynesians. The result is, that I believe there are numerous indications of the degeneracy of these people from a higher social and intellectual level than that which they at present occupy. I could not give in detail, in this letter, the entire evidence on which this opinion is based; I will therefore briefly mention two or three indications only of this degeneracy which I have noticed.

The language of the Polynesians furnishes one of these. While there is much in it which shows a low moral tone, there are, on the other hand, many refinements (a large proportion of which are known to most of the present generation) which I do not believe could have been invented, or gradually developed, by the race in its present intellectual condition. Their old traditional stories, and their ancient poetry also, are so different from anything the present Polynesians are capable of producing, that I often think (your classical readers will please pardon the comparison) the relative difference, between the past and present, is as great as that between the intellect of the Greeks, in the period of the highest

MAD-003 PHYSICAL CHARACTERISTICS

Attic culture, and those of the present century. I have often asked men of more than average intelligence, why their modern compositions are so inferior to many of the old ones. They invariably reply that the men of old were greater and wiser than those of the later generations.

The industrial and ornamental works of the Polynesians are all, I believe, of ancient origin. Their houses, their canoes (with one exception), their fine mats, the way in which they make their bark cloth, and even the patterns which they print on it, are all according to the traditional forms handed down from generation to generation. There is no originality. Invention is unthought of. Even now, when the influence of external civilisation is brought to bear with considerable force upon them, they adopt a new idea very, very slowly. If they had never been in a higher and more active intellectual condition, I cannot conceive how they could possibly have obtained the many comparatively excellent customs, the--- in many respects---elaborate language, and the advanced social customs which were in their possession when first they became known to the civilised world.

I am well aware that absolute proof of the degeneracy of the Polynesians will not, by any means, render necessary the conclusion that degeneracy has been universal with the human race. Advocates of the progressive theory do not deny that some instances of degradation are to be found. In his "Primitive Culture" (vol. i. p. 34) Mr. Tylor says: "Of course the progression-theory recognises degradation, and the degradation-theory recognises progression, as powerful influences in the course of culture." Hence I present the indications of degeneracy above-mentioned as, at most, only a minute portion of the cumulative evidence which must be adduced indisputably to prove the degradation-theory of general application to the human race.

Apropos of this question I may add, that I often think much of the difference between (at least the more moderate) progressionists and degradationists is owing to the want of a clear definition of the term civilisation as used on either side. One appears to me to think chiefly of a material civilisation, while the other thinks mainly of a moral civilisation. I do not believe in the evolution of man from a lower form of life. But, notwithstanding this, I doubt whether the first man was civilised in the ordinary sense in which that word is now used. So far as a material civilisation goes, I take him to have belonged to the earliest stone age. But at the same time I feel the strongest conviction that he was, in point of moral civilisation, immeasurably in advance of a savage. It has often been said by advocates of the degradation-theory that no well-authenticated instance has ever been given of a savage who has, apart from external help, improved his condition. I believe this assertion to be true, notwithstanding Sir John Lubbock's "Cases in which some improvement does appear to have taken place," given in the appendix to his "Origin of Civilisation" (pp. 376-380). I do not deny the force of the reply to the above assertion, given by advocates of the progression-theory; viz., that it is almost impossible to prove that a savage race has, unaided by external influence, bettered its condition. But from personal observation of savage and semi-savage life, I feel almost certain that a real savage is utterly incapable of, in any way, raising himself. He lacks the sensibility which must serve as a fulcrum for the lever which is to lift him. Upon this ground alone, if I had no other reason for it, I should doubt whether man had, unaided, developed himself from a state of unmitigated savagery.

The progressive "improvement" of mankind is thought by some to be a necessary consequence of the hypothesis of evolution. This is in direct contrast to the "fall of man" hypothesis.

It was common in 1875, as it still is now, to judge cultures in terms of our own as being the highest reference---a very condescending viewpoint.

SECTION ME: GEOLOGICAL ARTIFACTS

Geological artifacts are those traces of ancient man---usually accidental in character---left behind in the strata, the glacial drift, and other deposits. Geological artifacts are considered "strange" if they tend to indicate unusual dates for ancient man, unusual physical sizes, peculiar bone structure, and similar anomalies.

- MEF Fossil footprints. These may be in unexpectedly ancient strata or in association with animal remains or geological processes at variance with accepted theories of ancient man.

- MES Skeletons. Like footprints, skeletons may be found in strata that contradict current theories. The skeletons may also indicate unusual size or physique.

GEOLOGICAL ARTIFACTS

FOSSIL FOOTPRINTS MEF-001

MEF-001 ON THE SUPPOSED HUMAN FOOT-PRINTS RECENTLY FOUND IN NEVADA

ish, O. C. ; American Journal of Science, 3:26:139-140, 1883.

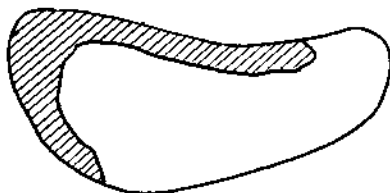
During the past summer, various accounts have been published of the discovery of human foot-prints in sandstone near Carson, Nevada. The locality is in the yard of the State prison, and the tracks were uncovered in quarrying stone for building purposes. Many different kinds of tracks were found, some of which were made by an animal allied to the elephant; some resembled those of the horse and the deer; others were apparently made by a wolf. There were also tracks made by large birds.

The foot-prints occur in series, and are all nearly in the same horizon. Some of the smaller tracks are sharp and distinct, but most of the impressions are indefinite in outline, owing apparently to the fact that the exact surface on which they were made is not usually exposed.

The supposed human foot-prints are in six series, each with alternate right and left tracks. The stride is from two and one-half to over three feet in extent. The individual foot-prints are from eighteen to twenty inches in length, and about eight inches wide. The distance between the line of right hand and left hand tracks, or the straddle, is eighteen to nineteen inches.

The form and general appearance of the supposed human tracks is shown in figure 2, which is a reduced copy of one of the impressions represented by Dr. W. H. Harkness, in his paper before the California Academy of Sciences, August 7th, 1882. The shaded portion was restored by him from other foot-prints of the series. A copy of this impression was given, also by Professor Joseph LeConte, in his paper before the same society, August 27th, 1882.

The size of these foot-prints, and especially the width between the right and left series are strong evidence that they were not made by men, as has been so generally supposed.



Fossil "human" footprint. (MEF-001)

MEF-002 FOSSIL FOOTPRINTS

A more probable explanation is that the impressions are the tracks of a large Sloth, either Mylodon or Morotherium, remains of which have been found in essentially the same horizon. In support of this view it may be said that the foot prints are almost exactly what these animals would make, if the hind feet covered the impressions of those in front. In size, in stride, and in width between the right and left series of impressions, the foot-prints agree closely with what we should expect Mylodon or Morotherium to make. In figure 1, the bones of the left hind foot of a species of Mylodon are represented, the figure being reduced to the same scale as the accompanying cut, figure 2, of one of the supposed human foot-prints.

The geological horizon of these interesting foot-prints is near the junction of the Pliocene and Quaternary. The evidence, at present, appears to point to the Equus beds of the upper Pliocene as the nearest equivalent.

Since the above communication was read, the writer has had an opportunity of examining photographs and casts of the Carson foot-prints, and is confirmed in his opinion that the supposed human tracks were made by large Edentates. The important fact has recently been determined that some of these tracks show impressions of the fore feet. The latter are somewhat outside of the large foot-prints, as would naturally be the case, if the animal changed its course.

MEF-002 CARSON FOOTPRINTS

Le Conte, Joseph; Nature, 26:101-102, May 31, 1883.

In Nature (vol. xxvii, p. 578) which I have just seen, the Duke of Argyll calls your attention to the so-called human footprints uncovered in the prison yard at Carson, Nevada. I have carefully examined these tracks, and read a paper on the subject before the California Academy of Science, August 27, 1882. Unfortunately the Proceedings of the Academy have not yet been published, though copies of the several papers on this subject have been printed and privately distributed. Perhaps a brief account of these tracks will be interesting to your readers.

The nearly horizontal strata in which they occur consist of beds of sandstone with thin layers of fine shale. The track layer, which is one of these latter, has been uncovered over an area of nearly two acres, and forms the floor of the prison yard, while the stone removed has been used to build the prison. In the course of the excavation a number of fossils have been found, among which the most important are the jaws and teeth of an elephant, probably E. Americanus, and two species of horse, Equus Pacificus and occidentalis; some freshwater shells, all of recent species, have also been found. The age of the deposit seems to be that of the "Equus beds" of American geologists, which by some are put in the uppermost Pliocene, and by others in the lowest Quaternary. It is probably a transition between the two.

The whole surface of the shale exposed in the prison yard is literally covered with tracks of many kinds, but the mud was so soft when the tracks were made that the nature of many of them can only be guessed. Some were probably those of a horse; some probably of a wolf; some certainly of a deer; many were those of long-legged wading birds. But the most interesting are those of the Mammoth and the problematical so-called human tracks. About the Mammoth tracks there can be no doubt. Some of these were uncovered by blasting in my presence; round basin-shaped impressions, 5 inches deep and 22 inches across, and occurring in regular alternating series, the hind-foot tracking almost perfectly with the fore-foot. The nature of the so-called human tracks, however, is far more

doubtful. These occur in several regular alternating series of 15-20. In size they are 18-20 inches long, and 8 inches wide. In shape they are many of them far more curved than the human track, especially in soft mud. The stride is 2-1/2 to 3 feet, and even more. The outward turn of the track is in many cases greater than in human tracks, especially in soft mud. But the most remarkable thing about them on the human theory is the straddle, i. e. the distance between the right and left series. This I found to be 18 and even 19 inches, which was fully as great as that of the mammoth tracks. This is probably the greatest objection to the human theory. On the other hand, the great objection to the quadrupedal theory is the apparent singleness of the tracks, and the absence of claw-marks. But it must be remembered that the tracks are deep, and the outlines somewhat obscure, and also that the mammoth tracks, on account of tracking of hind with fore-foot, are in most cases, though not always, single.

After careful examination for several days, the conclusion I came to was that the tracks were probably made by a large plantigrade quadruped, most likely a gigantic ground-sloth, such as the *Mylodon*, which is found in the Quaternary, or the *Morothentium*, which is found in the upper Pliocene of Nevada. The apparent singleness, the singular shape, and the large outward turn of the tracks I attribute to the imperfect tracking of hind and fore-foot on the same side, while the absence of claw-marks was the result of the clogging of the feet with mud.

This view seems to me most probable, but many who have seen the tracks think them human, and I freely admit that there is abundant room for honest difference of opinion. On any theory the tracks are well worthy of scientific attention.

MEF-003 HUMAN FOOTPRINTS IN NICARAGUA

Flint, Earl; American Antiquarian, 6:112-113, 1884.

In a recent trip to Managua for the Peabody Museum, to examine the human footprints found there in one of the quarries, now being worked for building purposes, I uncovered six rows of impressions, breaking through a layer of rock seven inches thick, over a space of six yards by two. Under this was a layer of black sand with an average thickness of one inch, resting on a layer of friable rock from one and one-half to two inches thick, covering the surface of the lowest layer of rock found in the quarry. Below this thin layer was a thin deposit of volcanic sand and gravel, filling up the inequalities caused by the impressions, with an average of one inch in thickness, as seen in the side cuttings.

The rock seems to owe its formation to a volcanic detritus, and ash brought down after the first volcanic eruption. I cannot account in any other way, for its original plasticity, as but little clay could reach the surface, if the eruption covered the neighborhood with rock and ash---evidenced in many places of a large district where this kind of rock occurs. Impressions of leaves and stems occur on the under surface, denoting an absence of forest at the point worked. The upper surface is nearly level, with a barely perceptible dip toward the lake shore---distant some 300 yards, and whose waters must have formerly occupied ---or overflowed at times of high water, as some of the aquatic plants, common in the marshy districts, are among the impressions preserved.

MEF-004 FOSSIL FOOTPRINTS

The footprints are from one-half to three inches in depth, consequently not made, as some had judged, by a people, fleeing from an inundation. In those exposed there is no length of stride to indicate it, and in the many removed by the owner of the quarry, none exceeded eighteen inches. Some of the impressions are nearly closed, the soft surface falling back into the impression, and a crevice about two inches in width is all one sees, and my first glance at some parallel to one less deep, gave me an idea that the owner of the latter was using a staff to assist him in walking. In some the substance flowed outward, leaving a ridge around it---seen in one secured for the museum; the stride is variable, owing to size of person, and the changing nature of surface passed over. The longest one uncovered was seventeen inches, length of foot ten inches, and width four inches, feet arched, steps in a right line, measured from center of heel to center of great toe over three steps. The people making them were going both ways in a direction consonant to that of the present lake shore E. and W. more or less. The nearly level surface extending around the neighborhood of the quarry prevented me from judging as to the nature of or mode of arrival other than that mentioned. As far as worked out, the thickness varied but little from twenty-eight to thirty inches. Following the inequalities of the primitive soil, the perpendicular cuttings on the southern and eastern faces of the quarry above the layers mentioned, show in only one place a barely perceptible dip to the east. The layer removed was covered by one of hard clay, with streaks of white pumice stone beneath and mingled with its lower surface---thickness seen in the cutting twelve inches; above this was a layer of ash, slate colored, very hard, seen in the cuttings along the Masaya road, and also between Granada and Jinotepe---west of latter place, 15 feet in thickness, under 15 feet of loam. In the location worked was only 14 inches, mixed with stems of plants and leaves on and near its under surface. Above this ashy formation are four successive layers of rock similar to the lower one and are being used for building. The lowest averages 28 inches; the others from 17 to 20 inches. The detritus separating the layers is insignificant. Saw many blocks, and found cavities formerly occupied by stems of plants, but none have leaves like the lowest layer. I think these layers were the results of different eruptions. The clay deposit one of repose.

The depth from the surface of the impressions was 14 feet 10 inches---not counting the surface soil, the strides from 11 to 17 inches. I would mention that later, the purchaser of those remaining uncovered, intends removing them to Europe and will be able to give a correct estimate of each. He kindly gave me permission to remove two. Had he not purchased the site, only the story of their occurrence could be relied on to prove man's antiquity here.

It is useless to speculate on the lapse of time that has passed since their occurrence. Experts in geology may give approximate dates.

Before examining them I was inclined to believe they were coeval with those at San Rafael, but am now convinced that they are in an entirely different formation. The former occurs on sedimentary rock of that locality. One human footprint associated with those of a tiger on hard volcanic rock, on the banks of Grand river, at Pinon, west of Jinotepe is now easily explained. I went in May to cut it out and found the place covered by water, but intend visiting San Rafael to procure specimens from them. Unlike those at Nevada the people of this region needed no covering to protect their feet from a vigorous climate. The discovery is unique and worth recording.

MEF-004 THE PRE-ADAMITE TRACK

MCA., A.; American Antiquarian, 7:364-367, 1885.

In the last issue of your always deeply interesting and instructive journal, I read an article from the pen of Mr. Flint, which aroused some thoughts to which I now take the liberty of giving free expression.

It appears that Mr. Flint, among some really valuable discoveries, came across what he believed to be two impressions of the human foot on a rock in Nicaragua. Finding that the rock contained fossils of a remote era, he has assigned the original of the "imprints" to a "date" ranging anywhere from 50,000 to 200,000 years ago.

Now, what I desire to say is, that it appears to me to be an error to assume that "footprints" found on the surface of rocks are as old as the fossils beneath. Some of the so-called pre-Adamite tracks are manifestly the work of sculptors, and utterly useless as data by which to calculate the antiquity of our race on this planet.

That sculptors passed through Nicaragua during some period in the remote past is perfectly evident from the images which have been found by travelers. Squier in his admirable book of travels through this region presents us with pictures of chiselled forms in stone that could only have been wrought by masters of the art. Some of the figures represent human bodies with heads of beasts. They are executed with marvelous skill, and nothing is clearer than that those sculptors could, if they pleased, have caused the representation of a footprint on rock.

If the tracks in Nicaragua were made when the rock on which they appear was in as soft condition as that sea beach on which the startled Crusoe beheld the footprint, then it would be correct to attribute those "footprints in the sand of time" to some pre-Adamite wanderer. But, on the other hand, if the tracks are the work of sculptors, they were, of course, carved after the matter in which they appear had become hard stone; and it would be absurd and misleading to say that the artist was the contemporary of the fossils found in the sculptured rock. Suppose we find a statue or shell clearly referable to the Tertiary period, would it be wise to conclude that the workman belonged to the same remote era?

I notice that your learned and ingenious correspondent speaks about writings which he has observed on the roofs of caves in the same section of country as that to which the "footprints" belong. It is highly probable that those who carved the tracks also cut the inscriptions. Bradford says: "The most singular of these sculptors [he is telling about the imprints of feet observed in Asia and America] has been discovered on the banks of the Mississippi, near St. Louis. This is a tabular mass of lime stone bearing the impression of two human feet. The rock is compact limestone of grayish-blue color, containing the encrinite, echinite, and other fossils. The feet are quite flattened, but the muscular marks are delineated with great precision. Immediately before the feet lies a scroll sculptured in similar style. "The opinion sometimes entertained, that these are actual impressions of the human feet, made upon a soft substance subsequently indurated, is incorrect; on the contrary, they are undoubtedly the result of art."---Am. Antiquities, p. 25.

On the other hand Priest in his work on "American Antiquities" takes substantially the same ground as Mr. Flint. He says, [speaking of the impressions at St. Louis,] "Directly before the prints of these feet, within a few inches, is a well impressed and deep mark, having some resemblance to a scroll, or roll of parchment, two feet long, by a foot in width. To account for these appearances, two theories are advanced; one is, that they were sculptured there by the ancient nations; the other that they were impressed there at a time when the rock was in a plastic state; both theories have their difficulties, but we incline to the latter, because the impressions are strikingly natural, and Mr. Schoolcraft, exhibiting even the muscular marks of the foot, with great precision and faithfulness to nature, and, on this account, weakens, in his opinion, the doctrine of their being sculptured by the ancient nations. But why there are no others going to and from these, is unaccountable, unless we may suppose the rest of this rock, at that time, was

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buried by earth, brush, grass, or some kind of covering. If they were sculptured why not other specimens appear; this one isolated effort of the kind, would seem unnatural.

Why doesn't Mr. Priest give us a dozen pictures of the rock at St. Louis? His answer is, because one drawing suffices; and in like manner, a single pair of sculptured "imprints" of feet---indicating that certain people had passed that way ---served even better than a great number. A multitude of tracks might possibly be mistaken for genuine impressions of the feet of wayfarers belonging to a remote epoch; but a single isolated pair with no trail leading to or from them could not but arrest attention. The perfection of the workmanship merely demonstrates the skill of the artist. And what about the carved scroll? Is it too a fossil? If so it may be a leaf out of the pre-Adamite library.

On page 151 of his profound work, Mr. Priest says: "A few miles south of Braystown, which is at the head waters of the Tennessee river, are found impressed on the surface of the solid rock, a great number of tracks, as turkeys, bears, horses, and human beings, as perfect as they could be made on snow or sand. The human tracks are remarkable for having uniformly six toes each, like the Anakims of Scripture; one only excepted, which appears to be the print of a negro's foot. One, among those tracks, is distinguished from the rest, by its monstrousness, being of no less dimensions than sixteen inches in length, across the toes thirteen inches, behind the toes, where the foot narrows toward the instep, seven inches, and the heel ball five inches."

We can produce no such feet now-a-days. What becomes of the doctrine of evolution in the light of this revelation? Think of feet sixteen inches in length, and bodies and brains in proportion! But I take refuge in the belief that the "imprints" are all carved. True, in Tennessee as in Nicaragua, the tracks of turkeys, for instance, have been found upon the precipitous rocks, and on the sides of caves. Are we to suppose that the gobblers actually walked up the cliffs at a time when the substance of which the rocks are composed was in a plastic state? And if certain people went to the trouble of representing turkey tracks and letters on vertical rocks, may they not have carved similar impressions and a scroll upon level stones?

Mr. Priest informs us that in addition to the feet of turkeys are those of "bears, horses and human beings." Was it a circus?

"That these are the real tracks of the animals they represent, appears from the circumstance of this horse's foot having slipped several inches, and recovered again; the figures have all the same direction, like the trail of a company on a journey." It must have astonished the natives.

It is interesting to be assured that there were horses in America away back in ancient times. This supports the Danish legend about Bjorn Asbjorndson having been seen on horseback by Snorre Sturluson. Moreover, the exiled chief was in command of a troop of horse. And in support of this view we have Priest's testimony: "One also among the tracks of the animals, is distinguished for its great size; it is the track of a horse, measuring eight by ten inches; perhaps the horse which the great warrior led when passing this mountain with his army."

You will note that this hero, whose foot was sixteen inches long, led his horse while crossing the mountain. Had he mounted the animal it would probably have gone right through the crust of the earth. Fortunately the immensity of the hoofs of this horse which so admirably matched its master, sustained it above ground while traveling with the show.

The horse was a genuine curiosity. Hoofs ten inches long! It was the only horse in the company, but in quality it atoned for quantity. Mr. Priest even endeavors to belittle it, so anxious is he not to offend our prejudices on the subject of natural history. But let the full truth be told. The track left by the horse is several inches over the ten just mentioned! We are informed that the foot "slipped

several inches and recovered again." How does any one know that it slipped? Isn't the track of the monster at least thirteen inches long? What kind of a horse have we here?

Mr. Priest next tells us about the mountains of South America, on whose smooth and perpendicular sides "are engraven [mark the word], at a surprising distance from the base, the figures of animals; also the sun, moon and stars, with other hieroglyphic signs." The thoughtful author concludes that "the stones were once so soft and plastic, that men could easily trace marks on them with their fingers, or with sticks!"

Isn't it much more likely that the sun, moon, and stars passed that way, during the procession of the equinox, and left those impressions of their visit on the towering cliffs? To concede that they are mere sculptures opens the door to a world of possibilities which we will not contemplate.

Cannot the slab of Nicaragua be removed north? It is really an interesting object whether viewed as the work of man's hands or feet. Connected with it there is an amazing story.

There is more than a touch of ridicule here, but McA. is quite right in asserting that many footprints, handprints, and even some gigantic fingerprints are petroglyphs.

MEF-005 THE ANTIQUITY OF MAN

Anonymous; American Naturalist, 19:211-212, February 1885.

Professor Frederick W. Putnam, Curator of the Peabody Museum of American Archaeology at Cambridge, made a few remarks at the semi-annual meeting of the American Antiquaries Society, bearing on the antiquity of man in America, based upon objects recently received at the museum.

He presented photographs of four blocks of tufa, each containing the imprint of a human foot. These blocks were cut from a bed of tufa sixteen feet from the surface, near the shore of Lake Managua, in Nicaragua, and were obtained by Dr. Earl Flint, who has been for several years investigating the archaeology of Nicaragua for the museum, and has forwarded many important collections from the old burial mounds and shell heaps of that country. The volcanic materials above the foot-prints probably represent several distinct volcanic eruptions followed by deposits of silt. In one bed, apparently of clay and volcanic-ash, six and one-half feet above the foot-prints, many fossil leaves were found. Specimens of these are now in the museum, and their specific determination is awaited for with interest. While there can be no doubt of a great antiquity for these foot-prints, only a careful geological examination of the locality and a study of the fossils in the super-imposed beds will determine whether that antiquity is to be counted by centuries or by geological time.

He also exhibited a portion of the right side of a human underjaw, which was found by Dr. C. C. Abbott in place in the gravel, fourteen feet from the surface, at the railroad cut near the station at Trenton, New Jersey. It will be remembered that in this same gravel deposit Dr. Abbott has found numerous rudely made implements of stone, and that in 1882 he found a human tooth, about twelve feet from the surface, not far from the spot where, as he states, the fragment of jaw was discovered on April 18, 1884. Both the tooth and piece of jaw are in the Peabody

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Museum, and they are much worn as if by attrition in the gravel. That they are as old as the gravel deposit itself there seems to be no doubt, whatever age geologists may assign to it, and they were apparently deposited under the same conditions as the mastodon tusk which was found several years since not far from where the human remains were discovered. While there is no doubt as to the human origin of the chipped stone implements which have been found in the Trenton gravel, a discovery to which archæology is indebted to Dr. Abbott, the fortunate finding of these fragments of the human skeleton add to the evidence which Dr. Abbott has obtained in relation to the existence of man previous to the formation of the great Trenton gravel deposit.

The discoveries announced in Professor Putnam's note are of the utmost importance, and they could not have fallen into more cautious hands. There is no doubt that Dr. Flint is an enthusiast on the antiquity of man in Central America. In a recent volume of the Smithsonian Annual Report, he is said to have found a cave that had been filled, after its formation, by tertiary sandstone. Now, on the removal of a portion of this sandstone, carvings, rock inscriptions were found on the walls of the cave, showing that man had arrived at the stage of rock carving in Central America before the deposits of tertiary sandstone. It is a pity that this cave cannot be visited by Professor Putnam.

Dr. Abbott's discovery, on the other hand, is simply in a line with his other finds. If man's works exist in the Trenton gravels, there is no improbability that man's remains will be found there. Wisely has Dr. Abbott yielded his own geological notions concerning his finds to the judgment of those who have studied systematically the Delaware basin.

MEF-006 HUMAN FOOTPRINTS IN THE EOCENE

Flint, E.: American Antiquarian, 10:252-254, 1888.

As adverse sentence has been pronounced before the American Philosophical Society, Nov. 18, 1887, by my friend Dr. D. G. Brinton, on the antiquity of footprints found in a quarry near Lake Managua, and other locations, which was due to a misunderstanding of my letter, leading him to associate surviving eocene shells from another locality, eocene sand, on which the Tufas containing the footprints lie, permit me to reply.

An imprint was sent him, and one to Prof. Baird, and the sand on which they lay was sent separate to both parties; the bag of shells contained a slip, stating, "shells from Lake Giloa, or Jitua, whose entire beach is made up of them," which is six miles northeast of quarry, and considered as belonging to same horizon. This collateral evidence would aid in placing the geological age of the Tufas: as the shells were a new species, and with many others abundant near the old caves, on the southwest slope of the volcanic range, were covered with similar types spread over our northern Territories.

Of those here, not 4 per cent are existing species. The "scarphaca" is not represented among living forms. The same remark applies to many others included in those sent to the National Museum in 1878, private Nos. 187 to 289, still undetermined but older than those found in the "shell heaps" along the coast range, which was re-peopled long after; even these contain old shells, among them the "calistar," are abundant, and though not passing beyond the cretaceous formation, are common among those found in the Territories, while those found

near the caves, are much older and pertain to the eocene-tertiary merging into the miocene; there is no doubt that the cave dwellers used them as food, at the same time made the inscriptions of the sea monsters with uncommon accuracy, and some in relief. I was unable to copy one correctly without the aid of instruments, while their authors lying face upwards chisled them in rock.

That these old masters saw the first eruption, we now consider indisputable, they were near the foot of the volcanoes and on opposite sides, and with the animals of the time passed over it immediately when moistened by rain, leaving their imprints in the plastic mass that soon hardened and preserved them.

The four subsequent eruptions soon followed, shown by their barely perceptible seams. A repose followed of long duration, vegetation crept slowly over the volcanic debris. Forests sprang up; its repeated decomposition, mingled with the wash from the hills forming the clayey soil, streams carried the leaves and drift seaward or to the ocean bed.

Ages passed and again the pent-up fires burst forth, convulsing the earth, lifting the former accumulations to fall back in fragments that show us its mighty force; hills of the present coast range bulged up through the ocean debris, rolling it over caves and shells, sealing up these records for future use.

Eruption followed similar to the first in the series, covering of ashes falling after the cataclysm, which is nearly as hard as the tufas. The old craters burnt out, once more quiet reigns. Passing showers cool the desert waste, gradually filling old craters, storing water for those to come. Then a soil accumulates and exists to-day. The new hills to the southeast at the same time were fitting up in a similar way, afterwards peopled by a race, or descendants who escaped the convulsion, or came from the Cordilleras. They continued to feed on the shell fish they found, evidenced by the enormous "kitchen middens," accumulated along the coast. We look among these for shells found near the old caves. We rarely find one; others have been evolved. We see by their forms that the people who used and cast them aside, did so in pliocene times. We wander among hills not distant from them, finding their remnants dwindling, and finally disappearing; they, too, had passed away.

We pass over the hills and see the older ones adhering to the fractured limestone, following the streams where they have removed the old sediment that engulfed the caves, we find them, as they existed in remote times; we continue to the strip of land unmoved by the convulsion and find a cave filled with sandstone, not suddenly, like its neighbors, but soon after by the wash from their graves.

We remove the rock, and copy the records on the inner roof of these old men, faithful delineations of animal monsters and others objects or signs. Some are cut with sharp angles with great skill, indicating a people capable of protecting their feet as they walked over the tufas.

No skeletons of these monsters were found; one vertebrae was all that we could add to the shells, its diameter was about ten inches; it probably lies in some quiet corner with the shells, in that great storehouse left by Smithson for the diffusion of knowledge.

Nicaragua is too far removed to awaken scientific attention. Nevada can be visited by rail to inspect footprints of the cucula, while here we wander alone among the hills and vainly try to impress our convictions on others.

A Dordogne artist depicts on horn figures of a horse, whose estimated age is 250,000 years; here those on the cave roofs, on rocks underneath were formed long ere the old master of the Dordogne was born; his descendants cross the sea and claim the ancient races here, as wanderers from their fatherland; they forget that Noah's children took lessons from the old Egyptians, whose forefathers left this continent ere the children of Israel were born; here they made pyramids of earth, and there of stone.

But why speculate on the days and weeks of the aeons since man commenced

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his wanderings here?

In conclusion, for the fifth time, I try to make myself understood when I say that man's works were buried here in eocene times; that the first volcanic eruption containing the footprints lies on sand and other formations of that epoch, while his works are in close proximity with eocene shell beds, and were buried together. Now permits me to carry the mooted footprints, from Post Pliocene to their proper place, the Eocene.

If you have any doubts as a juror, give me the benefit of the doubts until other witnesses confront me.

MEF-007 THE AGE OF THE NICARAGUA FOOT-PRINTS

Anonymous; American Antiquarian, 11:120-121, 1889.

The subject of the Nicaragua foot-prints has been discussed during the past year. Dr. Earl Flint, our esteemed correspondent, was the first discoverer. He maintains that the foot-prints belonged to the eocene strata. Dr. D. G. Brinton, on the contrary, taking by Dr. Earl Flint's own testimony, makes out that they do not belong to the eocene, but were of a much more recent date. He submitted the shells which were found in the yellow sand to Prof. Angello Heilprin for examination. He thinks that the deposit is more nearly post-pliocene than eocene. The leaves which were discovered in the new look of the shells, are cited as proofs of volcanic forces, which at a modern date covered the human tracks. Another proof more conclusive to Dr. Brinton's mind is that the foot-prints indicate the use of sandals or moccasins. As to the genuineness of the foot-prints the wood-cut kindly furnished so us by Dr. Brinton will illustrate the point. Several specimens have been sent to the United States. Four of them are in the Peabody Museum. One of these has an appearance as if a sandal had been used; the others are impressions of the bare foot. The specimen sent to Dr. Brinton contains the impression of a left foot. The apparent length of the foot was eight inches, though the total length of the impression was nine and a quarter inches, the breadth at the heel three inches, toes four and a half inches. The greatest depth of the impression is two inches, being at the ball of the foot, the weight having evidently been thrown forward as in vigorous walking. The place at which these foot-prints were discovered is in Nicaragua, a region which is subject to earthquakes and where volcanic eruptions were formerly numerous. Some of them were on the slope of the Sierra de Managua, near the town of San Rafael. The present specimen was taken from a quarry near the town of Managua, 300 feet from Lake Managua.

"The volcano Tizcapa is about two and a half miles from the shore of this lake and in ancient times its molten streams found their way into the waters of the lake. Its eruptions were irregular and evidently long periods of quiescence intervened, periods long enough for the tufa beds to become covered with vegetation. The impressions are found on the first or lowest tufa beds." Dr. Flint says that the rock bound shores of this and other lakes are covered with inscriptions of which no tradition can be obtained. Seven well-marked beds of tufa are penetrated; next a deposit of clay, the soil of other times, containing plants, trees, leaves, then four more deposits, including pumice, sand-drift, tufa black sand, volcanic sand, fossil leaves, etc., and then come the foot-prints.

One point of inquiry would be as to the certainty of Dr. Flint's division of the strata. On this there is great opportunity for imagination to work and it will require very close observation on the part of skilled geologists and naturalists to decide upon the number of deposits and the age of each. The subject is at arm's length at present. Dr. Flint is the only observer on the spot, but the professors in the university at Harvard, Philadelphia, and the gentlemen in the National Museum at Washington have only the few stone slabs which have been forwarded to them to judge from. An argument for exceeding antiquity has been made from the relative length of the big toe and the second toe, but the specimen sent to Dr. Brinton gives no such impression; it is quite a modern-looking foot. There is no doubt of these being genuine human foot-prints; but the use of sandals would certainly contradict the idea of very great age. A race which wears shoes can not be assigned to the early stages of human culture.

Once again we see that early man could not have been sophisticated enough to even wear sandals. This is in agreement with the still-dominant hypothesis that the progress of the race was ever upward.

MEF-008 NICARAGUA FOOT-PRINTS

Flint, Earl; American Antiquarian, 11:306-311, 1889.

In the editorial for March, page 120, you ignored my answer published in the Antiquarian for 1888, which explicitly denies the shells as occurring in the yellow sands, on which the first tufa lies; they were found six miles to the northwest, and were only sent as a relative evidence of the age of the foot-prints.

The scientific examination of Professor Heilprin ought to have noted the difference between Pyrgula, and Pyruia shells of an entirely different genus. You say that Dr. D. G. Brinton, "from my own testimony, makes out that they did not belong to the Eocene." This he could not do except by subverting it, or entirely misunderstanding my letter. As soon as his pamphlet was received I wrote him to correct it, as it would spread an egregious error. Not doing this, I wrote you to do so, and you kindly complied. The Honorable Secretary of the Victoria Institute also promised to reprint it, to avoid the promulgation of any erroneous interpretation of what I most positively assert: "The leaves which were discovered and new look of the shells are cited as proof of volcanic forces, which, at a modern date covered the human tracks"; this paragraph is entirely new, and I can not interpret it. The shells were from lake Gilva, and as no leaves accompanied them, I call them survivors of Eocene shells---none can dispute me on this point. The foot-print that seems to have been protected by a sandal is from the southwestern slope, forty miles from the quarry. The fact that a savage should protect his feet from injury does not weigh with me. In deciding about my divisions of the strata made when the quarry was in full blast, from a smooth-cut face, and the removal of layers immediately over the foot-prints when the divisions were carefully noted, and a copy of the original sent you, I used no imagination to aid me.

The feet were arched, generally small; the big toe factor applies better to the flat-footed African, not to a race with a high instep---in the latter it is always shorter.

As for the Harvard and Washington Museums having only a few slabs to aid them, you forget what I said about the shells and leaves.

MEF--008 FOSSIL FOOTPRINTS

All closet-writers are at fault when they strive to place their opinions above those of the observer of natural occurrences; if his descriptions are not lucid, they should first ask him to explain, ere launching opinions diametrically opposed to his, founded on what he sees in seismic transformations, but which he can not paint in words so as to be understood, thus obliging them to investigate personally phenomenal occurrences, examine Nature's witnesses, and then if proofs are found, reverse his judgment: this is what we have often solicited.

At this point, Flint provided an abundance of geological detail about the area where the footprints were discovered.

Let us now turn to the mooted question of the foot-prints. In our long preamble note the caves and shells covered by tufa, resultant of the first eruptions; they are similar to those in the quarry, but thicker. Both had the same leaves and stems of twigs: the five former were broken and scattered by some seismic force, the latter were not; the former were re-buried by subsequent eruptions, whose counterparts accumulated in the quarry; after this we can ascertain at which particular time the Coast Range was elevated. In the quarry between the eruptions a layer of clay is seen overlying the first five prominent ones---this certainly was not thrown out of a volcano. We find this all over the district in places fifteen feet thick, while at the well spoken of, it is fragmentary; while the ashes overlying it in many road cuttings are seen in a stratified form, covered by the subsequent eruptions, with no signs of subsequent disturbance. Under the ash in the quarry we see fossil leaves similar to those in the rock mentioned, that gave us a solution of the problem: the clay had been gradually formed over the other eruptions, and bore trees---this would require a very long period. During this time the vegetation had changed, the large leaves on and under the first eruption, had been replaced by smaller ones of another type; those on the western slope had accumulated in the alluvial earth and settled in the sea sediment, afterwards lifted up as stated, forming material for the sandstone seen in the cave.

Man was here long prior to the upheaval of the Coast Range and the formation of the sedimentary rock mentioned. Among the shells found with stone he used as food, we have an enormous oyster, some eighteen inches in length, an undetermined species; we also recognize the *Callista* and *Pecten*, the latter is common in the "Kitchen Middens." The large specimen of oyster was not found among them, others resembling some figured by Meeks. These enormous accumulations of shells occurred after the upheaval.

The foot-prints on the first stufa were prior to the commencement of the geological period noted in the change of fossil leaves, from that eruption to the ash deposit.

The monsters depicted by the cave men passed away during this time, and were succeeded by the mastodon, whose glazed fossil bones are above the clay, and he became extinct here about that time; it is possible that continental changes here have repeated themselves in other regions. We only try to describe what we see around us.

Judging from the volcanic material still existing, it alone would make two or three high mountains. An equal portion must have gone seaward during all this time---how long it required to burn away in their entirety large mountains, I will leave the reader to guess. Four hundred years ago no tradition existed of the men who inscribed the rocky borders of the lakes filling the craters; how many years prior to this would it require to fill and allow a soil to form around their borders, fit to sustain man? This soil after the time of the conquest was as we now see it, covered with mounds of former occupants, showing repeated re-occupations.

The rock inscriptions traced from Bolivia along the summits of the Cordilleras are continued on to the confines of Mexico; their counterpart is seen on a small island in the lake, found buried by the eruption of "Zapatera." On the debris a subsequent race planted their idols and buried their dead; their descendants were found there at the time of the Spanish Invasion; their burials occur around the borders of the island, as we find in these beads of European origin, mingled with the bones enclosed in earthen jars; the forest was cut off, the soil washed into the lake in places; we removed part of it on the lower incline, to delineate the sacrificial excavations, octopus, and animals of different types. Since my visit these inscriptions are becoming imperceptible---this relative evidence is mentioned, proving as it does, some antiquity and no disturbance since the conquest.

Our assertion, that the older shells here are coeval with those of the north-west territory, aids us in showing that the seismic forces did their work in remote times; a notable proof there is seen in the Uinta Mountains, which after the older convulsions had ceased, were gradually elevated, and the strata cut through by a river, 24,000 feet. Our most notable one here is the San Andes cave, which marks the upheaval of the Coast Range, and the commencing formation of the sedimentary rock; since that epoch there has been only an accumulation of material as the old volcanoes burned out.

The facts upset the argument about sudden changes obscuring our judgment respecting the age of the eruption, the later ones, after the sixth, have not changed the face of the country to any extent; mere local ones are of no value---this must be seen in all its details, in order to be appreciated; and then no man born of woman, would place the foot-prints in postpliocene times.

This is the last time I shall endeavor to convince you and others of my assertions. Quot homines tot sententiae.

Any archeologist would have trouble digesting Flint's claim that mankind was so ancient. Yet, today, the age of man in America is being pushed back far past the 10,000 years asserted just a few years ago.

MEF-009 FOOTMARKS IN KENTUCKY

Allen, E. A.; American Antiquarian, 7:39, 1885.

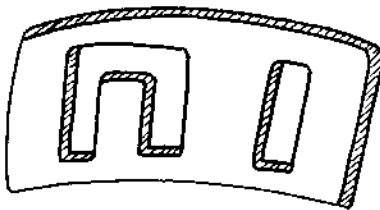
The following information was given me by Prof. J. F. Brown, of Berea College, Ky., who personally examined the locality. It may prove of some interest: Sixteen miles in an easterly direction from Berea, Ky., on what is known as Big Hill, in Jackson county, one of the spurs of the Cumberland Mountains, is a strata of carboniferous sandstone on the very summit. A wagon road now crosses it, and in ancient times a trail crossed the hill in the same locality. Recent removal of debris, consisting of dirt and leaves, exposed a new section of this ledge, and showed very distinctly marked in the stones a series of tracks. Two of these are the tracks of a human being, good sized, toes well spread, and very distinctly marked; one or more bear tracks, and two resemble the tracks of a horse of large size.

MEF-010 FOSSIL FOOTPRINTS

MEF-010 SINGULAR IMPRESSION IN MARBLE

Browne, J. B.; American Journal of Science, 1:19:361, 1831.

About twelve miles N. W. of this city, is a marble quarry owned by Mr. Henderson. It belongs to the primitive lime formation, and in this district forms the last of that series. The order in which the rocks repose are, commencing at Philadelphia, as follows; gneiss, mica slate, hornblende, talcose slate, primitive clay slate, a very narrow strip of eurite, and then the primitive lime rock, to which this belongs. The quarry has been worked for many years, in some places to the depths of sixty, seventy, and eighty feet. In the month of November last, a block of marble measuring upwards of thirty cubic feet, was taken out from the depth of between sixty and seventy feet, and sent to Mr. Savage's marble saw mill in Norristown to be cut into slabs. One was taken off about three feet wide and about six feet long, and in the body of the marble, exposed by the cutting, was immediately discovered an indentation, about one and a half inches long and about five eights of an inch wide, in which were the two raised characters. Fortunately, several of the most respectable gentlemen residing in Norristown were called upon to witness this remarkable phenomenon, without whose testimony it might have been difficult, if not impossible, to have satisfied the public, that an imposition had not been practised by cutting the indentation and carving the letters after the slab was cut off.



Singular impression in marble. (MEF-010)

MES-001 ANCIENT MOUNDS AT FLOYD, IOWA

Webster, Clement L.; *Nature*, 43:213-214, January 1, 1891.

After describing how the mounds were situated and the method of excavation, Webster notes the discovery of an unusual skeleton.

In making a thorough exploration of the larger mound, however, the remains of five human bodies were found, the bones, even those of the fingers, toes, &c., being, for the most part, in a good state of preservation. First, a saucer or bowl-shaped excavation has been made, extending down three and three-fourths feet below the surface of the ground around the mound, and the bottom of this macadamized with gravel and fragments of limestone. In the centre of this floor, five bodies were placed in a sitting posture, with the feet drawn under them, and apparently facing the north. First above the bodies was a thin layer of earth; next above this was nine inches of earth and ashes, among which were found two or three small pieces of fine-grained charcoal. Nearly all the remaining four feet of earth had been changed to a red colour by the long continued action of fire.

All the material of the mound, above and around the bodies, had been made so hard that it was with great difficulty that an excavation could be made even with the best of tools. The soil around the bodies had been deeply stained by the decomposition of the flesh. The first (west) body was that of an average-sized woman in middle life. Six inches to the east of this was the skeleton of a babe. To the north, and in close proximity to the babe, were the remains of a large, aged individual, apparently that of a man. To the east and south of the babe were the bodies of two young though adult persons. The bones of the woman, in their detail of structure, indicated a person of low grade, the evidence of unusual muscular development being strongly marked. The skull of this personage was a wonder to behold, it equalling, if not rivalling in some respects, in inferiority of grade, the famous "Neanderthal skull." The forehead (if forehead it could be called) is very low, lower and more animal-like than in the "Neanderthal" specimen.

This skull is quite small for an adult individual. The inner portions of the brow ridges are slightly prominent.

The distance from the lower portion of the nasal bone to the upper margin of the eye cavities is only four centimetres. A slight portion of this bone has, however, apparently been broken away.

The distance between the eye sockets at a point midway between the upper margin of the eye cavities and the lower portion of the nasal bone is two and three-fourths centimetres. One of the jaws, containing well-preserved teeth, was found. This was rather strong, but the teeth only moderately so. We were at first inclined to consider the strange form of this skull as due to artificial pressure while living, but a critical examination of it revealed the fact that it was normal, i. e. not having been artificially deformed. The teeth of the babe were very small, and the skull thick, even for an adult person.

The next skeleton was that of a man nearly six feet in height. The crowns of all the teeth had been very much worn down, some of them even down to the bone of the jaw.

As before stated, the remaining bodies were those of young adult persons, the skull of one of which was small for a fullgrown individual. No relics of any description were found with the human remains in this mound. Their burial appeared to be a very ancient one, the limestone fragments in the floor of the excavation being nearly if not all decomposed.

MES-002 SKELETONS

Aside from the common tendency of the time to denigrate Neanderthal Man, it is perplexing that such a skeleton should be found in North America.

MES-002 THE "OMAHA MAN"

Anonymous; American Anthropologist, 8:734-735, 1906

And now comes another "early man," this time from Nebraska, regarding which Messrs. E. H. Barbour and H. B. Ward, of the University of Nebraska, address the following communication to Science under date of October 27:

In a circular mound recently opened on a Loess hill north of Florence, near Omaha, Nebraska, various skeletal parts, and eight human skulls of a primitive type were exposed. The credit of the discovery belongs to Mr. Robert F. Gilder, of Omaha, who described and figured the skulls in the World-Herald, October 21.

That there was intrusive burial in this mound is apparent from the fact that the skulls found below a layer of burned clay are of a much more primitive type than those found above it. Already five skulls have been taken from the lower level, and three from the upper, and others are in evidence and will be dug out later. Those of the upper layer probably belonged to Indians of a later period, and may be left out of account for the present. The skulls of the lower layer are low-browed and inferior, the superciliary ridges being thick and protruding, the distance through the temples narrow, and the frontal eminences being as feebly developed as in Neanderthal man. The low arch of the skull is not the result of head-binding, but is normal and characteristic as is evidenced by five crania, two of which are fairly complete. Unfortunately the occiput is fragmentary or wanting in the specimens now at hand.

The skulls are brachycephalic, and extremely narrow in transverse diameter through the temples, expanding rapidly at the parietals. Length of skull 182 mm.; minimum breadth 93 mm.; maximum breadth 160 mm.

In shape and size the mandible agrees well with that of modern man, although the following marked differences are to be noted: the bone, particularly in the region of the symphysis, is far heavier, the muscular scars more prominent, and the third molar in each case is ground to the very gum, while the second and third are ground in a diminishing ratio. The canines are weak and scarcely distinguishable from the incisors, and the space between the molars and the base of the coronoid is wide.

The limb bones indicate a stature of six feet, the femora being somewhat stronger, and the humeri being somewhat weaker than might be expected. The femora, which are massive, manifest an interior curvature more pronounced than ordinary, and in cross section they appear triangular through the great development of the *linea aspera*, all muscular scars and tuberosities are noticeably prominent, the scar for *ligamentum teres* being elliptical in outline, deep and nearly twice as long as broad.

The skulls of the Nebraska man seem to be inferior to those of the mound builder, but for the present at least will be viewed as early representatives of that tribe [sic].

In corroboration are the flint implements or chips found associated with the skulls and bones, and the mode of burial. As work progresses a detailed illustrated report will be made.

MES-003 [LARGE SKELETONS FOUND WHILE MINING FOR COAL]

Anonymous; Nature, 28:180, June 21, 1883.

The Union Medicale of June 2 announces a discovery of the highest scientific interest, and which, if it turns out to be real, will show that prehistoric man is no longer a myth. On piercing a new gallery in a coal-mine at Bully-Grenay (Pas-de-Calais), a cavern was broken into containing six fossil human bodies intact--a man, two women, and three children---as well as the remains of arms and utensils in petrified wood and stone, and numerous fragments of mammals and fish. A second subterranean cave contained eleven bodies of large dimensions, several animals, and a great number of various objects, together with precious stones. The walls were decorated with designs of combats between men and animals of gigantic size. A third and still large chamber appeared to be empty, but could not be entered in consequence of the carbonic acid it contained, which is being removed by ventilators. The fossil bodies have been brought up to the surface, and five of them will be exhibited at the mairie of Lens; the others are to be sent to Lille in order to undergo examination by the Faculte des Sciences. Representatives of the Academie des Sciences of Paris and of the British Museum having been telegraphed for, are expected to be present.

S-004 PREHISTORIC PYGMIES IN SILESIA

MacRitchie, David; Nature, 66:151, June 12, 1902.

Under the above heading, Prof. G. Thilenius, of the University of Breslau, has recently (Globus, Bd. lxxxi. No. 17) made an important contribution to European ethnology. His deductions result from an examination of a quantity of osseous remains preserved in the Museum of Silesian Antiquities at Breslau, consisting of four groups obtained at different sites in the region between Breslau and the Zobten. They are, unfortunately, very fragmentary; but it has been ascertained that they are the remains of a number of persons of both sexes, all adult and all of very short stature. The mean height of one group is about 4 feet 8 inches (1.429 m.), of two others about 4 feet 11 inches (1.496 m.; 1.506 m.), and of the fourth about 5 feet (1.523 m.). With these Prof. Thilenius compares the remains of the Swiss pygmies described by Prof. Kollmann, of Basel, who estimates their height as ranging between 4 feet 5-1/2 inches (1.355 m.) and 4 feet 11 inches (1.499 m.), and comparison is also made with the similar remains found at Egisheim (in Lower Alsace, near Colmar), which, belonged, according to Herr Gutmann, to people whose stature ranged from about 3 feet 11 inches (1.200 m.) to something under 5 feet (1.520 m.). Further, the museum at Worms furnishes the remains of an individual of the estimated height of 4 feet 9 inches (1.445 m.). In all these cases, the bones show no trace of any pathological degeneration, and the consequent inference is that they represent a special race of low-statured men or dwarfs. Profs. Kollmann and Thilenius seem to prefer the term "pygmy" as most appropriate in denoting a special race, "dwarf" (Zwerg) being regarded as applicable to abnormal specimens of a race of ordinary size. Most writers, however, make no such distinction; and, indeed, "pygmy" is far from being strictly accurate when applied to people of 4 or 5 feet in height. Prof. Windle states that a people may be described as "pygmy" in which the average male stature does not exceed 1.450 m. (4 feet 9 inches).

MES-005 SKELETONS

Prof. Thilenius gives a wide range for the period in which these little people lived. While those of the Rhine valley are placed far back in time, some of the Silesian dwarfs are assumed to have been contemporaneous with the Romans and the Slavs, the most recent being placed at about a thousand years ago. But, before arriving at anything like a final conclusion on any of the questions relating to the mid-European pygmies, Prof. Thilenius desires a much greater accumulation of evidence in the shape of skeletal remains, and there is good reason to hope that this will be forthcoming in due time. Most of our information on the subject has been obtained within recent years, and fresh evidence can hardly fail to present itself to investigators in the future.

The above letter to Nature is included because of the frequent reference to dwarfs and other small races in myth and legend.

MES-005 FOSSIL MAN IN MEXICO

Anonymous; American Naturalist, 18:920, September 1884.

Dr. Mariano Barcena, director of the department of Geology and Palaeontology of the National Museum of Mexico, recently discovered the facial and mandibular parts of a human skull in a hard rock not far from the city of Mexico. The specimen was found in a hard siliceous limestone near the border of Lake Texcoco, at some elevation above the level of the water of the lake. Overlying the bed of limestone, is a lacustrine deposit, which is similar to that made by the present lake, and contains the same mollusca, etc. Whether the limestone be a still more ancient deposit of the lake, has not yet been determined by Dr. Barcena, but the overlying deposit indicates the former wider extension of its waters. It is also evident that since the entombment of the human skull, both deposits have been elevated several feet, and separated from the part now under the lake by a fault. This was probably accomplished at the time of the projection of an eruptive hill near the locality. Dr. Barcena, from whom the above statements are derived, will shortly describe the characters of this interesting specimen.

This discovery, like that of the Nicaragua footprints, could be interpreted as indicating the great antiquity of man in the New World. (See the MEF subsection.)

MES-006 [HUMAN REMAINS UNDER LAVA FLOW]

Anonymous; Nature, 44:438, September 3, 1891.

The last Bulletin of the Geographical Society of the United States contains an interesting paper on the curious discovery of human remains under the Tuolumne Table Mountain of California. Bones of men and grinding instruments were there found by Prof. Whitney, embedded in auriferous gravel under lava at the foot of the mountain. Remains of plants belonging to the Tertiary age, and the bones of extinct Mammalia, such as the rhinoceros of the West and the American mastodon, are also met with in the same strata. Pestles, mortars, and broken spear-heads are the most remarkable of the implements discovered.

SECTION MG: GRAPHIC ARTIFACTS

The graphic artifacts of ancient man that have survived the millennia are generally incised upon stone, hidden in caves, or somehow protected from the ravages of weather and the men who came after. Some graphic artifacts seem to be efforts at communication, such as glyphs, runes, etc. Other artifacts are more like scratch pads or memory joggers, such as the supposed lunar notation found on ancient bones in Europe. The majority of the graphic artifacts, however, seem to be products of the artistic urge. But premature conclusions must be avoided because we have no way to positively interpret the meaning ancient man may have attached to his symbols, drawings, and "art." The modern tendency is to be condescending and base interpretations on the assumption the ancients were superstitious, barbarian, and of low intelligence. Readers should be warned, on the other hand, that recent sensational literature often subscribes to radical interpretations for the Easter Island statues, the Nazca lines, and similar artifacts. No sides are taken in these sourcebooks, but an effort is definitely made to include anomalous material.

MGM Macroforms. Those graphic artifacts that can be appreciated best "in the large," as from an airplane. Included are the Nazca "lines," the leys or trackways, the Cerne Giant, and effigy mounds.

MGP Pictographs. Paintings, artwork.

MGS Symbols and notation. Cupmarks, spirals, crosses, all manner of signs. These may be simply series of scratches or arrangements of signs. Calendars and maps are included here. Also color codes.

MGT Statues, images.

MGW Writing. Glyphs, runes, script, hieroglyphics, "talking boards," the Ogham writing.

*This subsection not represented in Volume M1.

GRAPHIC ARTIFACTS

GM-001 THE CAMEL AND ELEPHANT MOUNDS AT PRAIRIE DU CHIEN

ewis, T. H.; American Antiquarian, 6:348-349, 1884.

While prosecuting archaeological researches in Vernon and Crawford counties, Wisconsin, lately, my attention was especially called to that part of your article on "Effigy Mounds," published in Vol. 9, of the Wisconsin Historical Society Collection, which treats of certain earthworks of that class, situated in Campbell's Coolie, not far from Prairie du Chien. The style in which your informant, Dr. Phene, treated them naturally created a curiosity which only actual examination could satisfy. I therefore visited this locality and made an instrumental survey of the best preserved of these remains---two so-called elephants. This place is two miles north of the center of Prairie du Chien and two and one-half miles east of the Mississippi river. There are three groups of effigies in the coolie proper; one at the mouth, one about one-quarter mile from Dousman's house (surveyed) and one near the spring, one-half mile off. I found the elephants to be the only figures with perfect outlines. In connection with them were one cross, three birds and twelve other mounds and embankments, but not worth surveying.

A camel at Campbell's Coolie might be somewhere on the surrounding bluff, for I do not believe that these "elephants" were the effigies Dr. Phene saw, but I rather think the "camel" was in some other coolie, as no one at Campbell's knew of any person having been there to see the groups I have just described. There are some mounds and embankments on the bluffs, but I could not find or hear of any effigy with them. People living a few miles further up, however, said that visitors in carriages had been seen one time in their neighborhood looking for such things. Nearly one mile west of these "elephants" is another ruined one, in a field near the Catholic burial ground.

It occurred to me that perhaps you might think drawings of these "elephants" plotted from my field-notes, worthy of the attention of your readers, and I therefore send you three diagrams herewith. Two are large scale plans (1:400) of the animal figures separately, the third is a little outline map, one-fifth the scale of the others (or, 1:2,000), showing the two creatures in their relative positions to each other, and to the slope of the contiguous hill.

These pictured outlines may be considered, I think, in the light of a trustworthy contribution to the material needed in the discussion of the subject of the co-existence of man and mammoth in this northwestern region; at any rate they are interesting subjects for speculation.

In my further travels I may meet with more such puzzles in antediluvian (?) zoology, in which case, if you desire, I will briefly notify you of the facts.

The "elephants" shown in the drawings are not particularly convincing. Neither has a trunk and could be virtually any animal if imagination were used. The largest is 137 feet long.

One does wonder though at the real purpose of effigy mounds. Like the desert figures of Nazca, they can only be appreciated from the air. They required immense labor---for what purpose? Just rituals?

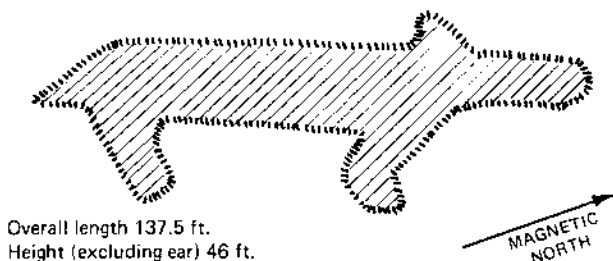
MGM-002 STONE SNAKES IN MINNESOTA

Allen, E. A.; American Antiquarian, 6:349, 1884

MGM-003 MACROFORMS

This is an interesting departure from the usual serpent mounds of earth found in North America. The serpent motif is, of course, found all over the world.

"There is a snake on top of Medicine Butte (near Pierre, Dak.) formed of stones about the size of a man's head. They are laid in two rows (varying in width apart to form a proper shape) from one to six feet, the whole being three hundred and fifty feet long. There are stones at the tail to represent rattles. They have been rudely carved. The eyes are two large red bowlders. Along the whole length, in the center of the snake, is a path where no grass was allowed to grow until last season. The Indians (Sioux) have now abandoned the Butte as a place of worship. There is about seventy or eighty acres of good land on the top of the Butte and most of it is covered with circles of stones that mark the graves of former chiefs."



Effigy mound of an "elephant" in Wisconsin. (MGM-001)

MGM-003 THE SERPENT MOUND OF LOCHNELL, NEAR OBAN

M., C. W.; Nature, 20:242, July 10, 1879.

I walked over yesterday from here to examine this for myself. I started with some feelings of doubt as to whether it was not one of those fantastic shapes naturally assumed by igneous rocks, seen through the spectacles of an antiquarian enthusiast. I came away quite satisfied that it is an artificial shape, designedly given, and deliberately intended to represent a snake. It partly closes the entrance of a singular little rock amphitheatre with a waterfall at the head (the north end of it), the Loch being to the southward. There is a raised plateau to the northward of the serpent, nearly square. The ground is apparently a rubble of gravel, stones, and dirt, such as is found in moraines. The head of the snake had been opened, and showed a quantity of stones with some indication of a square chamber in the middle.

I do not pretend to any antiquarian knowledge. The impression that it suggested to me, on the spot, was that a party had endeavoured to entrench itself, at the spot, but had been attacked before the entrenchment was complete on more than one face, and that the rampart was then converted into the snake form to commemorate either a successful assault, or the successful defence of an unfinished work.

I inclose you a sketch plan and elevation, of a very rough kind, which I made on the spot and have not retouched since, except by inking over my pencil marks.

Many serpent mounds portray the serpent swallowing something (often termed an "egg"). The symbolism is obscure, with different interpretations, such as a comet engulfing the moon, being common.

SYMBOLS AND NOTATIONS MGS-001

IS-001 CUPSTONES NEAR OLD FT. RANSOM, N.D.

ewis, T. H.; American Naturalist, 25:455-461, May 1891.

Apparently the earliest mention of cup-stones, in print, was in 1751, in a historical work on the Province of Brandenburg, by J. C. Bekmann. The author speaks of certain boulders there which have on them napfchensteine, or little-bowl-stones, as he terms them. Next, in 1773, there was found at Lynsfort, in North Britain, a druidical altar full of "rock basons," which was pictured in Camden's *Britannia*, 1789. From that time on, at intervals, first incidentally, then by purposed search, interesting discoveries were made until, so far as the rings were concerned, almost every country on the earth was represented. As regards the cups, their distribution has not yet proved to be nearly so widespread. Still they have been found in the British Isles, France, Switzerland, Bohemia, Austria, Northern Germany, the Danish Islands, and Sweden; but these are all the European countries known to possess them, apparently, according to the authorities. Flitting now eastward over vast kingdoms we meet with them again in far-off India. Here, in 1867, Mr. Rivett-Carnac found cup-cuttings upon the stones of the cycloliths of Nagpoor, and, shortly after, upon rocks in situ of the mountains of Kumaon, where, in one place, he found them to the number of more than two hundred, arranged in groups of apparently parallel rows. In the Kumaon region he also found ring sculpturing, which very much resembled that which is seen in Europe. Outside of these named countries, and North America to be mentioned further on, the world is a blank as regards cup-cuttings on rocks, so far as our present knowledge goes, or at least to the extent that I have been able to find recorded information of the same.

Although met with and described nearly a century and a half ago, as hereinbefore related, it is only within the last forty-five years that incised cups on rocks and stones have been particularly written about, either in Europe or in the United States, and speculative theories advanced concerning their origin and uses.

It was in 1847 that Messrs. Squier and Davis, partners in original research in the state of Ohio, brought their operations to a close by the production of the "Ancient Monuments of the Mississippi Valley," the comprehensive work which methodically displayed all that was then known of the antiquities of the great region implied by that geographical expression. In this book (on page 206) there is a description, with wood-cut illustration, of a block of sandstone which had been found in some unnamed Ohio mound. The stone weighed between thirty and forty pounds, and showed several circular depressions, evidently artificial, which our authors thought were used as moulds for the purpose of hammering thin plates of copper into small bosses of concavo-convex shape, such as had been often found. This is the prototype of the cup-stones of the western hemisphere.¹

Professor Daniel Wilson, of Toronto, in his "Prehistoric Man," (third edition, 1876, Vol. I.), also devotes several pages to the subject, and gives drawings of two cup-stones found, too, in Ohio. Of the first he speaks thus: "A cupped sandstone block on the banks of the Ohio, a little below Cincinnati. Others much larger were described to me by Dr. Hill," etc. The second one he describes as a "cupped sandstone boulder," found near Tronton [Ironton] in 1874. The author, in this work, considers that the use of these cups---everywhere, all the world over---was to grind the ends of stone implements, and that where they were accompanied by concentric circles and other devices the latter were no more than additions of idle fancy.

The late Professor Charles Rau, of Washington, D. C., seems, however, to be the first writer in the United States to bring forward and collate comprehensively in a special treatise the data relating to cup-stones on this side of the Atlantic, and to treat of their resemblance to those found in the eastern hemisphere. In his "Obser-

MGS-001 SYMBOLS AND NOTATION

vations on Cup-Shaped and Other Lapidarian Sculptures in the Old World and America" (1881) he² describes a few specimens whose characteristics are undoubted. The best of these are the "incised rock" in Forsyth County, Georgia; the sandstone block with cup-cavities discovered by Dr. H. H. Hill in Lawrence county, Ohio;³ and the sculptures on Bald Friar Rock in the usquehanna (sic) River, Cecil county, Maryland. Toward the end of the work Professor Rau gives the various speculations which have been published as to the purpose for which cup- and ring-cuttings were made, but states that after all that has been said concerning their significance in the Old World, he hardly ventures to offer an opinion of his own. Still he thinks that both kinds of sculpture belong to one primitive system, of which the former seem to be the earlier expression. Turning to America, he considers that here, as yet, the number of discovered cup-stones is by far too small to permit the merest attempt at generalization.

The author just referred to has shown in his book that true cup-stones have been found in the United States as far east as Connecticut and as far west as Illinois, but the fact that rocks having such incised work exist also far beyond the Mississippi valley has not yet, apparently, become known to the antiquarian world. It is therefore for the purpose of describing one so located that this paper is written.

The rock in question is situated in Ransom county, North Dakota, and, with others, it came under my observation in the middle of last August, at which time full notes were taken, and the pictographs to be described further on carefully copied.

Ransom county derives its name from a post of the United States army which was formerly maintained on the west side of the Snyenne River, in that part of its course known as the Great Bend. The top of the bluff on which the ruined fort stands is about two-hundred-and-fifty feet above the river. About one-quarter of a mile to the westward, on the north half of the southwest quarter of section 11, town 135, range 58, there is a large spring known as the "Fort Springs," situated in the bottom of a deep ravine, which is about ninety feet below the fort site. It is probably formed by a seepage from "Big Slough," which starts about one mile south and extends some fifteen or twenty miles in a southerly direction. The bluff immediately to the west of the ravine rises to the height of about one-hundred-and-sixty feet, and on the top, over a quarter of a mile away in a northwesterly direction, there is a small knoll which was called "Bear's-Den Hill" by the Indians. On the steep slope of the bluff, about one hundred yards north of west from the spring and fifty-three feet above it, there is a large light-colored granite boulder, on which there are a number of incised lines, cups, and other figures. The base of the boulder, which is firmly imbedded in the side-hill, is eight-and-a-half feet in length and four-and-a-half feet in width, and on the side next to the spring extends out of the ground about three feet. The top surface on which the carvings occur is irregular in outline, and is seven feet two inches in length, and from two feet six inches to three feet ten inches in width, sloping slightly towards the east. The particular figures seen upon it, and reproduced here in fac-simile as regards their forms, are explainable somewhat as follows, viz.:

Fig. 1---Apparently the horns of some animal.

Fig. 2---A nondescript. There is a similar figure on the quartzite ledge near Little Cottonwood Falls, in Cottonwood county, Minn.

Fig. 3---A crescent. This figure is often found along the Mississippi River in Minnesota, Wisconsin, and Iowa.

Fig. 4---A nondescript animal.

Fig. 5---A peculiar-shaped cross. There is one similar in form on the face of a cliff a few miles above Stillwater, Minn.

Figs. 6, 6. ---"Pins," so-called. There are two of the same shape on the quartzite ledge, among other figures, near the "Three Maidens," at Pipestone, Minn.

Figs. 7, 7, 7. ---Three pairs of cups, one set being joined by a straight groove,

and the other two by curved grooves.⁴

Figs. 8, 8, 8, 8.---Arc four long grooves with odd-shaped ends. These grooves are only about one-eighth of an inch in depth, while the ends are from one to one-and-a-half inches in depth.

Cups (not numbered), ---The cups or circular depressions are from about one-half-inch to nearly two inches in diameter, and one inch to one-quarter of an inch in depth. Some are perfect circles, while others are oblong in outline. There are thirty-four single cups and twenty-five cups that are connected with or intersected by grooves, making a total of fifty-nine positive cups, without considering the terminals of the four long grooves and others that are more doubtful. Where grooves intersect the cups an arbitrary line has been drawn on the illustration, in order to separate them and to more fully demonstrate the character of the designs. In every instance where this has been done the cups are well defined, but yet they cannot otherwise be fully shown on a tracing giving only surface outlines.

Within a radius of four hundred feet from the spring there are thirteen incised boulders of various sizes and shapes, the one here described being the largest and finest of the group. The pictures, etc., on five of the best ones were copied; the others having only slight grooves and a few cups were not.

On the bluffs on both sides of the ravine there are a number of ancient mounds of the mound-building period, one of which is located on the west side immediately above the spring.

There are other boulders at various places in the northwest on which these cup-like depressions occur, and they are also occasionally found on the face of perpendicular ledges and on the walls of caves, but in nearly every instance there are other incised figures on the same surface. It may be further stated that the cup-cavities as shown at the terminals of Fig. 5 of the illustration now given are also seen in connection with incised figures on rocks at these other localities referred to.

The cup-stones (large boulders or rocks) are not to be confounded with the smaller stones called "nut-holders" or "anvils," which are from two to twenty inches in diameter, one to four inches in thickness, and which have one or more slight cavities or pits on each face. These cavities average about one inch in diameter, and very rarely exceed one-half inch in depth, the average being one-fourth of an inch. These relics are found throughout the west and south along the streams and lakes, and the prairies are no exception to the rule. Still less should cup-stones proper be confounded with the large circular excavations in rocks found in various regions which have been used as mortars. Mortars are found in fields. The rocks may be ten inches square and upwards, and the cavities range from six to fifteen inches in diameter and from one to five inches in depth. They are also found on the upper surface of ledges and on the tops of very large boulders. In one place in this vicinity there are at least twenty-five mortars on two acres of land.

While the American cup-stones are similar in nearly every respect to those found in Europe and other portions of the globe, it would be the best policy to study them as an entirely separate class of antiquities, for in all probability there is not even a remote connection between the two hemispheres in this respect. After a thorough comparison has been made and the necessary links have been found, there will then be ample time in which to bring forward the facts to prove relationship. In the meanwhile, awaiting thorough exploration of the field, all such attempts, though interesting in a literary point of view, may be considered somewhat premature in a scientific one.

Since the above was written I have examined a book, just published, which treats of the same kind of ancient work. It appears nine or ten years after Rau's,

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and, so far as known to me, is the only general handling of the subject within this period. Its title is "Archaic Rock Inscriptions; an Account of the Cup and Ring Markings on the Sculptured Stones of the Old and New Worlds." It is of an anonymous authorship, but bears the imprint of A. Reader, London, 1891, and is a 12mo of only 99 pages. The writer is evidently one of the mystical antiquarians who, to speak figuratively, have their eyes continually turned to those ignes fatui the elusive and ever unapproachable ancient faiths---the Tree, Serpent, Phallic, Fire, Sun, and Ancestor worships---and delight in the search for analogies concerning them. As regards the cup- and ring-markings, he himself adopts the phallic theory for their origin. His little book, however, admirably fulfills the promise of its title, for it not only includes most that prior writers collected, but gives interesting facts not accessible or not discovered when Professor Rau wrote. The most striking piece of new information is concerning the cup- and ring-markings on the rocks in the environs of Ilkley, Yorkshire,---a new locality. Here the cups have been counted into the hundreds in all; many of them are connected by grooves.

As regards America, all that this new author finds---and probably all there is to find---are two articles in the American Naturalist. The first one is contained in the number for December, 1884, and is entitled "Rock Inscriptions in Brazil," by J. C. Branner. The author does not use the word cups at all, nor do his diagrams show any; he only mentions in his text certain "points or indentations," often arranged in parallel vertical lines, and portrays them in the drawings, where also single circles are shown, ---mostly provided with a central point. He found, however, "mortars" scooped out on the rocks by the river. The other article appears in the number for July, 1885, under the heading of "Ancient Rock Inscriptions on the Lake of the Woods," by A. C. Lawson. Neither does this writer mention cups, but his illustrations show concentric circles which have the usual central dot.

¹ Were the facts concerning the Teololingo rock, situated sixteen leagues southeast of Orizaba, Mexico, exactly known, it might with propriety take precedence here in the text of the Squier and Davis stone; for it was discovered in 1805 by Captain Dupaix, who said that on its surface were some circular holes of little depth. By reason of the dissimilarity of the published representations of it, however, Professor Rau (1881) thought that a proper doubt remained, not to be removed until the stone had again been examined and reported upon.

² In "Contributions to North American Ethnology," Vol. V., Washington, 1882.

³ This is the same as the "cupped sandstone boulder" already illustrated in Professor Wilson's "Prehistoric Man" (1876).

⁴ Sir James Simpson describes and figures an isolated stone near Balvraid, in Invernessshire, Scotland, which has five pairs of cups that are joined by straight or curved grooves.

See Plate XIV., 2, of his "Archaic Sculpturings upon Stones in Scotland," etc., Edinburgh, 1867. The same type occurs on boulders and slabs found in France, Switzerland, and Sweden. Similar figures also appear on early British coins prior to Cunobeline's time (A.D. 40), and on the French-Keltic coins of moulded bronze. See Plates LIII and LV of Waring's "Stone Monuments," etc., London, 1870.

MGS-002 CUP-MARKS

Anonymous; The Saturday Review, 56:662-663, November 24, 1883.

Ignorant people have this distinct advantage over scientific observers, that they are readily able to arrive at conclusions which are perfectly satisfactory to themselves on subjects which have been the battle-fields of scholars for centuries. Persons who believe in Pixies and fortune-telling have no hesitation in explaining, for example, the existence of mammoth remains in Western Europe as being traces of Noah's Flood; nor do they find any difficulty in accounting for the megalithic monuments which, to the mystification of archaeologists, lie scattered over every quarter of the globe. These huge relics are to them but "giants' beds," "Devil's tables," "old wives' lifts," "hags' couches," or Devil's arrows," and they leave to others the task of inquiring into the vexed question of their origin and of explaining their universality and meaning. These are points of great interest; but, when we pass from the stones themselves to the inscriptions which they bear, curiosity is still further excited. Any untutored savages might have reared up the stones; but none but a people possessing some sort of culture could have left their records on the hard sides of granite and limestone rocks. Some of these records vary in character with the districts in which they are found, as, for instance, the Ogham writing in Ireland; but there is one form of inscription, and that the simplest, which is almost as ubiquitous as the monuments themselves. In Europe, Asia, Africa, and America, in almost every country and under every clime, there are found on these ancient remains shallow, round, cup-like depressions, sometimes in rows, sometimes singly, sometimes surrounded by a ring or rings, but most frequently quite plain. Markings of the kind are found on Dartmoor and elsewhere, and are beyond question due to the action of atmospheric forces. But these may, as a rule, be distinguished from the artificial marks by the absence of certain characteristic surroundings which generally accompany those which, in the opinion of many, have been formed by the hand of man. Whatever may have been their motive, the cup-markers showed a decided liking for arranging their sculpturings in regularly spaced rows; not unfrequently, also, they surrounded them with one or more clearly cut rings; sometimes, again, they associated them with concentric circles or spirals, and occasionally they unconsciously proclaimed their artificial origin by carving them in spots beyond the reach of atmospheric influences, such as the interiors of stone cists or of dwellings. But if there is thus a sufficient distinction between those which are natural and those which are artificial, it by no means follows that there may not have been some distant connexion between the two, and that the depressions worn by wind and rain may not have suggested the idea of cup-markings to those who first sculptured them.

It has only been of comparatively late years that these marks have attracted particular notice, but when once the attention of archaeologists was drawn to them their constant occurrence under every change of longitude and climate became apparent. The British Isles are peculiarly rich in these markings. In Banffshire, Invernesshire, Perthshire, Dumfriesshire, and from Lancashire, Cumberland, and the Isle of Man to Kit's Coty House in Kent and the Channel Islands, they are repeatedly found. In America, France, Algeria, Circassia, Switzerland, and Palestine they have of late years been also recognized, and in India some particularly interesting specimens have been brought to light by Mr. Rivett Carnac in the Kumaun Valley (*vide Journal of the Royal Asiatic Society of Bengal, 1877*). In the neighbourhood of a temple, on a rock overhanging the stream, Mr. Rivett Carnac tells us he noticed marks which, on being brushed clean of the dust and dirt which covered them, proved to be a number of cup-marks, some arranged in rows of odd and even numbers, others in varying shapes and in numerous "combinations and permutations." This is as far east as they have hitherto been discovered by modern archaeologists. But the description given of them in Mr. Rivett Carnac's paper, and the diagrams which illustrate it, suggests to M. Terrien de la Couperie the idea that the "River Drawings" discovered by the

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Chinese Emperor Fuh-he (B. C. 2852-2737) on the banks of the Ho, and upon which he is said to have founded the diagrams of the Book of Changes, were similar marks. A comparison between these, as they have been handed down by tradition, and those described by Mr. Carnac confirms this surmise.

The Chinese legend says that on the occasion of Fuh-he's visit to the banks of the Ho "in the 'grass-springing' month, during the days when the rain descended, [the men of] the Lung-ma [tribe] brought drawings," and presented them to him. These drawings, we are told, consisted of "round starlike" marks arranged in rows; and that when forming from them his famous eight diagrams, he represented the rows consisting of odd numbers by straight unbroken lines, and those by even numbers by divided lines. As in all ancient legends, the story varies in the pages of different authors. Sometimes it is Hwang-te (B. C. 2697-2597), who, after having fasted for seven days, is presented on the banks of the Sui-kwei river with drawings consisting of "plain marks, vanda leaves, and red writings." At other times it is Yaou (B. C. 2356-2255), who builds an altar at the junction of the Ho and Lo, and who has there laid before him "a cuirass" bearing inscriptions. But whether it be Fuh-he, Hwang-te, or Yaou, the marks are always described as having been brought to their notice on the banks of rivers, and generally in connexion with altars or some sacred spots. Not only thus do the shape of the markings and form of the inscriptions agree with those observed by Mr. Rivett Carnac, but the localities in which they occur are precisely similar. In Kumaun Valley and elsewhere in India the marks are invariably found in the neighbourhood of temples, of hillside altars, or of burial-grounds. Those particularly described by Mr. Rivett Carnac occur on a shelving rock overhanging a stream near a temple of Mahadeo. In the small space of fourteen feet by twelve feet there are no fewer than two hundred of these mark arranged in lines and in every possible combination. Among them also are examples of every known variety of the sculpturings. There are cup-marks pure and simple, then again cup-marks surrounded by a ring or rings, and yet again others surrounded by a ring ending in a groove forming together the shape of a jew's-harp. When questioned as to the origin of these sculpturings, the natives declared their belief that they were the work of either the giants of old or of herdsmen, while others attributed them to the Pandus, an ancient people, who, like the Picts in Scotland and P'anku in China, are supposed to have been the architects of every ancient monument in India which is without a recognized history. Mr. Rivett Carnac throws out a suggestion that they may be the writings of a primitive race, and points out that the combinations in which they occur are sufficiently numerous to answer the requirements of writing.

In Palestine and the country beyond Jordan some of the marks found are so large that it has been supposed that they may have been used as small presses of wine or as mortars for pounding the gleanings of wheat. But there is an objection to these theories, as accounting for the marks generally, which is fatal to them. To serve these purposes, the rocks on which the marks occur should be in a horizontal position, whereas in a majority of cases all over the world the "cups" are found either on shelving rocks or on the sides of perpendicular stones. This renders worthless also the ideas which have at different times been put forward, that they may have been used for some sort of gambling game or as sun-dials. A Swiss archaeologist who has lately devoted himself to the question believes that he has recognized in the sculpturings under his observation maps of the districts, the "cups" indicating the mountain peaks. In the same way others have thought that similar markings may have been intended as maps or plans pointing out the direction and character of old circular camps and cities in their neighbourhood. But if any such resemblances have been discovered, they can hardly be other than fortuitous, since it is difficult to understand how rows of cup-marks, arranged at regular intervals and in large numbers, could have

served as representatives either of the natural features of a country or of camps and cities. But a closer resemblance may be found in them as maps, if we suppose that they were intended to represent things in the heavens rather than on earth. The round cup-like marks are reasonably suggestive of the sun, moon, and stars, and if only an occasional figure could be found representing a constellation, some colour might be held to be given to the idea; but unfortunately this is not the case. Nevertheless, the shape of the marks has led many to believe that they are relics of the ancient sun-worship of Phoenicia, and that their existence in Europe is due to the desire of the Phoenician colonists to convert our forefathers to their faith. But there are many reasons for regarding this theory, though supported by the authority of Professor Nilsson, as untenable. The observations of late years have brought to light cup-marks and megalithic circles in parts of Europe on which a Phoenician foot never trod; and it is a curious circumstance that in those portions of the British Isles most frequented by these indefatigable traders there are fewer traces of these monuments than in the northern and inland districts, which were comparatively inaccessible to them. We know also that the early Phoenician travellers belonged to the bronze age, and we should therefore expect to find bronze implements in the tombs marked by cup sculpturings if these were carved either by the Phoenicians or their disciples. But, as a matter of fact, the only implements found are of wood, horn, and polished stone.

But there is yet another reason for supposing that the cup-carvers belonged to a period far anterior to the arrival of the Phoenicians in Britain, and that is that the markings have never been found in connexion with any shape or form of letter-writing. This one fact, in the face of the acknowledged tendency of people of every age and clime to inscribe characters and letters, when they possess a knowledge of any, on stones and rocks, is enough to prove that these rock-carvers were ignorant of the use of letters. Thus people who accept the theory that the marks are, at any rate in some cases, artificial, are carried far back in the world's history, possibly to a time when the dolicocephalic people, whose remains are found interred in long barrows surrounded by stone implements, were the occupiers of the British Isles. But whoever these carvers were, and whenever they lived, it is beyond question that for considerable periods they must have inhabited almost every known country in the world, "from China to Peru." And it is the difficulty of fixing the age in which they flourished which gives to the identification of the marks shown to Fuh-he its special interest. Here we have a date which enables us to trace back the existence of similar marks to the twenty-ninth century before Christ or thereabouts. This, in conjunction with the general history of the sculpturings, still more completely disposes of the theories that they owe their origin to the sunworshipping Phoenicians or to people of later times. As to their meaning, it will be seen from what has been said that no satisfactory explanation of it has been offered; and the Chinese legend, therefore, which states that an old man told the Emperor Yaou (B. C. 2356-2255) that they were "records of the years of the Emperors," may fairly claim an equal bearing with the rest. It is further curious to observe that, while mention is made in the Chinese record of representations of vanda leaves having been found in conjunction with the marks, Mr. Fergusson points out that a palm-leaf or fern occurs conjoined with cup-marks at New Grange in Ireland; though how, he remarks, "a knowledge of an Eastern plant reached New Grange is by no means clear."

Another possible explanation of the cup-marks is that they might be tally-marks used in celestial observations, perhaps like bone markings and even Stonehenge's Aubrey Holes.

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The use of letters in writing is always assumed to be a significant step forward in the history of mankind. This may be untrue, for the effective use of glyphs and abstract symbols in communication may indicate an extremely high level of memory (and, by inference, intelligence).

MGS-003 CURIOUS MARKINGS ON STONES IN SCOTLAND

Anonymous; Nature, 126:743, November 8, 1930.

The Glasgow Herald of Sept. 17 contains an article by Mr. L. MacLellan Mann describing the markings on some stones at Langside and Cleuch, near Glasgow. The markings on the two stones are nearly alike, consisting of series of rings, arcs, and cup-like depressions. Mr. Mann claims that these have astronomical significance; some of the groups of cups are shown to resemble the Sickle in Leo and (more doubtfully) a star-group in Scorpio. He further claims that he can identify records of ancient eclipses; it would, however, need a fuller explanation of his method to induce astronomers to accept his claims in full. He states that he identified the date of a recorded eclipse as B. C. 2983 March 28* Gregorian reckoning from the stone itself, and afterwards found by consulting astronomers in Berlin that there was a total eclipse on that date, the track of totality passing over or near Glasgow. The writer of the present note has verified this latter fact independently, making use of the new-moon tables by the late C. Schoch that are contained in "The Venus Tablets of Ammizaduga" (Langdon and Fotheringham, 1928). These tables make use of the latest values of the solar and lunar accelerations; but there is of necessity a considerable margin of uncertainty in computing the tracks of very early eclipses.

.....

Mr. Mann claims to have found similar records of still older eclipses; thus he refers to one in New Mexico of the date B. C. 3457 Sept. 5. It would, however, be well for him to make the full case for the 2983 eclipse accessible to astronomers before asking them to consider these more remote ones.

*Mr. Mann gives Mar. 27, but 28 appears to be correct.

More recent studies---those of Alexander Marshack in particular---markings on ancient bones have been construed as notations of astronomical observations. The "markings" above may be in the same category.

MGS-004 THE CROSS IN AMERICA

Anonymous; American Antiquarian, 10:292-315, 1888.

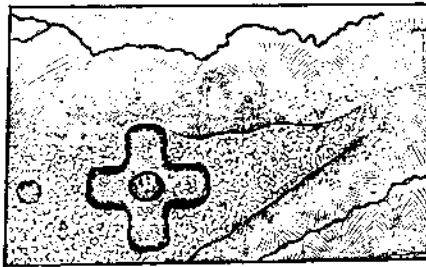
This very long article will not be reproduced in full. Since it is essentially a compilation of various uses of the cross motif in America, a few of the best examples should suffice here.

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Among the many surprises which the conquerors of Mexico experienced, the greatest was when they discovered the cross in the midst of the heathen temples of this far-off land. Their first explanation was that St. Thomas the Apostle, who was reputed to have been a missionary to India, had also made his way to America, to here introduce the Christian symbol. As they continued to notice it and learned of the human sacrifices which were offered and other cruelties which were practiced, they concluded that it was the work of the devil; that he had taken this symbol of peace and had made it sanction the most cruel atrocities, and thus had deluded the people and led them to their own destruction. We do not wonder at the indignation of the priests when they discovered this symbol associated with so cruel practices, for they were ignorant of the real history of the cross. The cross is a pre-Christian symbol, and had existed in Asia long before the history of Europe began. It was an instrument of punishment in the days of Christ, and it was only because so innocent and holy a being as our Savior was crucified upon it that it became sacred to Europeans. Were we to look upon it as it existed in Asia before the days of Christ and as it existed in America before the time of the discovery, we should better understand it as a symbol. We shall in this paper consider it in that light. We shall endeavor to disassociate it from pre-conceived ideas and to place it before ourselves as any common symbol, having no more sacredness in our eyes than the earth circles, the stone relics, the Mexican pyramids, but an object of study like them. We must acknowledge its prevalence throughout the continent, and shall probably be led to the conclusion that it was a symbol of nature worship, very much as the circle, the crescent, the square and other figures were.

The cross as a sun symbol or weather symbol is the subject of this paper. We are to show that it was so used. It was one of the symbols of sun worship.

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Aerial view of a cross in Pickaway County, Ohio. (MGS-004)

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There is another structure which shows that the Mound-builders were familiar with the figure of the cross and that they embodied it in their earth-works. It has been described by Squier and Davis in their "Ancient Monuments". The work here figured is found near the little town of Tarlton, Pickaway County, Ohio, in the narrow valley of "Salt Creek," a tributary of the Scioto river, eighteen miles northeast from Chillicothe, on the great road to Zanesville. In position it corresponds generally with the remarkable work last described though wholly unlike it in form. It occupies a narrow spur of land at a prominent point of the valley; its form is that of a Greek cross, ninety feet between the ends, and elevated three feet above the adjacent surface. It is surrounded by a slight ditch, corresponding to the outline of the elevation; in the center is a circular depression, twenty feet across and twenty inches deep. The sides of the cross correspond very nearly with the cardinal points. Immediately back of it is a small circular elevation of stone and earth, resembling that in connection with the Granville effigy and denominated an altar in the description of that work. Several small mounds occur near by; and upon the high hill, a spur of which is occupied by the cross, are several large mounds.

The relics which exhibit the symbols of sun worship will next engage our attention. There are many such in all parts of the country. We shall at present speak of those which are found only among the mounds. Mound-builders' relics may be divided, according to the material of which they are composed, into several classes. First, the inscribed shells; second, the ornamented pottery; third, the carved stone specimens. We shall dwell mainly upon the shell gorgets or inscribed shells.

(1) First among these are the shell gorgets which contain circles. Descriptions of these have been given by various authors, but all agree in making the figures upon them symbols of the sun. The figures represent a single dotted circle in the center, around which are placed three crescent-shaped figures arranged in the form of a wheel; outside of these are several dotted circles arranged in a band, which surrounds the crescent wheel, the number of the circles varying from four to six. Outside of these is still another band, which is filled with dotted circles, varying in number from twelve to fifteen. Scattered over the whole field there are small dots which have been punctured into the shell. Here then we have a complicated sun symbol. A central sun, three moons, which are supposed to rule the year; next, the suns, which represent the seasons or the divisions of the year; next, the suns or circles, which represent the months or divisions of the seasons; next, the stars or dots, which possibly represent days. We are reminded by these gorgets of the sun circles of Mexico, which always have the sun symbol in the center and the symbols for the season arranged in circle around the center. How it should happen that these rude shell gorgets should have symbols so similar to the circles and symbols on the highly ornamented calendar stones of Mexico is a mystery. The fact gives rise to many conjectures. (a) Either the Mound-builders were a degenerate race from the same stock, or (b) they borrowed ideas from the Mexicans and embodied them in this rude way on shells, or (c) there was a transmission of thought from a primitive time when all were together; the Mexicans having added to the simple rudiments all the elaborate and complicated symbols which have grown up with their increased culture and civilization. There is one lesson to be learned from the analogy. Sun worship existed in different stages throughout the country. The symbols or the gorgets marks the lowest stage, while those on the calendar stone marks or of the higher stages. (pp. 207-209)

Many other authors have noted a strong Mexican influence in the works of the Mound-builders.

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MGS-005 THE ESPERANZA STONE

Older, Charles F. : Scientific American, 103:196, September 10, 1910.

Many years ago a strange stone resembling a meteorite fell into the valley of the Yaqui, Mexico, and the sensational story went from one end to the other of the country that a stone bearing human inscriptions had descended to the earth.

Hundreds visited the place, natives made a pilgrimage to it from all over Sonora, and the stone, called the Esperanza, became famous in its way, and many of the inhabitants believe that it is a message from heaven, and demand that it be translated.

The stone was found by Major Frederick Burnham, of the British army, the famous scout of the Boer war, and not long after he invited the writer to visit it, and endeavor, if possible, to decipher its story.

We left Los Angeles in April, and in a day and a half reached Noales. A day's trip took us down the great valley to our headquarters, the fine adobe of the Rio Yaqui Rod and Gun Club, located at Esperanza.

We started out with a Yaqui driver to hunt for the stone the following day, going south or east of Esperanza. Major Burnham had no marks, yet he located it with ease, and I soon found him standing by the alleged meteorite. In all the delta, three thousand square miles of which I rode over, in various directions, I did not see a stone or rock of any kind, hence the sudden view was striking of a big black pseudo-volcanic rock standing buried to half its size in the sand.

Major Burnham had his Yaquis dig out the dirt about the stone, so that it was easy to examine it. It impressed me as an ancient find. The soil line half way up was very distinct, and it had the mellowing tint, the rounding of the edges, that could only come in a long time.

The stone was a brown igneous rock, its longest axis being about eight feet, and on the eastern face, which had an angle of about forty-five degrees, was the deep-cut inscription, and as I glanced at it, the Mayan Codex flashed into my eyes, as I recognized some of the familiar symbols of this ancient record of Yucatan which has puzzled the wise men for years.

We had taken some flour paste with us, and outlined roughly the deep marks for the photographer, but omitted several of importance. The location was a singular one, being five or six miles from the Rio Yaqui and on what was doubtless the highway from south to north. In the soil thrown up by the men I found a number of pieces of pottery, parts of broken ollas, suggesting that those who had made the inscription, cutting it deep in the stone, must have brought water in them from the Yaqui, as the work with stone implements must have taken days or weeks. What the inscription means is of great interest. Major Burnham, who discovered the remarkable gold ornaments in a granite ruin of a remote civilization in Rhodesia, Africa, and explored that continent and Mexico, agreed with me as to the Maya suggestiveness; and I can only submit my own deductions, with the hope that they may aid some professional ethnologist in solving the riddle. I assumed the hypothesis that as there had been a high civilization in Yucatan and Guatemala in the past, shown by the writings and antiquities of the Mayans and later Mexicans, such a people must have been dominated by the spirit of exploration to the north; and as the stone is on a natural line of march from the south to the north, I assume that this is a record or report of some ancient people, probably Mayas, telling to the world and those who might come after, that they had reached the big river which to-day bears a similar name, the Maya and the Yaqui. They doubtless chiseled on the rock a picture of one or two of their many gods, the time of arrival, and some emblem indicating who

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they were.

Over this delta hundreds of expeditions have passed in the last thousand year migratory bands, the ancestors of the Pueblos and others, and in the sixteenth century began the Spanish invasion of what is now New Mexico and Arizona, the search for the so-called "seven cities." Among the first was that of Nuno Guseman, who, while Cortez was in Spain, organized an expedition for the exploration of the countries to the north.

In 1538, two friars reached the Gila. Many expeditions followed. All crossed a portion of the very heart of the forest of the Rio Yaqui, and among the legends and folklore of the natives of to-day are suggestions and memories of the gallant men, mounted on strange animals, bedecked in armor, who, pressing north, passed unknown the richest mines in the world in their search for gold.

Old Yaquis living in the Bacatete Mountains to-day have a legend that among the wild hordes who came up from the south were some who "cut signs on rocks," who left a message of discovery, or arrival, a notice possibly of water in abundance, a rich land, or a consecration to the gods, a legend interesting in connection with the inscription.

Assuming that the stone carvings are of Mayan origin, what is the evidence? The inscription faces the east; the strange figure on the left is perhaps one of the many gods, and is characteristic of the strange figures on the Mayan codices, or it may be a native picture. Beginning at lower left extremity of the inscription is the tail of a snake, and the body is traced entirely across the stone, ending at the left hand of Major Burnham, who stands by it in the photograph. The snake was a Mayan god. Leaving this, the next figure to the right is a circle within a circle. I find this on the original Mayan manuscript known as Codex Cortesianus, published in 1882. This codex is supposed to represent the Mayan gods of the four cardinal points, and the circle within a circle is Muluk, the sixth day. The figure following along to the right resembles the figure 6, and suggests Kan or south of the codex. Next to this is a period or dot, a common numeral on the codex; then we come to the striking inverted scroll which I find on the Mayan codex, known as the "Dresden," copied in the United States Government Report of 1884.

There is reason for supposing this to indicate water, to the Aztecs at least, and I find it on many beautiful Tusayan water jars in the Smithsonian collection, and repeatedly on Tusayan water bowls.

Following the double scroll to the right is another figure somewhat like the 6. On the top of the stone is a cutting resembling a pair of glasses or two eyes. This is a Mayan codex symbol.

The dots and dashes found on the Burnham rock---two parallel lines near the scroll and two above---may be a part of the snake, but they are shown on the Dresden Mayan codex as numerals. Thus, one dot was one, a straight line and a dot, as six, a straight line and two straight lines, as seen near the big volute, indicates ten. Just above the big inverted scroll is a diamond with a line in the center, a symbol I find on the Dresden Mayan codex.

It is impossible in this brief space to go into an elaborate investigation, but I think I have shown at least that most of the symbols are Mayan. All appear in the famous Mayan codices or calendars since the time of the discovery of Yucatan. The conclusion is that ages ago a Mayan expedition passed this way, within two miles of Esperanza, Sonora. They left a record of their travels on this rock. The left (a common feature of Mayan codices) is a picture representing some feature of the trip. It may be an animal, the big tail suggests the armadillo, or it may be a god. The snake may be the god under whose protection they were; the double inverted cone suggested the discovery of two big rivers---a striking feature of the region---the Maya and the Rio Yaqui, or merely the Swastica sign. The two lines indicate possibly distance, while the other symbols are the cardinal

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points relating to the year---the sixth day, Muluk---and other data considered of importance. This is what the Burnham stone may mean. What it actually does mean, remains for the scientific men of the world to decide, but Major Burnham and myself are committed to the romantic hypothesis that this is the message of a forebear of the Mayas, some ancient warrior of the long ago, some knight who fought his way to the land of the Yaquis, who brought a great rock down from the mountains and placed upon it the seal of Mayan conquest.

I submitted the photograph to the Field Museum and the Smithsonian and one or two others, and to my surprise the reply was that they could make nothing out of it. I venture to say, even as a layman, that had I the time, I could translate the inscription.

Although perhaps not important here, meteorites have often been objects of reverence.

MGS-006 ROCK INSCRIPTIONS IN BRAZIL

Branner, John C.; American Naturalist, 18:1187-1192, December 1884.

Petroglyphs exist in South America in great profusion, just as they do in all other continents. Only the more interesting accounts are selected for the Sourcebooks. The Brazilian petroglyphs described below have strong astronomical overtones.

In 1876 I visited Aguas Bellas, a small town in the interior of the province of Pernambuco, and about a hundred miles from the coast, for the purpose of examining localities said to contain the remains of extinct mammals.

The fossils were found at and in the vicinity of a cattle ranch known as Lagoa da Lagea, eight leagues east of Aguas Bellas. During the time spent at this place I learned of several rocks in the vicinity bearing inscriptions which, it was said, no man could read. I took time to visit the most convenient of these localities and to make careful drawings of the markings, the characteristic ones of which are here represented.

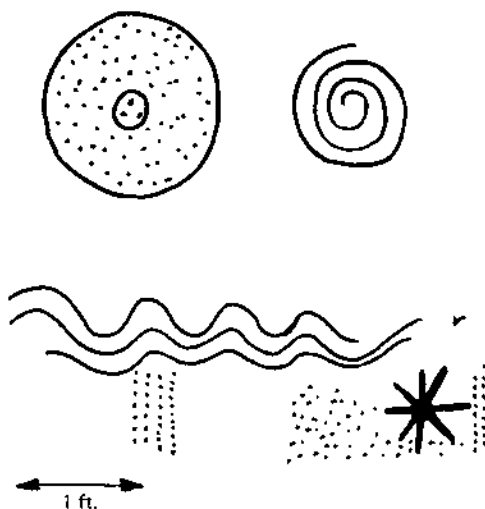
The first place visited for this purpose was a small farm about a league from Lagoa da Lagea, known as Cacimba Circada. The rock found at this place, together with its inscription, is shown at k (Plate xxxiv). This rock is a gneiss boulder of decomposition, about 10' x 6' x 6', lying upon the bed rock near the Rio Garanhunzinho. On the right, as one faces the inscription, is an asterisk a foot in diameter, made by four lines crossing each other at equal angles, while the remainder of the inscription on the left consists of three rows of marks or indentations that run down from near the top of the rock about two and one-half feet to where a portion of the block has split off from the lower left corner, probably carrying away part of the inscription. It is impossible to determine the exact number of these points, for some of them, especially those next the top, have become very indistinct through the weathering of the face of the rock. The inscriptions appear to have been made by pecking with stone implements, and in the case of the asterisk the stone was rubbed up and down the line until the furrows were well polished. After being ground out these points and lines were painted, the color now having a dull red or brown appearance.

The next place visited was Pedra Pintada (painted stone) which is located upon a stream (during the rainy season) taking its name from the marked stones---Rio da Pedra Pintada. It is said to be ten leagues from Aguas Bellas, twelve from Garanhuns and nine from Papacaca. There are here about forty designs engraved,

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and part of them both engraved and painted upon the large blocks of gneiss on the banks, and upon the flat smooth rock in the dry bed of the stream. There is a cascade about twenty-five feet high just here, and at the foot of it a pot-hole, now filled up, which is about fifteen feet wide by as many deep, and to the presence of which these inscriptions are possibly due, as I shall show. The forms of the inscriptions are shown in the figures, which are drawn to scale, and I need not describe them in detail. Figs. a, b, c, d, e, f, r and s are engraved on the bed rock of the stream above the cascade. These are not painted, and if they ever were, the paint has been washed off by the stream charged with sand and gravel. Many of these are becoming indistinct, some of them have almost entirely disappeared, while others have doubtless disappeared altogether. The concentric chipping of the rock, so common in the tropics, has also removed some of the inscriptions both in the bed of the stream and upon the banks.

The engraving appears to have been done like that at Cacimba Circada, by pecking and grinding with stones having thin rounded edges. After being thus polished these marks were painted, the color now showing as a dull red or brown. In some cases the points and lines are combined as is shown in e and f. The arrange-



Brazilian rock inscriptions with astronomical overtones. (MGS-006)

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ment of points in parallel vertical lines is rather frequent, occurring several times here, as well as at Cacimba Circada (Fig. k), and at Sant' Anna. There are several such rings as that shown at e, one of them having thirty-four points instead of thirty-six, while others are broken, or the points are too indistinct to be determined. There are two asterisks of eight rays, one associated with other markings and another one independent, while still another asterisk has twenty rays. The only figure that seems to be intended to represent anything is Fig. r, which appears to be a rude representation of a spear-head. Part of Fig. a might be supposed to represent a fish, but I fancy that whatever resemblance there may be is accidental. The resemblance between some of these designs and some given by Professor Hartt from the Amazon region is noteworthy, especially that of the spiral shown in h and that of the circle with the point at the center, such as are shown at j.

Returning from Aguas Bellas to the Rio Sao Francisco by way of the village of Sant' Anna, in the province of Alagoas, at half a league from this latter place I found the figures shown at x inscribed upon the side of a large gneiss boulder of decomposition. These figures are both cut and painted, and have the same dull red color as those at Pedra Pintada. There are other marks upon the vertical faces of this and of the other boulders of the group, evidently made by the same hands. These are simply polished spots varying in size from one to two feet in diameter. They are, for the most part, nearly round, but some of them are oblong, and none of them are more than about a quarter of an inch in depth---most of them not so deep, and are all painted. The stones upon which these inscriptions are made, as has already been stated, are gneiss boulders of decomposition, about a dozen in number, from six to twelve feet in height, and are grouped together upon the summit of a little hill of solid gneiss, as shown in the accompanying sketch.

The inscription x is upon the largest and most prominent of these boulders, while many, though not all the others, have polished places upon their sides such as I have described. During dry weather there is no water in the immediate vicinity, though the Ipanema is only about a mile distant.

It should be noted that these inscriptions, as well as many others which I heard of through this part of the country, are all upon these large stones, and generally in some such prominent place. One inscription in particular was mentioned to me by several persons, all of whom gave substantially the same account of it. This inscribed rock is near Agua Branca, twelve leagues above Piranhas and ten leagues from the falls of Paulo Affonso, on the Fazenda da Caisara, and is known as the *pedra navio*, or ship stone. It is said to be a large and nearly round boulder, standing upon a very narrow base upon the solid rock, and to have all its sides covered with Indian inscriptions.*

Through this part of the country, where the archæan rocks form a wide belt between the plateaus of the interior and the Cretaceous and Tertiary beds near the coast, these boulders of decomposition are not uncommon, and almost every one that I have seen has had some sort of artificial marks upon it, generally too badly eroded to be defined, but sufficiently distinct to leave no doubt concerning their origin.

Of the figures themselves I am unable to suggest any definite explanation. The explanations given by the people in the vicinity throw no light upon the subject. Some think they were made by the Dutch when they held the country about Pernambuco in the early part of the seventeenth century, but the general impression is

*I was told that there are extensive rock inscriptions further up the Rio Sao Francisco at Salgueiro on the Rio Quixaba and at Ouricury, both in the western part of the province of Pernambuco. On the road between Diamantina and Beribery, in the province of Minas Geraes, are some rude Indian paintings of animals upon a ledge of rock. These latter I have seen, but had no opportunity of sketching them.

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that they refer to some treasure hidden in the neighborhood. This idea led a former proprietor of the country about Pedra Pintada to make diligent search for this supposed treasure, and he even cleaned out the great pot-hole at the foot of the cascade, but without finding anything.

It is to be noted, however, as far as I have observed, that these inscriptions are always near the water, or near a place where water is likely to be found late in, if not quite through the dry season. * At Pedra Pintada the pot-hole below the fall has water in it long after the stream proper has dried up, the Ipanema has never been known to dry up entirely at Sant' Anna, while Cacimba Circada (fenced spring) takes its name from a spring at that place. This occurrence of the inscriptions in the neighborhood of water might admit of more than one explanation. If they have no other relation to the water itself, they happen to be in these localities because these are the places where the original inhabitants of the country would naturally live during the dry season, which is here nearly half the year, and indeed a part of these inscriptions at least---those in the bed of the stream---must have been made during the dry season. I am, however, inclined to the opinion that a part if not all these markings refer in some way to the water supply which is so uncertain in this region of great drouths. Exactly in what way, whether as records of seasons, or as petitions or offerings to the powers supposed to bring rain, it is idle now to speculate.

* There can be no confusing these markings with the holes made in large stones by Indians grinding their corn, and which also occur near the water. Many excellent examples of these mortar holes were found by me at the foot of the Pao d'Assucar on the Rio Sao Francisco. They are made in the upper surface of large fragments of rock near the river.

The "mortar holes" may actually be "cupmarks" made by the tens of thousands the world over for some unknown purpose.

MGS-007 MAP OF 1500 B.C. SHOWS AMERICAS, ORIENTALISTS SAY

Anonymous; Reuters, July 17, 1970.

Moscow, July 17 (Reuters)--Two Leningrad specialists in Oriental antiquity have a theory that ancient Asian geographers knew of the existence of the Americas at least 1,500 years before the birth of Christ, Tass news agency reported today.

The specialists, Lev Gumilev and Bronislav Kuznetsov, base their hypothesis on the deciphering of ancient maps of the world in old Tibetan books, Tass said.

The arrangement of countries and continents on the maps conformed with the knowledge of the world by the ancient Sumerians and Chaldeans, the earliest geographers.

The Soviet specialists concluded the data contained in the map were known in Asia in the second millennium B. C.

The agency said the ancient Tibetan maps were known to Orientalists before, but were believed to be charts of imaginary lands of fantasy or mystical Buddhist tables.

This view changed after a laborious analysis of complex old Tibetan and Indian toponymy---the study of place names---it was stated.

The Soviet specialists had interpreted a reference to a "green land lying far across the Eastern Sea" as meaning America.

IGT-001 EASTER ISLAND

Joseley, H. N.; Nature, 21:32, November 13, 1879.

As the reviewer of Australasia in Nature, vol. xx. p. 598, I must ask space for a few further words with regard to Rapanui. Mr. Albert J. Mott draws conclusions with regard to the ancient navigation of the Pacific Ocean and a former condition of high civilisation of the erectors of the stone images, which will not be admitted by any scientific ethnologist. The difficulties attending the erection by savages, or very slightly civilised people all over the world, of large stones has been greatly overrated. In the case of the stone images of Easter Island, the latest observer, M. A. Pinart, who has paid great attention to this very question and published the fullest account of the matter, together with a series of excellent illustrations, finds no difficulty in accounting for their erection. He writes as follows:- "L'ensemble de ce vaste atelier de statues gigantesques les unes entierement terminees les autres a l'etat d'ebauche et en voie d'execution nous permet de nous rendre compte de la facon dont le travail etait accompli, et de la maniere dont elles etaient erigees et mise en place apres leur complet achèvement. L'execution de ce travail qui de prime abord paraît considerable, qui a tout etonne les voyageurs et suggere de nombreuses hypotheses, est cependant d'une grande simplicité."

M. Pinart then goes on to explain how the sculptures were always cut out on rocks considerably inclined, and slid down hill to the place assigned, where they were tilted by means of an inclined plane of earth and stones built up, into holes dug deep enough to bury all but the head of each statue. I must refer readers wishing for more detailed information to M. Pinart's paper, "Voyage a l'île de Paques," Le Tour du Monde, 1878, p. 225, No. 927, for drawing my attention to which I am indebted to the librarian of the Royal Geographical Society, Mr. Rye.

The population of Easter Island was by some earlier voyagers estimated at as high as 1,500. It may have been greater, and as many as 500 men would certainly not be required for the erection of any of the images. There was undoubtedly a good deal of wood in the island in old times, and thus rollers and levers would be made use of. The trees of the island have now been exterminated by the inhabitants. Palmer speaks of a peculiar gesture of the modern Rapanui natives which he compares with certain features in the images. It is the opinion of experts that the general appearance of the sculptured faces is decidedly Polynesian, as far as mode of artistic treatment is concerned. Mr. Mott's conclusion that the existence of these images proves that a nation formerly existed which navigated ships to Easter Island at regular intervals, and kept the place going as a colony, will be regarded as simply absurd by any one who knows anything of the science of navigation. So small and so isolated an island as Rapanui could only be reached by navigators who had a very advanced knowledge of astronomy and navigation, and were provided with instruments of great precision, and who had determined the position of the island on maps with exact correctness. No Chinese, Japanese, Indian, or Arab navigators could have hit on the island except by accident. An exact determination of longitude, as well as of latitude is involved in the matter. A mere knowledge of the compass with even as good information concerning its variations as we now possess would not avail. The island was discovered by Roggeveen on April 5, 1722; in 1764 Commodore Byron, with two ships, sought for the island in vain; in 1766 Bougainville, with two French ships of war, sought for it also in vain; in 1767 Capt. Cartaret made the same attempt with a similar result. It was only on March 11, 1774, that Capt. Cook found the island again, and Mr. Mott would have us believe that persons who were by the

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undoubted evidence of their artistic capabilities and method of treatment of the human figure in sculpture, savages, were able to accomplish, as often as they wished, a feat of navigation which baffled some of the best European navigators of the eighteenth century. Even at the present day so difficult is the determination of longitude to persons not specially trained as expert navigators that the island of Bermuda, and even the Virgin Islands have been more than once reported as "gone down" by merchant captains who could not find them.

With regard to Mr. Mott's "gentle protest" against my statement that "the accepted scientific position is that primitive man was savage," no protest, whether gentle or otherwise, will alter the fact that such is the case; but it is quite superfluous to enter into a discussion here on the general theory of evolution, in accordance with which that position is maintained.

Although Moseley is rather dogmatic about asserting the savagery of ancient man, his claim that the Easter Island statues were not really too difficult to raise has been confirmed experimentally by modern workers, such as Thor Heyerdahl.

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Anonymous; Nature, 46:258-260, July 14, 1892.

Accounts of Easter Island are numerous and usually emphasize how mysterious everything there is, particularly the statues. The following description is much more matter-of-fact and sees mystery only in the "writings" of the islanders.

The prehistoric remains of Easter Island make it for archaeologists one of the most interesting islands in the Pacific. They will therefore read with interest an elaborate paper in the Report of the U. S. National Museum for 1888-89, which has just been issued. The paper is entitled "Te Pito Te Henua, or Easter Island," and is by William J. Thomson, Paymaster, U. S. Navy. It records the results of researches made by Mr. Thomson during a visit paid to Easter Island by the American vessel, the Mohican, towards the end of 1886. The Mohican anchored in the Bay of Hanga Roa on the morning of December 18, 1886, and remained till the evening of the last day of the year, when she sailed for Valparaiso.

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According to the traditions of the natives, the island was discovered by King Hotu-Matua, who came from the land in the direction of the rising sun, with two large double canoes and three hundred chosen followers. Mr. Thomson thinks there may have been more than one migration of people to the island, and that their traditions may have been mingled together; but there can, he believes, be no reasonable doubt about the progenitors of the present islanders being of the Malayo-Polynesian stock. The people were shockingly treated by some of the early voyagers, and in 1863 the majority of the able-bodied men were kidnaped by Peruvians, who carried them away to work in the guano deposits of the Chinch Islands and the plantations in Peru. Just before the arrival of the Mohican a complete census of the population had been taken by Mr. Salmon, who found that the total number of natives was 155. The children are not much darker than Europeans, but the skin assumes a brown hue as they grow up and are exposed to the sun and trade-winds. The eyes are dark brown, bright, and full, with black brows and lashes not very heavy. The countenance is usually open, modest and pleasing. In disposition the natives are cheerful and contented. They all profess

Christianity, but there are now no missionaries among them, and they display a tendency to return to the old Pagan ideas. Tattooing is no longer practised, but every islander advanced in life is ornamented in all parts of the body.

At one time the island must have been densely populated, and the surviving monuments show that the inhabitants had attained to a higher civilization than that of other Polynesians. The ancient stone houses at Orongo were thoroughly explored by Mr. Thomson and his party. These curious dwellings seem to have been built for the accommodation of the natives while the festival of the "sea-birds' eggs" was being celebrated. During the winter months the island is visited by great numbers of sea-birds, most of which build their nests among the ledges and cliffs of the inaccessible rocks. Some, however, choose two islets lying a few hundred yards from the south-west point of Easter Island, and the natives are believed to have selected Orongo as a convenient spot for watching for the coming of the birds. The fortunate person who obtained possession of the first egg, and returned with it unbroken to the expectant crowd, became entitled to certain privileges and rights during the following year. Near Orongo are the most important sculptured rocks in the island. They are covered with carvings intended to represent human faces, birds, fishes, and mythical animals, all very much defaced by the time and the elements. The most common figure is a mythical animal, half human in form, with bowed back and long claw-like legs and arms. According to the natives, this symbol represented "Meke-Meke," the great Spirit of the sea.

On the high bluff west of Kotatake Mountain the party discovered the ruins of a settlement extending more than a mile along the coast-line and inland to the base of the hill. These remains bear unmistakable evidences of being the oldest habitations on the island. The houses are elliptical in shape, with doorways facing the sea, and were built of uncut stone. Some of the walls are standing, but the majority are scattered about in confusion. Each dwelling was provided with a small cave or niche at the rear end, built of loose lava stones, which was in a number of instances covered by an arch supported by a fairly shaped key-stone. The recesses were "undoubtedly designed to contain the household gods."

Mr. Thomson has, of course, much to say about the stone images with the idea of which Easter Island is intimately associated in the minds of all who have devoted any attention to its antiquities. Every image in the island was counted, and the list shows a total of 555 images. Mr. Thomson says:-

"Of this number forty are standing inside of the crater, and nearly as many more on the outside of Rana Roraka, at the foot of the slope where they were placed as finished and ready for removal to the different platforms for which they were designed; some finished statues lie scattered over the plains as though they were being dragged toward a particular locality but were suddenly abandoned. The large majority of the images, however, are lying near platforms all around the coast, all more or less mutilated, and some reduced to a mere shapeless fragment. Not one stands in its original position upon a platform. The largest image is in one of the workshops in an unfinished state, and measures 70 feet in length; the smallest was found in one of the caves, and is a little short of three feet in length. One of the largest images that has been in position lies near the platform which it ornamented, near Ovahe; it is 32 feet long, and weighs 50 tons.

"Images representing females were found. One at Anakena is called 'Viriviri Moai-a-Taka,' and is apparently as perfect as the day it was finished; another, on the plain west of Rana Roraka is called 'Moai Putu,' and is in a fair state of preservation. The natives have names for every one of the images. The designation of images and platforms as obtained from the guides during the exploration was afterwards checked off in company with other individuals without confusion in the record. The coarse gray trachytic lava of which the images were made is found only in the vicinity of Rana Roraka, and was selected be-

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cause the conglomerate character of the material made it easily worked with the rude stone implements that constituted the only tools possessed by the natives. The disintegration of the material when exposed to the action of the elements is about equivalent to that of sandstone under similar conditions, and admits of an estimate in regard to the probable age. The traditions in regard to the images are numerous, but relate principally to impossible occurrences, such as being endowed with power to walk about in the darkness, assisting certain clans by subtle means in contests, and delivering oracular judgments. The legends state that a son of King Mahuta Ariiki, named Tro Kaiho, designed the first image, but it is difficult to arrive at an estimation of the period. The journals of the early navigators throw but little light upon the subject. The workshops must have been in operation at the time of Captain Cook's visit, but unfortunately his exploration of the island was not directed towards the crater of Rana Roraka.

"Although the images range in size from the colossus of 70 feet down to the pigmy of 3 feet, they are clearly all of the same type and general characteristics. The head is long, the eyes close under the heavy brows, the nose long, low-bridged, and expanded at the nostrils, the upper lip short and the lips pouting. The aspect is slightly upwards, and the expression is firm and profoundly solemn. Careful investigation failed to detect the slightest evidence that the sockets had ever been fitted with artificial eyes, made of bone and obsidian, such as are placed in the wooden images.

"The head was in all cases cut flat on top, to accommodate the red tufa crowns with which they were ornamented, but the images standing outside of the crater had flatter heads and bodies than those found around the coast. The images represent the human body only from the head to the hips, where it is cut squarely off to afford a good polygon of support when standing. The artists seem to have exhausted their talents in executing the features, very little work being done below the shoulders, and the arms being merely cut in low relief. The ears are only rectangular projections, but the lobes are represented longer in the older statues than in those of more recent date.

"The images were designed as effigies of distinguished persons, and intended as monuments to perpetuate their memory. They were never regarded as idols, and were not venerated or worshipped in any manner. The natives had their tutelary genii, gods, and goddesses, but they were represented by small wooden or stone idols, which bore no relation to the images that ornamented the burial platforms. The image-makers were a privileged class, and the profession descended from father to son. Some of the natives still claim a descent from the image-makers, and refer to their ancestors with as much pride as to the royal family.

"The work of carving the image into shape, and detaching it from the rock of which it was a part, did not consume a great deal of time, but the chief difficulty was, in the absence of mechanical contrivances, to launch it safely down the slope of the mountain and transport it to a distant point. It was lowered to the plain by a system of chocks and wedges, and the rest was a dead drag accomplished by main strength. A roadway was constructed, over which the images were dragged by means of ropes made of indigenous hemp, and sea-weed and grass made excellent lubricants. The platforms were all built with sloping terraces in the rear, and up this incline a temporary road-way was constructed of a suitable height, upon which the statue could be rolled until the base was over its proper resting-place. The earth was then dug away to allow the image to settle down into position, the ropes being used to steady it in the meantime."

Interesting as these monuments are, they are less remarkable than the incised tablets which show that the Easter Islanders had worked out for themselves a kind of writing. The following account of the tablets is given by Mr. Thomson.

Their existence "was not known until the missionaries settled upon the island. Numerous specimens were found in the possession of the natives, but no especial attention appears to have been directed towards them. Several persons, belonging to vessels that were wrecked at Easter Island, report having seen such tablets, but the natives could not be induced to part with them. The three hundred islanders who emigrated to Tahiti had in their possession a number of tablets; they created some attention on account of the remarkable skill with which the figures were executed, but they were highly prized by the owners, and no effort was made to secure them because their real value was not discovered. The Chilean corvette O'Higgins visited Easter Island in January 1870, and Captain Gana secured three tablets, two of which are on deposit in the National Museum at Santiago de Chili, and the third was sent to France, but does not appear to have reached its destination. Paper impressions and casts were taken from the Chilean tablets for the various Museums of Europe. Those sent to the English Ethnological Society created some interest after a time, but others sent to Berlin were regarded as stamps for marking native cloth (Mittheilungen, July 1871). Seven of these tablets are now in the possession of Tepano Jansser, Bishop of Axieri, all in excellent state of preservation.

"While the Mohican was at Tahiti, the Bishop kindly permitted us to examine these tablets and take photographs of them. These tablets were obtained from the missionaries who had been stationed on Easter Island, and they ranged in size from 5-1/2 inches in length by 4 inches broad, to 5-1/2 feet in length and 7 inches wide. Diligent search was made for specimens of these tablets during our visit to Easter Island. At first the natives denied having any, but Mr. Salmon knew of the existence of two, and these were finally purchased after a great deal of trouble and at considerable expense. The tablets obtained are in a fair state of preservation. The large one is a piece of driftwood that from its peculiar shape is supposed to have been used as a portion of a canoe. The other is made of the toromiro wood indigenous to the island. In explanation of the disappearance of these tablets, the natives stated that the missionaries had ordered all that could be found to be burned, with a view to destroying the ancient records, and getting rid of everything that would have a tendency to attach them to their heathenism, and prevent their thorough conversion to Christianity. The loss to the science of philology by this destruction of valuable relics is too great to be estimated. The native traditions in regard to the incised tablets simply assert that Hotu-Matua, the first king, possessed the knowledge of this written language, and brought with him to the island sixty-seven tablets containing allegories, traditions, genealogical tables, and proverbs relating to the land from which he had migrated. A knowledge of the written characters was confined to the royal family, the chiefs of the six districts into which the island was divided, sons of those chiefs, and certain priests or teachers, but the people were assembled at Anekena Bay once each year to hear all of the tablets read. The feast of the tablets was regarded as their most important fete day, and not even war was allowed to interfere with it.

"The combination of circumstances that caused the sudden arrest of image-making, and resulted in the abandonment of all such work on the island, never to be again revived, may have had its effect upon the art of writing. The tablets that have been found in the best stage of preservation would correspond very nearly with the age of the unfinished images in the workshops. The ability to read the characters may have continued until 1864, when the Peruvian slavers captured a large number of the inhabitants, and among those kidnapped were all of the officials and persons in authority. After this outrage, the traditions, &c., embraced by the tablets, seem to have been repeated on particular occasions, but the value of the characters was not understood, and was lost to the natives.

"A casual glance at the Easter Island tablets is sufficient to note the fact

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that they differ materially from other kyriologic writings. The pictorial symbols are engraved in regular lines on depressed channels, separated by slight ridges intended to protect the hieroglyphics from injury by rubbing. In some cases the characters are smaller, and the tablets contain a greater number of lines, but in all cases the hieroglyphics are incised, and cover both sides as well as the bevelled edges and hollows of the board upon which they are engraved. The symbols on each line are alternately reversed; those on the first stand upright, and those on the next line are upside down, and so on by regular alternation.

"This unique plan makes it necessary for the reader to turn the tablet and change its position at the end of every line; by this means the characters will be found to follow in regular procession. The reading should commence at the lower left-hand corner, on the particular side that will bring the figures erect, and followed as the characters face in the procession, turning the tablet at the end of each line, as indicated. Arriving at the top of the first face, the reading is continued over the edge to the nearest line, at the top of the other side, and the descent continues in the same manner until the end is reached. The Boustrophedon method is supposed to have been adopted in order to avoid the possibility of missing a line of hieroglyphics."

A man called Ure Vaeiko, one of the patriarchs of the island, professed to have been under instructions in the art of hieroglyphic reading at the time of the Peruvian visit, and claimed to understand most of the characters. The photographs of the tablets owned by the Bishop were submitted to this old man, who related with fluency and without hesitation the legend which he declared to be appropriate to each. "The story of all the tablets of which we had knowledge," says Mr. Thomson, "was finally obtained, the words of the native being written down by Mr. Salmon as they were uttered, and afterwards translated into English."

Ure Vaeiko's tales, with the translations, are printed in Mr. Thomson's paper; and, as they are manifestly not the reciter's own invention, they have a certain interest for students of anthropology. But whether they represent the meaning of the inscriptions on the mysterious tablets is another question. It is noteworthy that, although Ure Vaeiko's fluent interpretation of the tablets was not interrupted, "it became evident that he was not actually reading the characters." "It was noticed that the shifting of the position did not accord with the number of the symbols on the lines, and afterwards, when the photograph of another tablet was substituted, the same story was continued without the change being discovered." These facts raise a doubt as to the trustworthiness of his pretensions to knowledge. However, Mr. Thomson does not seem to have yet presented a full account of the work accomplished in connection with this curious problem. "Results of an extremely interesting nature," he says, "are barely outlined at present, and not in shape to be presented herewith. It is not considered expedient to attempt an explanation of the symbols until the subject can be treated exhaustively."

Some experts feel that the Easter Island inscriptions, like the Mayan glyphs, serve only to prod the memory.

Two intriguing points made above are: (1) the Easter Islanders knew how to build true arches with keystones unlike the early civilizations of Central and South America, and (2) something caused the precipitate abandonment of statue building. Perhaps the latter event was synchronous with the abandonment of Mayan cities and/or connected with some natural catastrophe.

MGT-003 [CURIOSLY MARKED PEBBLES]

Anonymous; Nature, 65:594, April 24, 1902.

This item is included in this volume because of the possibility that the sculptured pebbles may be man-made.

In the Jahrbuch der k.-k. geol. Reichsanstalt, Band li., Heft 1 (1901), Dr. O. Abel contributes a very interesting paper on some curiously marked pebbles from the Algerian Sahara. The pebbles, as the result of exposure to desert erosion, possess a characteristic surface sculpture of ridges and furrows, which have a more or less regular radial disposition. The special interest of this character lies in its wonderfully close resemblance to the sculpture frequently exhibited by moldavite, made more particularly familiar to us through Dr. F. E. Suess's advocacy of the meteoric origin of this mineral. The sculptured pebbles dealt with in this paper are of discoid form, and radial furrows are impressed on both sides of the disc. At the periphery the furrows become more plainly marked, and tend to pass across the margin of the disc in a direction at right angles to the flattened surfaces. The author examines the possible causes of this curious sculpture, and concludes that the ordinary action of the wind, driving sand-grains against the motionless pebbles, would be quite inadequate to produce the stellate figures on opposite surfaces of the stone. He believes, however, that the natural sand-blast is, in fact, the true eroding agent, but that the pebbles were rotating when attacked by it, while raised from the ground and driven forward over the surface of the desert during repeated sand-storms. That the stellate sculpture would result from such agencies the author considers to be proved by certain experiments carried out by Dr. F. E. Suess, to which he refers. As regards the analogous sculpture of moldavite, the author suggests that it might also have been produced by the prolonged exposure of the moldavite fragments to desert conditions, an idea which is supported by the form and size of the moldavite specimens as well as by the relative softness of this glass when compared with quartz sand. At the same time, he considers that the theory of the cosmic origin of moldavite is in no way weakened by such a conclusion. The paper is excellently illustrated.

MGT-004 REMARKABLE ANCIENT SCULPTURES FROM NORTH-WEST AMERICA

Wallace, Alfred R.; Nature, 43:396, February 26, 1891

Mr. James Terry has just published descriptions and photographs of some

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of the most remarkable works of prehistoric man yet discovered on the America continent. The title of his paper is sufficiently startling, but it is fully borne out by the beautiful full-size and half-size photographic prints with which it is illustrated. They represent three rude, yet bold, characteristic, and even life-like sculptures of simian heads, executed in basalt. One of these belongs to the author, one to Mr. T. Condon, and the third to Prof. O. C. Marsh, who referred to it, in his address "On Vertebrate Life in America," in the following terms:- "On the Columbia River I have found evidence of the former existence of inhabitants much superior to the Indians at present there, and of which no tradition remains. Among many stone carvings which I saw, there were a number of heads which so strongly resembled those of apes that the likeness at once suggests itself. Whence came these sculptures and by whom were they made?" Unfortunately we have no detailed information as to the conditions under which these specimens were found, except that "they would be classed a 'surface finds,' from the fact that the shifting sand-dunes, which were largely utilized for burial purposes, are continually bringing them to the surface and exposing them." This gives no indication of their antiquity, but is quite compatible with any age which their other characteristics may suggest.

The size of the heads varies from eight to ten inches in total height, and from five and three-quarters to six and a half inches in width. The three are so different from each other that they appear to represent three distinct animals; and, so far as I can judge, they all differ considerably from the heads of any known anthropoid apes. In particular, the nostrils are much farther from the eyes and much nearer to the mouth than in any of the apes. In this respect they are more human; yet the general form of the head and face, the low and strongly-ridged forehead, and the ridges on the head and cheeks seem to point to a very low type of anthropoid. In a letter to Mr. Terry, Mr. Condon suggests "that they were copied from the figure-head of some Malay proa that may have been wrecked on the coast;" but such a supposition is quite inadmissible, since nothing at all resembling these heads is ever carved on Malay proas, and there is no reason to believe that if such a carving did come into the possession of the natives they would ever think of copying it in stone; while these sculptures were found two hundred miles from the coast on the east side of the Cascade Mountains.

Taking into consideration the enormous antiquity of the stone mortars and human remains found in the auriferous gravels of California buried under ancient lava streams and associated with a flora and fauna altogether different from that of any part of America at the present time, Mr. Terry's own conclusion appears the more probable. It is, "either that the animals which these carvings represent once existed in the Columbia valley, or that, in the remote past, a migration of natives from some region containing these monkeys reached this valley, and left one of the vivid impressions of their former surroundings in these imperishable sculptures." The latter alternative appears to me, for many reasons, to be highly improbable; and though the former will seem to many persons to be still more improbable, I am inclined provisionally to accept it.

The material above was taken from: "Sculptured Anthropoid Ape Heads found in or near the Valley of the John Day River, a tributary of the Columbia River, Oregon." By James Terry. (New York, 1891.)

It should also be noted that the human remains in the auriferous gravels were controversial for many years---and still are to those who believe that man appeared only recently in North America.

There may be a connection, far-fetched though it may be, between these sculptures and the elusive primates (called "sasquatch") reported in this area for many years.

MGT-005 THE IDAHO FIND

Wright, G. Frederick; American Antiquarian, 11:379-381, 1899.

Wright later became involved in a great controversy because he believed man lived in America during the Ice Ages. See, for example, his book Man and the Glacial Period.

In the latter part of September I received from Charles Francis Adams, president of the Union Pacific Railroad, a letter stating that while at Boise City, Idaho, a short time before, he had heard much about a "clay image," which had been found while boring for artesian water at Nampa, Idaho, a station on the Oregon Short Line railroad, about twenty miles from Boise City, and about half way between Boise river and Smoke river, being seven miles from the former and twelve from the latter. This whole region like hundreds of thousands of square miles of the Pacific Slope, is covered with deposits of lava rock belonging to late tertiary or quaternary times. Beneath these lava deposits in California occurs much of the gold-bearing gravel; and in this gravel, thus covered with lava, Professor Whitney, some years ago, reported the discovery of many human implements, and the celebrated Calaveras skull. But, because of the advanced stage of culture evinced, and of the high character of the skull, the archaeologists of Europe have been slow to accept the genuineness of Professor Whitney's alleged discoveries; for they do not tally with their preconceived notions respecting the slow and regular evolution of the human race from ape-like progenitors. The present discovery comes, therefore, with great confirmatory power to the support of Professor Whitney, and from its character bears strongly against the extreme views as to the evolution of man. It points rather to a degeneracy of the race in the case of paleolithic man in the Eastern United States and in Europe.

The circumstances under which the Nampa image was found are as follows: Mr. M. A. Kurtz, an educated and competent man, was engaged in boring an artesian (sic) well. After penetrating the surface soil sixty feet, fifteen or twenty feet of lava rock was encountered. Below this for upward of 200 feet there was nothing but alternate beds of quicksand and clay; then coarse sand was struck in which the image came up, then below was vegetable soil and then sand rock. Thus it is evident that the image lay buried to the depth of about 300 feet, beneath deposits which had accumulated in a lake formed by some ancient obstruction of the Snake river valley, and that over this accumulation there had been an outflow of lava sufficient to cover the whole and seal it up.

In reply to letters of inquiry as to the possibility that the image had fallen in from the top or been thrown in, Mr. Kurtz says the well is tubed from the top with heavy six-inch wire tubing, section after section having been added as the whole was driven down, so that nothing could have fallen in. As to the theory that the image was thrown in, Mr. Kurtz well says that in that case, falling on the top of the water and sand, it would have been ground to pieces by the sand pump. Furthermore, when subjected to the inspection under a magnifying glass by Professors Haynes and Putnam it became at once evident that it is not a clay image, as Mr. Adams and Mr. Kurtz supposed, but that it has been carved out of fine and rather soft pumice-stone, and that the reddish coating over it was such a film of oxide of iron as would form only after long exposure in peculiar conditions. In this case also small particles of sand were cemented into the crevice between the arm and the body. All this shows that it is no recent affair, and that it can not be a hoax.

In reference to the age of the stratum where the image lay, Mr. Emmons, of the U. S. Geological Survey, who is more familiar than any other geologist with the region, writes me that, in his opinion (subject, however, to correction), they are "probably of far greater antiquity than any deposits in which human implements

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have hitherto been discovered."

It is difficult to institute any trustworthy comparison between the age of this image and that of the paleolithic implements found in the eastern part of the United States. At Trenton, N. J., Madisonville, O., Medora, Ind., and Little Falls, Minn., rough stone implements, similar in type to the paleolithics discovered in the valley of the Somme in France and at various places in Southern England, have been found in glacial gravels, thus connecting man with the closing scenes of the glacial period. From data connected with the recession of the Falls of Niagara and of St. Anthony, however, it is found that this period may not have been more than eight or ten thousand years ago.

As to the connection of the deposits on the Pacific Slope with the glacial age, we have no very definite data, though it seems altogether probable that there was some connection. During the great ice age glaciers abounded throughout the Sierra Nevada and the Rocky Mountains, and their melting was probably hastened by the vast lava outflows which occurred in the region. The Snake river rises in the mountains surrounding the Yellow Stone park, where glaciers were of great extent. The sudden melting of these may, very likely, be the cause of the rapid accumulation of silt in the temporary lake of Nampa, where the image was found.

The high degree of art displayed in the image is noteworthy. It is not the work of a boy or of a novice. The proportions are perfect, and there is a pose of the body that is remarkable, and which differentiates it from anything that has been found among the relics of the Mound-builders. Altogether it supports the hypothesis of Professor Putnam, advanced some years ago, that civilization advanced on the Pacific Coast long in advance of that which has anywhere else been discovered. And it is by no means impossible that we have some relics of those catastrophes by floods which are so universal in the traditions of all nations. --- New York Independent.

Wright has described what is now known as the "Nampa Image," which is taken by some to indicate a great antiquity for man in North America.

MGW-001 HIEROGLYPHIC TABLETS AND SCULPTURE IN EASTER ISLAND

Harrison, J. Park; Nature, 10:399-400, September 17, 1874.

Early last spring mention was made in Nature (vol. ix. p. 351) of some photographs of inscribed tablets from Easter Island, which the Academy of Sciences at San Francisco had shortly before received from Mr. Croft, of Papeeti, Tahiti.

Up to that time only three tablets were known for certain to have been discovered in the island. From information, however, which has recently been received, it appears that there are now no less than five tablets at the Roman Catholic Mission in Tahiti; and one, obtained last year by the mate of a vessel wrecked on the island, is said to have been taken to San Francisco. Two others are in the National Museum at Santiago de Chili;* and casts from these, made under Mr. E. Reed's directions, were sent to England and Germany in 1873. This, however, is not all. Natives who are in the employ of planters at Papeeti inform Mr. Croft that incised tablets were formerly very numerous in Easter Island, but many were destroyed in intestine wars. Some are said to have contained descriptions of land and boundaries; others, directions for planting and fishing; many were connected with religion and mythology; and, more important than all, a few "contained the ancient history of the island, and its kings or ruling chiefs:" these, it was feared, might all have been destroyed, not by the natives themselves, but by direction of Roman Catholic priests, who, as in America at the time of the Spanish conquest, persuaded their first converts to burn and destroy a large number of records without discrimination. It is known, however, that a few remain in possession of the islanders, who are said to attach the greatest possible value to them.

Should no others prove to be historical, it is almost certain that one, at least, of those at Santiago, of which we have the plaster casts, answers this description. The tablet alluded to is fully described in the Journal of the Anthropological Institute,** where plates will be found of the hieroglyphics.

Some of the older natives of Easter Island are said still to possess the art of engraving tablets, and to be able to interpret them. But whether this refers to the ancient signs, or only to those which Senor G. de la Rosa found were used by the chiefs a hundred years ago, is at present doubtful. Dr. Philippi, of the University of Santiago, on the authority of Pere Einaud, one of the French missionaries, says that the natives do not attach any meaning to the signs. Probably expert wood-carvers like the Easter Islanders would from time to time have replaced decayed tablets and multiplied others. They may also, very possibly, know from the general appearance of the hieroglyphics what they refer to, and yet not understand individual signs.

Before showing that it may prove an easy task for anyone acquainted with the Pacific to interpret the signs, provided he has some knowledge of the traditions of the Easter Islanders, it will be necessary to mention the legend of their origin as ascertained by Commodore Powell and Senor Gana from the missionaries on the spot (in 1868 and 1870). It is briefly this; that their ancestors arrived in two boats many years ago, each boat being under the command of a chief; and there is a distinct tradition that they had been expelled from Oparo, or Rapa-iti, an island 1,600 miles to the west.

Now there is a drift-current from that direction, that carries wood and other waifs to the shores of Easter Island; so that it is physically possible for a canoe or other vessel to have arrived by its aid. It is worth mentioning that the current turns round Easter Island, and then goes northwards.

Oparo, also, bears silent witness to the truth of the story. Though little more than seven miles in length, several of its hills are capped with stone forts; and there are platforms and stone houses as in Easter Island, as well as a fortress or temple in five stages (like the ruin of Pollanarrua, in Ceylon). It need scarcely be added

that there are traditions of fierce wars and feuds in the island. Unfortunately, little more than this is known about its antiquities and legends.

Passing by, with the bare mention, several symbolic practices of the Easter Islanders---for example, the enormous trouble that was taken by them to crown the great statues with huge tiaras of red tufa; the erection of effigies of their chiefs on platforms of squared stone, the masonry of which, Cook said, was "equal to any in England;" the peculiar form of the huts, like inverted boats; their moon-shaped shields, used only in dances (some with faces carved on the cusps, like the eagles' heads on the Phrygian peltas); the bi-fronted staffs or batons, which were held in the hands of the chiefs; and tattoo marks like those in Burmah and India, ---all of which may possibly, by and by, aid us in discovering the land from which the mysterious chiefs of Easter Island originally came, ---passing by these, we will confine our attention to the symbols which appear more immediately to relate to the arrival of vessels from Oparo, and seem to establish the tradition on an historical basis.

Few who have visited the Cnidus Shed at the British Museum can have failed to notice the emblematic carving on the back of one of the statues from Easter Island, at present deposited there. It was found under cover in the range of stone houses called "Taura Renga," in the centre of a chamber lined with wall slabs, and partly excavated from the cliff. The bas-reliefs faced the entrance, a small square door, with stone posts and lintel, in a rubble wall about 5 ft. in thickness. On the back of the head of the statue there is a bird, over which is a solar crown; and on either side a rapa, or steering paddle, with a human face on the spade-like blade. A third but very much smaller rapa is carved on the back of the right ear of the statue, whilst four ovals are incised on the left. The lobes of both ears are greatly lengthened.

Lower down on the back of the statue there are two herronias---symbolic animals, with albatross-like beaks, which are turned, not ungracefully, towards the bird. Immediately above the waist-belt of the statue---its only dress---there is a circle.

The explanation of these hieroglyphics is at once suggested by the story of the arrival of the chiefs. The two rapas, or steering paddles, were dedicated to the gods, and symbolise the vessels of the two chiefs. They were doubtless carved on the statue to commemorate their safe arrival. The two herronias may represent the chiefs themselves. The circle is the accepted emblem of life.

The same symbolism, though of a more realistic kind, may be recognised in the curious wooden images which are peculiar to Easter Island. They are mostly anatomical; that is, figures in which the ribs, vertebrae, and other bones are distinctly shown, as they would appear in a person suffering from extreme emaciation. They were styled by La Perousse "squelettes." Nearly all of them have strongly marked Semitic features, a tuft on the chin, and highly symbolic carvings on the scalp; e.g., herronias, double-headed birds, and a solar deity with rays round the head. The legs of these little images are uniformly short, and the earlobes enlarged. There is also very generally, if not always, a circle on the lower part of the back. It can hardly be doubted, in view of the symbolism which pervades almost everything in Easter Island, that these squelettes are connected with the story of the voyage from Oparo, and represent the half-starved condition in which it may well be conceived that the crews arrived.

In one of these images, in the Ethnographical Room at the British Museum, the head is perfectly smooth, which appears to intimate that it was shaven. It perhaps represents a priest; for we are informed that Roggewein, the discoverer of Easter Island in 1720, noticed a native with his head shaved, who had large "white balls" in his ears, and appeared very devout: the Dutch judged him to be a priest.

Returning to the tablets, of which casts are in the museum of the Anthropological Institute, it will be sufficient to mention that they are engraved with hieroglyphics on both sides, every part being covered with minute signs, apparently intended as actual representations of various forms of animal and vegetable life; as well as scenes and incidents such as were likely to have been met with among the islands in the Pacific. On the bottom line of what is considered to be the front face of the smaller tablet there is a procession of bird-headed men, who are approaching or standing before a pillar, or stone, * with two discs, or circles, on each side. Immediately before the first figure, which it is presumed is a chief, from his holding a staff in his hand, are two curved lines, the hieroglyphic for a boat or canoe. Behind the chief another bird-headed man is represented as kneeling down, and holding up his hands; he is probably a priest. A third bird-headed figure follows without a staff. Then, after two small curves high up in the line of hieroglyphics---perhaps a sign for the moon,---there is a character with a bird's head and beak, of a different shape from those of the bird-headed men. It has a crest on its head, and short wings, and is probably intended for a domestic fowl---the only land bird in Easter Island. It appears to be a victim about to be sacrificed. Two more bird-headed men, without staffs, follow in a certain stately order. Then there is a second sign or hieroglyphic for a boat, followed by another chief; and then a third sign for a boat, with a waved or zigzag line before it, which is perhaps intended to signify that the vessel which follows it was lost or driven away in some other direction by a storm. This last boat is followed by a bird-headed man without a staff.

The signs for the chiefs' vessels, it will be seen, agree in number with the large rapas, or steering paddles, upon the back of the stone statue; and the bird-headed chiefs answer to the two herronias. The diminutive steering paddle, represented apart from the others on the ear of the statue, may symbolise the same casualty that appears to be signified by the waved line, viz., that there was a bird boat, which did not reach Easter Island. The small carving of a rapa would thus have been erected merely in memoriam. However this may be, taken in conjunction with the tradition, there can be little doubt that the hieroglyphics on the tablet and the carvings on the statue relate to a more important matter than the arrival of the chiefs.

As regards the signs generally, a considerable number have been identified as conventional representations of birds and animals which are not found in Easter Island; weapons, also, and other objects are introduced (e.g., an Eastern bow), which belong to regions far to the west. Some of the identifications that have been suggested may be doubtful; but amongst those that will perhaps meet with general acceptance, by no means the least important are the hieroglyphics of three distinct types of men: (1) Tall, bird-headed men, with short legs, as in the wooden images. (2) Men with large ornaments or projections on each side the head, scarcely exaggerating the practice of enlarging the ear-lobes by inserting in them discs, or plugs of wood and other materials, which prevails in certain islands in the Pacific, as well as amongst the older races in India and Burmah. (3) Dog-faced men, or Negritos, with strangely shaped heads, which, from plates in the "Cruise of the Curacoa," appear to be characteristic of the natives of the Solomon Islands, as well as the more westerly islands of the Fiji group. They squat like the dog-faced men in the tablets, whilst the large-eared men sit in the Eastern manner. The peculiar appearance of the head is explained by the custom of dressing and plastering the hair. Several of these Negritos are represented about the middle of the tablet as celebrating a fish-fete; the men dancing by themselves on one side, and the women in couples on the other. Two of the men with enlarged ear-lobes stand by as spectators.

Enough has perhaps been said to suggest the great importance of an early and systematic exploration, above and below ground, of Easter Island and Oparo, as

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almost unworked mines, abounding in matter of the greatest ethnological and anthropological interest.

*Two more are reported to have been taken by a surveying ship to Russia a few years ago, and another to Germany.

**Journ. Anthro. Inst. Jan. 1874. Trubner and Co.

*Compare the legend of the "Emigration of Turi," Pol. Myth. p. 214 "Amongst the chiefs who landed there was one called Porua. . . the second (dog) they cut up raw as an offering for the gods. . . and built a second place, and set up pillars for the spirits."

The bird-headed figures are strongly reminiscent of Egyptian figures.

MGW-002 [TRANSLATION OF EASTER ISLAND INSCRIPTIONS REPORTED]

Anonymous; Nature, 46:494, September 22, 1892.

In the second number of the Journal of the Polynesian Society Dr. A. Carroll, of Sydney, offers what he believes to be translations of some of the famous Easter Island inscriptions. He is of opinion that Easter Island was at one time occupied by a pre-Polynesian people from American, and that to them the inscriptions are to be attributed. "While engaged in studying the languages, histories, antiquities, and inscriptions of ancient American peoples," he says, "I came upon similarities to the Easter Island characters, &c.; with these as keys, discovered what certain groups expressed, and from these, proceeding upon the recognized methods of decipherment, succeeded in reading into the original languages, and from these translating into English these Easter Island inscriptions." This is very vague, and, until Dr. Carroll gives some more definite information as to his methods, his claim that "another ancient writing is deciphered" will seem somewhat extravagant. Among the other contents of the number are an interesting account of some stone implements from the Chatham Islands, by Mr. S. Percy Smith, and the first part of a history of the occupation of the Chatham Islands by the Maoris in 1835, by Mr. A. Shand. Mr. Shand's information has been derived from the Maoris themselves, many of those who supplied it having taken part in the transactions they described.

MGW-003 PHOENICIAN CHARACTERS IN SUMATRA

Harrison, J. Park; Nature, 11:228, January 21, 1875.

In a short communication to the Anthropological Institute in December last (Nature, vol. xi, p. 199), Phoenician characters were stated by me to be still in use in South Sumatra. As many of your readers may be glad to have more information on the subject, I write to say that the district above alluded to includes Rejang, Lemba, and Passammah, between the second and fifth parallels of south latitude. Several manuscripts, on bamboo, from this region are preserved in the

library of the India Office; and a Rejang alphabet is given by Marsden in his "History of Sumatra," third edition. Some of his characters, however, appear to have been incorrectly copied. About half the Rejang letters are admitted by all the Oriental scholars to whom I have shown them to be Phoenician of the common type; others being similar to forms found in Spain and other Phoenician colonies. Most of the letters are reversed, a peculiarity which is explained by the fact that the Rejang writing, according to Marsden, is read from left to right, contrary to the practice of the Malays generally. The matter is of great interest, and, it is to be hoped, will be investigated by Phoenician scholars.

MGW-004 THE EGYPTIAN SPHINX

Le Plongeon, Austus; American Antiquarian, 10:358-363, 1888.

Le Plongeon first presents some Egyptian history and mythology. He ends with this intriguing reference to the sunken continent of Mu, purportedly only a figment of the fertile imaginations of the occultists.

We have endeavored to show elsewhere that "Seb" and "Nut" and their children, Osiris, Aroeris, Set, Isis and Nike, worshiped as gods by the Egyptians, were personages who had lived and reigned in Mayax, where, having received the honors of apotheosis after their death, temples had been erected to their memory and divine homage paid to them. That Osiris and Isis or Mau were no other than Prince Coh and his sister-wife Moo, the queen of Chichen, whose history is repeated, more or less correctly, in the myth of these deities held in such great veneration throughout Egypt, there seems to be no doubt.

After the killing of Prince Coh by his brother Aac, Moo, at the head of her followers, waged war against the murderer to avenge the death of her husband, over whose remains she erected a splendid mausoleum, placing on the top his totem---a leopard with a human head.

The country was for a long time divided into two camps. Fortune at times favored one party; at times the other. At last Moo's adherents were routed. The queen herself fell into the hands of her foe, who ill-treated her in all manner of ways, although she was his own sister, the companion of his childhood. She escaped from him and sought refuge among the populations of the southern parts of the country that still remained faithful to her. Aac pursued her thither. Having again defeated her defenders he took possession of the land, and the kingdom became re-united under his sway. Meanwhile Moo, having lost her hold even on those parts, fled to the sea coast, then across the sea eastward to the "land of Zinaan" (scorpion), the Antilles of our days.

But let us hear the recital of these events from the author of the Troano, MS., one of the four Maya books that escaped destruction at the hands of the fanatical Spanish friars who destroyed by fire all the ancient American records they could find at the time of the conquest of Yucatan. The reading of this account begins at the right hand upper corner. "The people of Maya, being subdued by blows and cowed, not opposing great resistance to him, the master seized her by the hair; and, in common with others, caused her to suffer from blows." This happened on the ninth day of the tenth month of the year Kan, that is on the 7th of the month yax of the year Kan.

"Being completely routed, she passed to the opposite seacoast toward the east. Seeking refuge, the queen went to the seacoast in the southern parts of the

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country, that were already wounded." This event took place on the sixth day of the first month of the year Kan, that is, on the sixth Muluc of the month Pog, or seven months after she was made a prisoner.

In the illustration the country figured by a deer is severed in two. The head and fore parts of the body represent the north, the hindquarters the south. The queen is pictured by her totem, a macaw, painted black---token of disaster, sorrow mourning; the eye of the bird corresponds to our letter M, and with the crest gives her name Moo. She is seen flying toward the land of Zinaan, the image of which, a scorpion, she carries in her beak, having just lost her grasp on the southern part of the country, as indicated by her hanging leg with the claw half open, and the sign Kan, "south," forming the rump of the bird.

"The northern parts of the Mayax being thoroughly cowed he, having vanished one by one all who had hid her, joined the severed parts and again made the country whole."

This took place on the fourth day of the eighth month, that is on the I manik of the month Mol of the year Kan, eight months and twenty-five days after the queen's departure for Zinaan.

The illustration speaks for itself---the artist represents King Aac carrying away the whole country.

The queen not feeling safe in Zinaan, which seems to have been subject to the rulers of Mayax, continued her flight further East, in the hope of reaching the "Land of Mu." She was accompanied by her suite, her adherents and her youngest son Hul. Not finding any vestige of the ill-fated Mu, that had sunk and entirely disappeared under the waves of the ocean but a short time before---on the thirteen chuen of the month Zac in the year Kan---(about 7,500 years B. C.), according to the same Maya author, she proceeded onward intent on reaching the Maya settlements already founded in the lands of the Rising Sun.

Did she reach the valley of the Nile and settle on the banks of that river with her followers, thus laying the foundation of the nation of most renown in ancient history? Was it Moo, the queen of Chichen, in Mayax, who became Mau or Isis, the deity adored with such reverence in the temples of Egypt that her worship was superior even to that of Osiris?

One must be very suspicious of anyone who claims to be able to "read" a Mayan codex! L. Sprague de Camp reports on Le Plongeon's excesses in his book Lost Continents.

MGW-005 AN ANCIENT ROMAN SETTLEMENT IN AMERICA?

Mack, Bill; Argosy, 376:42-43, March 1972.

Many anomalous inscriptions and artifacts, purportedly indicating very early trans-oceanic contacts have been discovered in North America. Here is a popular article describing several of them.

Compiler's Summary: The predominantly Mexican community of Los Lunas is located near Albuquerque, New Mexico, in the fertile borders of the Rio Grande River. The Rio Puerco, a dried-up tributary of the Rio Grande, skirts Los Lunas. Within sight of Los Lunas, sixteen miles from Los Lunas, is a basaltic outcrop. Chiseled on one of the huge boulders in the area are the Ten Commandments---in Phoenician. Called Inscription Rock, its existence has been known for over a century. Now largely forgotten, it was once the subject of much study and debate. Generally it was considered a hoax.

Mack's article goes on to relate how John Wagner, a former employee of Stanford Research Institute, now a writer and archeological illustrator, travelled with the author to New Mexico to examine Inscription Rock. Their ultimate conclusion was that some 1100 years ago the American Southwest was host to a group of pre-columbian refugees from the Mediterranean area.

The conclusion of the two writers is based on additional discoveries, as well as Inscription Rock, such as some crude lead crosses, short ceremonial swords, and some rough lance heads found near Tucson in 1924. Inscribed on the crosses were messages in badly jumbled Latin telling of how a group of Roman Christians had fled to the Americas to escape religious persecution. The artifacts were turned over to the University of Arizona and, after some controversy, designated as a hoax.

Mack supports the legitimacy of the artifacts, noting that they were heavily encrusted with caliche, a hard mineral deposit similar to concrete. Caliche forms on objects in the desert only after centuries of water percolation through the mineral-bearing soil.

The controverted artifacts are now in the possession of Thomas Bent, who has written a large typescript book defending them. Mack notes that this book may be found at the library of the Department of Anthropology of the University of Arizona.

According to Mack, Inscription Rock and the anomalous artifacts created quite a stir for a short while and were then swept under the rug and "relegated to that special limbo reserved for such disturbing finds."

Mack and Wagner did further research and turned up a case in which the discovery of Roman coins was reported. A young couple had shown strange coins to Mrs. A. W. Marshall, a librarian in Deming, New Mexico. The coins were subsequently identified as Roman. The couple stated that they had found them while exploring a cave in the nearby Cook Mountains. [Note that Roman coins have been found frequently in mounds in the eastern U. S.]

The coins, plus Inscription Rock, plus the lead crosses add up to proof to Mack. Proof that ancient Romans were in the area 1100 years ago. The dates of discovery; 1968, the 1800s, and 1924, respectively, make it doubtful that a single hoaxer did all three.

Mack states his conclusion thus: "It is our conviction that a ship carrying the Romans, most probably crewed by Phoenicians, entered the Rio Grande from the Gulf of Mexico, sailed up that long river until it reached the tributary Rio Puerco, sailing up that then navigable stream by intent or accident, and then for reasons unknown, abandoned the ship." In their wanderings and possible settlement the group of immigrants deposited the crosses, coins, and other artifacts, and carved Inscription Rock.

MGW-005 WRITING

The article has a photograph of two lead crosses with this caption:

Among ceremonial swords and roughly-made lance heads found on desert property near Tucson, Arizona in 1924 were these crudely-made leaden crosses believed to have been left by Roman Christians. Inscribed in badly jumbled and confusing Latin, the texts translated as follows: Left: "Benjamin was king of the people. He came from Seine to Rome. The bravest of the Gauls. He came to the assistance of the people to lay the foundation of the city. He built a wall around the city to resist the enemy. Benjamin---mighty in strength, he filled the multitude with religion. He was slain by the Thebans. I heard this from my father 500 years after, behind the mountain, in memory of his father, Joseph." (Vertical lines) "880 A. D. ---Israel Third was banished, for he had liberated the Toltezus. He was slain first to break the custom. The earth trembled, fear overwhelmed the hearts of mortals in the third year after he had fled. They betook themselves into the city and kept themselves within the walls. Thou shalt not bury or burn a dead body in the city. Right: "Before the city extended a plain; hills encompassed the city. It is a hundred years since Jacobus was king. Jacobus was busy in the front lines---he attended everything, fought much in person and often struck down the enemy. Israel gave his attention to the appointment of priests. Life has been granted to us, a people of extensive sway." (Vertical lines) "An unknown land, A. D. 895. May I be able to accomplish my endeavors to serve the King. It is uncertain how long life will continue. There are many things which may be while the war was raging. Three thousand men were slain, the leaders with their chiefs were taken, nothing but peace was sought. God ordains all things. O. L."

SECTION ML: LEGENDS, MYTHS, CONCEPTS

The physical records of ancient man are sparse compared to the immense amount of information transmitted across the gulf of time by word of mouth. Messages and hidden meanings probably abound in myth and legend, especially in those of world-wide distribution. The keys to understanding this body of data seem to have been lost and the tendency is to interpret myth and legend in a condescending fashion. Why, for example, detract from ancient man because we have not discovered vast written records? Perhaps memories were better in those days! Such a surmise, however, is not in the spirit of these sourcebooks, for it is wise to avoid hypotheses; although the purpose here is to accumulate data that tend to support such radical hypotheses.

*MLD Dwarfs.

*MLE Elementals.

MLG Gods, messiahs.

MLM Giants.

*MLO Origin of man.

MLW Cosmology, world history. Legends of ancient terrestrial catastrophism are included here; viz., the Deluge.

*This subsection not represented in Volume M1.

LEGENDS, MYTHS, CONCEPTS

G-001 THE MEXICAN MESSIAH

ly, Dominick; American Antiquarian, 11:14-30, 1889.

The possibility that Quetzatcoatl and the Irish missionary, St. Brendan, were one has been an increasingly popular subject in recent years. Daly is an enthusiastic supporter of this hypothesis.

There are few more puzzling characters to be found in the pages of history than Quetzatcoatl, the wandering stranger whom the early Mexicans adopted as the Air-God of their mythology. That he was a real personage; that he was a white man from this side of the Atlantic, who lived and taught in Mexico centuries before Columbus; that what he taught was Christianity and Christian manners and morals---all these are plausible inferences from facts and circumstances so peculiar as to render other conclusion well-nigh impossible.

When, in 1519, Cortez and his 600 companions landed in Mexico they were astonished at their coming being hailed as the realization of an ancient native tradition, which ran in this wise: Many centuries previously a white man had come to Mexico from across the sea (the Atlantic) in a boat with wings (sails) like those of the Spanish vessels. He stayed many years in the country and taught the people a system of religion, instructed them in principles of government, and imparted to them a knowledge of many industrial arts. He won their esteem and veneration by his piety, his many virtues, his great wisdom and his knowledge of divine things. His stay was a kind of golden age for Mexico. The seasons were uniformly favorable and the earth gave forth its produce almost spontaneously and in miraculous abundance and variety. In those days a single head of maize was a load for a man, the cotton trees produced quantities of cotton already tinted in many brilliant hues; flowers filled the air with delicious perfumes; birds of magnificent plumage incessantly poured forth the most exquisite melody. Under the auspices of this good white man, or god, peace, plenty and happiness prevailed throughout the land. The Mexicans knew him as Quetzatcoatl, or the green serpent, the word green in this language being a term for a rare and precious thing. Through some malign influence---brought about by the enmity of a rival deity---Quetzatcoatl was induced or obliged to quit the country. On his way to the coast he stayed for a time at the city of Cholula, where subsequently a great pyramidal mound surmounted by a temple was erected in his honor. On the shores of the gulf of Mexico he took leave of his followers, soothing their sorrow at his departure with the assurance that he would not forget them, and that he himself or some one sent by him would return at some future time to visit them. He had made for himself a vessel of serpents' skins, and in this strange contrivance he sailed away in a northeasterly direction for his own country, the holy island of Hapallan, lying beyond the great ocean.

Such in outline was the strange tradition which Cortez found prevalent in Mexico on his arrival there, and powerfully influencing every inhabitant of the country from the great Montezuma, who ruled as king paramount in the city of Mexico, to the humblest serf who tilled the fields of his lord. Equally to their surprise and advantage the Spaniards found that their advent was hailed as the fulfilment of the promise of Quetzatcoatl to return. The natives saw that they were white men and bearded like him, they had come in sailing vessels such as the one he had used across the sea; they had clearly come from the mysterious Hapallan; they were undoubtedly Quetzatcoatl and his brethren come, in fulfilment of ancient prophecy, to restore and permanently re-establish in Mexico the reign of peace and happiness of which the country had had a brief experience many centuries before.

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The Spaniards made no scruple of encouraging and confirming a belief so high favorable to their designs and it is conceded by their writers that this belief to a large extent accounts for the comparative ease and marvelous rapidity with which a mere handful of men made themselves masters of a great and civilized empire and subjugated a warlike population of millions. To the last the unfortunate emperor Montezuma, in spite of much evidence of the ungodlike character of the Spaniards held to the belief that the king of Spain was Quetzatcoatl and Cortez his lieutenant and emissary under a sort of divine commission.

The Mexicans had preserved a minute and apparently an accurate description of the personal appearance and habits of Quetzatcoatl. He was a white man, advanced in years and tall in stature. His forehead was broad; he had a large beard and black hair. He is described as dressing in a long garment, over which there was a mantle marked with crosses. He was chaste and austere, temperate and abstemious, fasting frequently and sometimes inflicting severe penances on himself, even to the drawing of blood. This is a description which was preserved for centuries in the traditions of a people who had no intercourse with or knowledge of Europe, who had never seen a white man, and who were themselves dark skinned with but few scanty hairs on the skin to represent a beard.

It is therefore difficult to suppose that this curiously accurate portraiture of Quetzatcoatl as an early European ecclesiastic was a mere invention in all its parts---a mere fable which happened to hit on every particular and characteristic of such an individual. Nor is it easier to understand why the early Mexicans should have been at pains to invent a messiah so different from themselves, and with such peculiar attributes. Yet in spite of destructive wars, revolutions and invasions---in spite of the breaking up and dispersal of tribes and nations once settled in the vast region now passing under the name of Mexico---the tradition of Quetzatcoatl and the account of his personal peculiarities survived among the people to the days of the Spanish invasion. Everything therefore tends to show that Quetzatcoatl was an European who by some strange adventure was thrown amongst the Mexican people and left with them recollections of his beneficent influence which time and change did not obliterate. But time and change must have done much in the course of centuries to confuse the teachings of Quetzatcoatl. These would naturally be more susceptible of mutation than the few striking items of his personal appearance which (if only on account of their singularity) must have deeply impressed the Mexicans, generation after generation. Notwithstanding such mutation enough remained of the teachings of Quetzatcoatl to impress the Spaniards of the sixteenth century with the belief that he must have been an early Christian missionary as well as a native of Europe. They found that many of the religious beliefs of the Mexicans bore an unaccountable resemblance to those of Christians. The Spanish ecclesiastics, in particular, were astounded at what they saw and knew not what to make of it. Some of them supposed that St. Thomas, "the apostle of India," had been in the country and imparted a knowledge of Christianity to the people; others with pious horror and in mental bewilderment declared that the Evil One himself had set up a travesty of the religion of Christ for the more effectual damning of the souls of the pagan Mexicans.

The religion of the Mexicans as the Spaniards found it was in truth an amazing and most unnatural combination of what appeared to be Christian beliefs and Christian virtues and morality with the bloody rites and idolatrous practices of pagan barbarians. The mystery was soon explained to the Spaniards by the Mexicans themselves. The milder part of the Mexican religion was that which Quetzatcoatl had taught them. He had taught it to the Toltecs, a people who had ruled in Mexico some centuries before the arrival of the Spaniards. The Aztecs were in possession of power when the Spaniards came and it was they who had introduced that part of the Mexican religion which was in such strong contrast to the religion established by Quetzatcoatl. It appeared further that the Toltec rule

in the land had ceased about the middle of the eleventh century. They were a people remarkably advanced in civilization and mental and moral development. Somewhere between the latter part of the fourth century and the middle of the seventh century they were supposed to have come into Mexico from the Northeast ---possibly from the Ohio valley, where vast remains of a strange character have been found. They were versed in the arts and sciences, and their astronomical knowledge was in many respects in advance of that of Europe. They established laws and regular government in Mexico during their stay in the country, but about the year 1050 A. D. they disappeared south by a voluntary migration, the cause of which remains a mystery. They are supposed to have been, subsequently, the builders of the great cities the marvelous remains of which are found in the wilds of Central America. In the migration of the Toltecs some remained behind from choice or necessity, but no attempt appears to have been made at reestablishing a Toltec empire and government in Mexico.

After the lapse of a century or more from the era of the great Toltec migration the first bands of Aztecs began to appear. They were wanderers from the Northwest, the Pacific slopes of North America, and were a fierce and warlike people, possessing little capacity for the mental and moral refinement and high civilization of their Toltec predecessors. It was not until the middle of the fourteenth century that the Aztecs acquired sufficient settled habits to enable them to found states and cities, and by that time they seem to have adopted so much of what had been left of Toltec civilization and Toltec religion as they were capable of absorbing, without, however, abandoning their own ruder ideas and propensities. Hence the incongruous mixture of civilization and barbarism, mildness and ferocity, gentleness and cruelty, refinement and brutality, presented by Mexican civilization and religion to the astonished contemplation of the Spaniards when they entered the city two centuries later. "Aztec civilization was made up" (as Prescott, the author of the History of Mexico, says), "of incongruities apparently irreconcilable. It blended into one the marked peculiarities of different nations, not only of the same phase of civilization, but as far removed from each other as the extremes of barbarism and refinement."

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All that was savage and barbarous in the religious rites of the Mexicans was attributed by the Mexicans themselves to the Aztecs; all that was gentle and humanizing to the Toltecs, and probably with substantial justice in each instance. To a Toltec origin was assigned those doctrines and practices which struck the Spaniards as remnants of an early knowledge of Christianity. The Aztecs only came into the inheritance of those doctrines and practices at second hand---that is from the remnants of the Toltec people. The new-comers were probably little disposed to submit wholly to the influence of alien religious ideas essentially different from their own gloomy and sanguinary notions of divine things. Some they adopted, while still retaining their own national observances, and hence the extraordinary mixture of brutality and gentleness presented to the wondering contemplation of the Spaniards by the Mexican cult as they found it in the early part of the sixteenth century. The better, that is the Toltec side of this mixed belief included amongst its chief features a recognition of a supreme God, vested with all the attributes of the Jehovah of the Jews. He was the creator and the ruler of the universe, and the fountain of all good. Subordinate to him were a number of minor deities, and opposed to him a father of all evil. There was a paradise for the abode of the just after death, and a place of darkness and torment for the wicked. There was an intermediate place which was not perhaps so much a purgatory as a second-class heaven. There had been a common mother of all men, always pictorially represented as in company with a serpent. Her name was Cicacoatl, or "the serpent woman," and it was held that "by her sin came into the world." She had twin chil-

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dren, and in an Aztec picture preserved in the Vatican at Rome those children are represented as quarreling. The Mexicans believed in a universal deluge, from which only one family (that of Coxcox) escaped. Nevertheless, and inconsistently enough with this, they spoke of a race of wicked giants, who had survived the flood and built a pyramid in order to reach the clouds; but the gods frustrated their design by raining fire upon it. Tradition associated the great pyramid at Cholula with this event. This was the pyramid which had been erected to Quetzacoatl, and which had a temple on the summit dedicated to the worship of him as the god of air. The Mexicans regarded Cholula as the one holy city---the Jerusalem or Mecca of their country---from having been the place of abode of Quetzacoatl. The pyramid in a dilapidated condition still remains, and is surmounted by a chapel for Christian worship. It is scarcely necessary to suggest that the traditions of Cicacoatl, Coxcox, the giants and the pyramid at Cholula, are extremely like a confused acquaintance with biblical narratives.

The foregoing are merely specimens of the more remarkable features of Mexican belief, and they are so special and peculiar in character as to leave no reasonable alternative to the supposition that the Mexicans must have had imparted to them at one time a knowledge of the bible. This has induced in some quarters the opinions that the Mexicans are descendants of the lost tribes of Israel; but whatever may be the arguments for or against this theory, the still more abundant knowledge of a Christian-like character possessed by the ancient Mexicans is strongly suggestive of Christian teaching, which would sufficiently account for familiarity with narratives contained in the Old Testament.

Whether due to such teaching or to accidental coincidence, it is certain that the Mexicans held many points of belief in common with Christians. They believe in the Trinity, the Incarnation, and apparently the Redemption. One of the first things which struck the Spaniards on their arrival in Mexico was the spectacle of large stone crosses on the coast and in the interior of the country. These were objects of veneration and worship. One cross of marble near one of the places the Spaniards named Vera Cruz was surmounted by a golden crown, and in answer to the curious inquiries of the Spanish ecclesiastics the natives said that "one more glorious than the sun had died upon a cross." In other places the Spaniards were informed that the cross was a symbol of the god of rain. At any rate it was an object of divine association and consequent adoration. In the magnificent pictorial reproduction of Mexican antiquities published by Lord Kingsborough there is a remarkable sketch of a monument representing a group of ancient Mexicans in attitudes of adoration around a cross of the Latin form. The leading figure is that of a king or priest holding in his outstretched hands a young infant, which he appears to be presenting to the cross.

Further acquaintance with the people and their religious ideas disclosed to the Spaniards additional evidence of Christian-like beliefs. They believed in original sin and practiced infant baptism. At the naming of the infant the lips and bosom of the child were sprinkled with water and the Lord was implored to "permit the holy drops to wash away the sin that was given to it before the foundation of the world, so that the child might be born anew."

Confession to the priests, absolution and penance, were also features of the Mexican religion. The secrets of the confessional were esteemed inviolable. Absolution not only effaced moral guilt but was held to free the penitent from responsibility for breaches of the secular law. Long after the Spaniards had established their rule in the country it was a common thing for native culprits, especially in the remoter districts, to demand acquittal on the plea that they had confessed their crimes to the priest.

The Mexican prayers and invocations were strongly Christian in character. The priestly exhortation, after confession, was---"Feed the hungry and clothe the naked according to your circumstances, for all men are of one flesh." Another

form of exhortation was---"Live in peace with all men; bear injuries with humility; leave vengeance to God, who sees everything." Among the invocations to the deity was the following---"Wilt thou blot us out, O Lord, forever? Is this punishment intended not for our reformation but for our destruction?" Again, "Impart to us, out of Thy great mercy, Thy gifts, which we are not worthy to receive through our own merits." A still more striking similarity to scriptural morality and expression is contained in the admonition---"He who looks too curiously on a woman commits adultery with his eyes."

The Mexicans believed in the doctrine of transubstantiation in its strictest form, and even in its Roman Catholic peculiarity of communion under one kind. Communion and administration of the eucharist took place at stated intervals. The priest broke off morsels from a sanctified cake of maize and administered it to the communicant as he lay prostrate on the ground. Both priest and communicant regarded the material as the very body of God himself. The religious consumption of a horrible mixture of maize and human blood, and sometimes flesh, has already been alluded to as associated with the worship of the Aztec war god, Huitzilopochtli, and is suggestive of an Aztec perversion of the Christian, and apparently Toltec, idea of transubstantiation. On some occasions a model of the god was formed out of a paste of maize flour tempered by the blood of young children sacrificed for the purpose, the figure being subsequently consumed by the worshippers.

The Mexican priesthood had much in common, and little in conflict, with the priesthood of the papacy. Celibacy was esteemed a merit and was observed by certain orders, though not by all; but all were governed by rules of a monastic character, very similar and quite as severe as those in force in the earlier ages of the Christian church. Thrice during the day and once at night the priests lodging in the great temples were called to prayer. They also mortified the flesh by fasting and abstinence, by severe penances, flagellations, and piercing the flesh with sharp thorns. They undertook the entire education of the young and devoted themselves to works of charity. The great cities and rural districts were divided into parishes, each presided over by a priest. These priests were of a different order and had different functions from the priests who lived and served in the temples, and seem to have been in all important respects similar to the regular parochial clergy of Christian countries. The inference to be drawn by students of early Mexican history from these apparent remnants of Christian teaching is very much a matter of personal capacity and individual idiosyncrasy. Probably the majority will conclude that the Mexicans must have had Christian enlightenment from some source at a time long antecedent to the Spanish invasion. That such enlightenment should have become obscure and confused in the lapse of centuries, through the operation of revolutions, and by contact with Aztec idolatry, would not be surprising; the only wonder would be that so much that was still Christian-like should remain at the beginning of the 16th century. Was it then remains of Christianity which the Spaniards found? There is no reason to doubt the concurrent testimony of their writers and historians, lay and clerical, as to what they did find. There could be no adequate motive for a general conspiracy amongst them to manufacture evidence and invent fables for the purpose of making it appear that the people whom they were about to plunder, enslave and slaughter were a sort of Christian. On the contrary, their expressions of surprise and horror at finding Christian doctrines and Christian practices, intermingled with the grossest idolatry and most barbarous and bloody rites, are too natural and genuine to be mistaken. They---the direct observers and with the best opportunities for judging---had no doubt that what they saw was a debased form of Christianity. The points of resemblance with real Christianity were too numerous and too peculiar to permit the supposition that the similarity was accidental and unreal. With them the only difficulty was to account for the possession of Christian knowledge

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by a people so remote and outlandish--or rather to trace the identity of Quetzatcoatl, the undoubted teacher of the Mexicans. Their choice lay between the dev and St. Thomas. However respectable the claims of the former, it is clear enough that the St. Thomas was not Quetzatcoatl and had never been in Mexico. He was dragged in at all because the Spaniards long clung to the idea that America was a part of India, and St. Thomas was styled "the Apostle of India," on the authority of an ancient and pious but very doubtful tradition. The weakness of the case for St. Thomas secured a preference for the claims of the devil, and the consensus of Spanish opinion favored the idea that Quetzacoatl (sic) was indeed the devil himself, who, aroused by the losses which Christ had inflicted upon him in the old world, had sought compensation in the new, and had beguiled the Mexicans into the acceptance of a blasphemous mockery of the religion of Christ infinitely more wicked and damnatory than the worst form of paganism.

Another theory as to the identity of Quetzatcoatl may here be noticed. Lord Kingsborough makes the startling suggestion that Quetzatcoatl was no other than Christ himself, and in support of this maintains that the phonetic rendering, in the Mexican language, of the two words "Jesus Christ" would be as nearly as possible "Quetzat Coatl." He does not mean to say that Christ was ever in Mexico, but his suggestion is that the Mexicans, having obtained an early knowledge of Christianity, and become acquainted with the name and character of its Divine Founder, imagined in subsequent ages that Christ had actually been in Mexico, and so built up the tradition of Que-zatcoatl. But this theory does not get rid---on the contrary makes essential---the presence of a missionary in Mexico through whom the people were instructed in the truths of Christianity, and from whom they obtain~1 a knowledge of Christ. It is of course possible that in the lapse of ages the Mexicans might have transferred to this missionary the name of the great founder of his religion, but that there was no confusion of personalities is obvious, for in and in many personal peculiarities Quetzatcoatl is represented as very different from the earthly figure of Christ. It may further be noted that the terms "Quetzatcoatl" has a clear and appropriate significance ("Green Serpent") in the Mexican language, and this is somewhat inconsistent with the supposition that they are a close phonetic rendering of the words "Jesus Christ." In fact Lord Kingsborough's ingenious and not wholly improbable theory in no degree helps to the identity of the early Christian missionary called Quetzatcoatl.

But whoever Quetzatcoatl may have been, and whatever might be the right designation of the religion which he taught, it is clear beyond question that he was the medium through which the Mexicans obtained their curious Christianlike knowledge. To him there is no rival. The Aztecs claimed the honor of being the importers of the terrible Huitzilopochtli and all the unholy rites connected with his worship. They, and all other Mexicans, agreed in assigning the milder features of Mexican worship to the teachings of Quetzatcoatl. To him also they attributed the foundation of the monastic institutions and clerical systems, and the introduction of baptism, confession, communion, and all the beliefs, ceremonies, and practices, having a greater or less resemblance to those of the Christian religion.

It is, therefore, hard to understand what it was that Quetzatcoatl taught if it was not Christianity, and equally hard to conceive what he could have been if he were not a Christian missionary. His personality and attributes are altogether, and without a single exception or the slightest qualification, those of an early Christian missionary. A white man, with all the peculiarities of an European, teaches to a remote and isolated pagan people something, the remnants of which in after centuries bears an extraordinary resemblance to Christianity. Could that "something," coming from such a source, be other than Christianity? The teacher himself is depicted as a perfect and exalted type of a Christian missionary, though the Mexicans could have had no model to guide them in their delineation of

such a character. The "Lives of the Saints," the "Annals of the Faith," any records of the lives and labors of pious and devoted Christian missionaries, supply no more perfect nor more Christian-like character than that of Quetzatcoatl. Long, earnestly and successfully he preached the worship of the great unseen but all present God, and taught the Mexicans to trust in an omnipotent and benevolent Father in heaven. He preached peace and good will amongst men, and he "stopped his ears when war was spoken of." He encouraged and taught the cultivation of the earth, and the arts and sciences of peace and civilization. He conferred upon the Mexicans, through the great influence he seems to have obtained over them, so many material benefits that in after ages they exaggerated the period of his rule into a veritable golden age, and impiously exalted himself into a deity of the most benevolent attributes. The impression he made was indeed so profound that the memory of his virtues and good works survived and were exaggerated through centuries of change and trouble, and made him acceptable as a god even to the rude intruding barbarians, who only learnt of him remotely and at second hand, ages after the completion of his mission. Chaste, frugal, earnest, self denying, laborious, he stands depicted in Mexican tradition as the highest specimen of an apostolic saint or early Christian missionary. Can he then be an imaginary person? Could the early Mexican pagans have evolved such a character from their own fancy, or created it out of pagan materials? The thing seems incredible. It would indeed be a curious thing if the Mexicans---never having seen a white man, and wholly ignorant of European ideas and beliefs---had invented a fable of a white man sojourning amongst them; it would be still more curious if, in addition to this, they had invented another fable of that white man instructing them in European religion and morals. The white man without the teaching might be a possible but still a doubtful story; the teaching without the white man would be difficult to believe; but the white man and the teaching together make up a complete and consistent whole almost precluding the possibility of invention.

Three points in relation to Quetzatcoatl seem well established: (1) He was a white man from across the Atlantic; (2) he taught religion to the Mexicans; (3) the religion he taught retained to after ages many strong and striking resemblances to Christianity. The conclusion seems unavoidable---that Quetzatcoatl was a Christian missionary from Europe who taught Christianity to the Mexicans or Toltecs.

Accepting this as established, the possibility of fixing the European identity of Quetzatcoatl presents itself as a curious but obviously difficult question. To begin with, the era of Quetzatcoatl is not known with any precision. It has a possible range of some six and a half centuries---from before the beginning of the fourth century to the middle of the tenth century---that is from about A. D. 400 to A. D. 1050, which is the longest time assigned to Toltec domination in Mexico. The era of Quetzatcoatl may, however, be safely confined to narrower limits. The Toltecs must have been well established in the country before Quetzatcoatl appeared amongst them, and he must have left some considerable time before their migration from Mexico. The references to Quetzatcoatl's visits to the Toltec cities prove the former, and the time which would have been required to arrange for and complete the great pyramid built at Cholula in his honor, and after his departure, proves the latter. From a century to two centuries may be allowed at each end of the period between A. D. 400 and A. D. 1050, and it may be assumed with some degree of probability that Quetzatcoatl's visit to Mexico took place some time between (say) A. D. 500 and A. D. 900.

If attention is directed to the condition of Europe during that time it will be found that the period from about A. D. 500 to A. D. 800 was one of great missionary activity. Before the former date the church was doing little more than feeling its way and asserting itself against the pagan supremacy in the basin of the Mediterranean and elsewhere. After the latter date the incursions and devastations of the northern barbarians paralyzed European missionary efforts. But from the be-

ginning of the fifth century to the beginning of the eighth there was no limit to missionary enterprise, and if even a Christian missionary had appeared in Mexico all probability favors the theory that he must have gone there during those centuries. The era of Quetzatcoatl may therefore be narrowed to those three hundred years, and the task of tracing his identity thus simplified to some slight extent.

It may now be asked: Is it reasonable to expect that there are, or ever were, any European records of the period from A. D. 500 to A. D. 800 referring to any missionary who might have been Quetzatcoatl? It is a long time since Quetzatcoatl, whoever he was, sailed from the shores of Europe to carry the truths of Christianity into the unknown regions beyond the Atlantic, but the literary records of his assumed period are numerous and minute and might possibly have embraced some notice of his undertaking. It seems unlikely that his enterprise would have escaped attention altogether, especially from the ecclesiastical chroniclers, who were not given to ignoring the good works of their fellow religionists. Moreover, the mission of Quetzatcoatl was not one which could have been launched quietly or obscurely, nor was there any reason why it should be. The contemplated voyage must have been a matter of public knowledge and comment in some locality; it could not have been attempted without preparations on some scale of magnitude; and such preparations for such a purpose must have attracted at least local attention and excited local interest. It is thus reasonable to suppose that the importance and singularity of a project to cross the Atlantic for missionary purposes would have insured some record being made of the enterprise. *A fortiori* if the venturesome missionary ever succeeded in returning---if he ever came back to tell of his wonderful adventures---the fact would have been chronicled by his religious conferees and made the most of, then and for the benefit of future ages. It comes therefore to this---accepting Quetzatcoatl as a Christian missionary from Europe we have right and reason to expect that his singular and pious expedition would have been put upon record somewhere.

The next step in the inquiry is to search for the most likely part of Europe to have been the scene of the going forth and possible return of this missionary. The island of Hapallan, says the Mexican tradition, was the home from whence he came and whither he sought to return. The name of the country afforded us assistance, and it might not be safe to attach importance to its insular designation. But in looking for a country in Western Europe---possibly an island---which, from A. D. 500 to A. D. 800, might have sent out a missionary on a wild trans-Atlantic expedition, one is soon struck with the possibility of Ireland being such a country. To the question, 'Could Ireland have been the Hapallan, or Holy Island, of the Mexican tradition?' an affirmative answer may readily be given, especially by any one who knows even a little of the ecclesiastical history of the country from A. D. 500 to A. D. 800. In that period no country was more forward in missionary enterprise. The Irish ecclesiastics shrunk from no adventures of land or sea, however desperate and dangerous, when the eternal salvation of heathen peoples was in question. On land they penetrated to all parts of the continent, preaching the gospel of Christ and founding churches and religious establishments. On sea they made voyages for like purposes to the remotest known lands of the northern and western seas. They went as missionaries to all parts of the coast of Northern Britain, and visited the Hebrides, the Orkneys, and the Shetland and Faro Islands. Even remote Iceland received their pious attention, and Christianity was established by them in that island long before it was taken possession of by the Norwegians in the eighth century.

Prima facie, then, Ireland has not only a good claim, but really the best claim to be the Hapallan of the Mexicans. It is the most western part of Europe; it is insular, and in the earlier centuries of the Christian era was known as the "Holy Island"; between A. D. 500 and 800 it was the most active centre of missionary enterprise in Europe, and its missionaries were conspicuous above all others

for their daring maritime adventures. It is natural therefore to suspect that Ireland may have been the home of Quetzatcoatl, and, if that were so, to expect that early Irish records would certainly contain some references to him and his extraordinary voyage. Upon this the inquiry suggests itself: Do the early Irish chronicles, which are voluminous and minute, contain anything relating to a missionary voyage across the Atlantic at all corresponding to that which Quetzatcoatl must have taken from some part of Western Europe?

To one who, step by step, had arrived at this stage of the present inquiry, it was not a little startling to come across and obscure an almost forgotten record which is, in all its main features, in most striking conformity with the Mexican legend of Quetzatcoatl. This is the curious account of the trans-Atlantic voyage of certain Irish ecclesiastic named St. Brendan in the middle of the sixth century---about A. D. 550. The narrative appears to have attracted little or no attention in modern times, but it was widely diffused during the Middle Ages. In the Bibliothéque at Paris there are said to be no less than eleven MSS. of the original Latin narrative, the dates of which range from the eleventh to the fourteenth centuries. It is also stated that versions of it, in old French and Romance, exists in most of the public libraries of France; and in many other parts of Europe there are copies of it in Irish, Dutch, German, Italian, Spanish and Portuguese. It is reproduced in Irsher's "Antiquities," and is to be found in the Cottonian collection of MSS.

This curious account of St. Brendan's voyage may be altogether a romance, as it has long been held to be, but the remarkable thing about it is the singularity of its general concurrence with the Mexican tradition of Quetzatcoatl.

St. Brendan---called "The Navigator," from his many voyages was an Irish bishop who in his time founded a great monastery at Cloufert, on the shores of Kerry, and was the head of a confraternity or order of 3,000 monks. The story of his trans-Atlantic voyage is as follows: From the eminence now called after him, Brendan Mountain, the saint had long gazed upon the Atlantic at his feet and speculated on the perilous condition of the souls of the unconverted peoples who possibly inhabited unknown countries on the other side. At length, in the cause of Christianity and for the glory of God, he resolved upon a missionary expedition across the ocean, although he was then well advanced in years. With this purpose he caused a stout bark to be constructed and provisioned for a long voyage, a portion of his supplies consisting of five swine. Taking with him some trusty companions he sailed from Tralee Bay, at the foot of Brendan Mountain, in a southwesterly direction. The voyage lasted many weeks, during several of which the vessel was carried along by a strong current without need of help from oars or sail. In the land which he ultimately reached the saint spent seven years in instructing the people in the truths of Christianity. He then left them, promising to return at some future time. He arrived safely in Ireland, and, in after years (mindful of the promise he had made to his trans-Atlantic converts) he embarked on a second voyage. This, however, was frustrated by contrary winds and currents, and he returned to Ireland, where he died in 575 at the ripe age of 94 and "in the adorn of sanctity."

It would be idle to expect a plain matter of fact account of St. Brendan's voyage from the chroniclers of the sixth century. The narrative is, in fact, interwoven with several supernatural occurrences. But eliminating these there remains enough of apparently real incident worthy of serious attention. The whole story, as already suggested, may be a mere pious fable promulgated and accepted in a non-critical and ignorant and credulous age. If substantially true the fact could not be verified in such an age; if a pure invention its falsity can not now be demonstrated. All that can be said about it is that it is in wonderful agreement with what is known or may be inferred from the Mexican legend. The story of St. Brendan's voyage was written long before Mexico was heard of, and if forged it could not have been with a view to offering a plausible explanation of a singular

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Mexican tradition. And yet the explanation which it offers of that tradition is so complete and apropos on all material points as almost to preclude the idea of accidental coincidence. In respect to epoch, personal characteristics, race, religion, direction of coming and going---the Mexican Quetzatcoatl might well have been the Irish saint. Both were white men, both were advanced in years, both crossed the Atlantic from the direction of Europe, both preached Christianity and Christian practices, both returned across the Atlantic to an insular home or Holy Island, both promised to come back and failed in doing so. These are at least remarkable coincidences, if accidental.

The date of St. Brendan's voyage---the middle of the sixth century---is conveniently within the limits which probability would assign to the period of Quetzatcoatl's sojourn in Mexico, namely from about the fifth to the eighth centuries. The possibility of making a voyage in such an age from the Western shores of Europe to Mexico is proved by the fact that the voyage was made by others at about the same time. The probability of St. Brendan designing such a voyage is supported alike by the renown of the saint as a "navigator," and by the known maritime enterprises and enthusiastic missionary spirit of the Irish of his time; the supposition that he succeeded in his design is countenanced by the ample preparations he is said to have made for the voyage.

There is a disagreement between the Mexican tradition and the Irish narrative in respect to the stay of the white man in Mexico. Quetzatcoatl is said to have remained twenty years in the country, but only seven years---seven Eastern---are assigned to the absence of St. Brendan from his monastery. Either period would probably suffice for laying the foundations of the Christianity the remnant of which the Spaniards found in the beginning of the sixteenth century. On this point the Irish record is more likely to be correct. The Mexican tradition was already very ancient when the Spaniards became acquainted with it---as ancient as the sway of the vanished Toltecs. For centuries it had been handed down from generation to generation, and not always through generations of the same people. It is therefore conceivable that it may have undergone variations in some minor particulars, and that a stay of seven years became exaggerated into one of twenty years. The discrepancy is not a serious one, and is in no sense a touch-stone of the soundness of the theory that Quetzatcoatl and St. Brendan may have been one and the same person.

A curious feature in the Mexican tradition is its apparently needless insistency upon the point that Quetzatcoatl sailed away from Mexico in a vessel made of a serpents' skins. There seems no special reason for attributing this extraordinary mode of navigation to him. If the design were to enhance his supernatural attributes some more strikingly miraculous mode of exit could easily have been invented. The first impulse accordingly is to reject this part of the tradition as hopelessly inexplicable---as possibly allegorical in some obscure way, or as originating in a misnomer, or in the mis-translation of an ancient term. But further consideration suggests the possibility of their being more truth in the "serpents skins" than appears at first sight. In the absence of large quadrupeds in their country the ancient Mexicans made use of serpents' skins as a substitute for hides. The great drums on the top of their temple-crowned pyramids were, Cortez states, made of the skins of a large species of serpent, and when beaten for alarm could be heard for miles around. It may therefore be that Quetzatcoatl in preparing for his return voyage across the Atlantic made use of the skins of serpents or crocodiles to cover the hull of his vessel and render it water-tight. The Mexicans were not boat-builders and were unacquainted with the use of tar or pitch, employing only canoes dug out of the solid timber. When Cortez was building the brigandines with which he attacked the City of Mexico from the lake, he had to manufacture the tar he required from such available trees as he could find. Quetzatcoatl may have used serpents' skins for a similar purpose, and such use would imply that the

vessel in which he sailed away was not a mere canoe, but a built-up boat. If he was really St. Brendan nothing is more likely than that he would seek for a substitute for tar or pitch in skins of some sort. Coming from the west coast of Ireland, he would be familiar with the native currahs, couracles, or hide-covered boats then in common use (and not yet wholly discarded) for coasting purposes, and sometimes for voyages to the coasts of Britain and continent of Europe. Some of these were of large size and capable of carrying a small mast, the body being a stout frame work of ash ribs covered with hides of oxen, sometimes of threefold thickness. It may have been a vessel of this kind which Quetzatcoatl constructed for his return voyage, or it may be that he employed the serpents' skins for protecting the seams of his built-up boat in lieu of tar or pitch. In any case the tradition makes him out a navigator and boat-builder of some experience, and if he were really St. Brendan he would have had a knowledge of the Irish mode of constructing and navigating sea-going crafts and would probably have employed serpent's skins, the best Mexican substitute for ox-hides, at either of the ways suggested.

It would be presumptuous to claim that the identity of Quetzatcoatl and St. Brendan has been completely established in this essay, but it may reasonably be submitted that there is no violent inconsistency involved in the theory herein advanced, and an examination of the evidence upon which it is based discloses many remarkable coincidences in favor of the opinion that the Mexican Messiah may have been the Irish saint. Beyond that it would not be safe to go, and it is not probable that future discoveries will enable the identity of Quetzatcoatl to be more clearly traced. It is a part of the Mexican tradition that Quetzatcoatl, before leaving Mexico, concealed a collection of silver and shell objects, and other precious things, by burial. The discovery of such a treasure would no doubt show that he was a Christian missionary, and would probably settle the question of his nationality and identity. But the deposit may have been discovered and destroyed or dispersed long ago, and if not there is little probability now that it will ever see the light of day. It would be equally hopeless to expect that Mexican records may yet be discovered containing references to Quetzatcoatl. A thousand years may have elapsed from the time of that personage to the days of Cortez, and since then nearly another four hundred years have contributed to the further destruction of Mexican monuments and records. In the earlier days of the Spanish Conquest, all the memorials of the subjugated races were ruthlessly and systematically destroyed, and so effectually that but comparatively few scraps and fragments remain of native historical materials which formerly existed in great abundance. Even these remnants are for the most part useless, for in a single generation or two of Spanish fanaticism and Spanish egotism destroyed all use and knowledge of the native Mexican languages and literature. It may, therefore, be concluded that we know all we are ever likely to know of the history and personality of the Mexican Messiah, and what we do know is this---that he was a Christian missionary from Europe, and is more likely to have been St. Brendan than any other European of whom we have knowledge.

This "essay" is singularly devoid of references, and there are many assertions in need of such buttressing. The identification of Quetzatcoatl seems almost too easy.

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MLG-002 TRADITIONS OF PRECOLUMBIAN LANDINGS ON THE WEST COAST OF SOUTH AMERICA

Bandelier, Adolph F.; American Anthropologist, 7:250-270, 1905.

This is a wonderful old article full of references to giants, bearded Christ-like missionaries, a deluge, and an angel delivering heavenly retribution.

The origin of the people inhabiting the New World was one of the first problems that busied European minds as soon as it became realized that America was an independent continent. How could man have reached this land, that was so widely separated from the rest of the known world? In reality this question was not a new one, for it had been asked in regard to every distant island found inhabited by animals and plants as well as by man. Solutions had been proposed long prior to the fifteenth century---theories in harmony with the state of knowledge and with the religious fervor of the period. Among others, Saint Augustine, in the fifth century, speculated on the problem of how quadrupeds, such as beasts of prey, that are of no use to man, came to live on distant isles. I wish to lay stress on these precolumbian speculations, for when the origin of the American Indian became the subject of investigation, the autochthonous theory was as freely discussed as any other. But the general trend of opinion in the sixteenth century was in favor of the belief that the "aborigines" of America were not in reality aboriginal, but that at some more or less remote period they had migrated from other sections of the globe. Many were the theories proposed in regard to the regions whence these migrations might have come: but this is not the place to discuss their relative merits.

The belief in an extra-American origin of the Indians has direct bearing on the value of Indian traditions, as recorded by Europeans who were under the influence of that conjecture, for it naturally led Spanish investigators, for example, to interpret any tale that might be construed in favor of the assumption that man came to America from the outside world. I am by no means favoring the hypothesis of an independent creation or evolution of the Indian on this continent. All I desire to call attention to is the danger of early Indian lore having been colored, by those who gathered it, so as to support a favorite theory. Such coloring is a serious obstacle to the critical use of aboriginal American lore supposed to embody historical information.

Among Indian myths that appear to touch on an extra-American descent of the natives in the western parts of South America, we must discriminate between (1) allusions to the appearance of strange individuals or groups of individuals, long before the epoch of Columbus but while the land was already peopled; (2) tales mentioning a primitive settlement of parts of South America from other parts of the globe; and (3) stories of landings on the western coast of the southern continent.

The tale of Tonapa (sometimes identified with Viracocha), in the interior of Peru and Bolivia, has already been discussed by me, so far as the scanty material and its nature permitted. The Tonapa story, in its later version by Calancha, begins in Brazil. It tells of the wanderings of two white men, at a time quite remote, but still after the beginning of our era. These white travelers are reputed to have landed on the Brazilian shore, whence they pushed inland, preaching to and teaching the natives after the manner of Christian apostles or missionaries. They are accredited with accomplishing the portentous journey through southern Brazil, Paraguay, and northern Argentina into western Bolivia, where, near the shores of Lake Titicaca, one of them suffered death at the hands of the

natives, while the other pursued his way to the Pacific and there disappeared. This version, however, dates from the middle of the seventeenth century, and extends the scope of the original Tonapa or Viracocha lore obtained in southern Peru and in Bolivia. It bears the stamp not merely of confirmation, but of explanation and adaptation to Christian legends about apostolic labors in remote corners of the earth. The early, hence more authentic, versions of the Tonapa and Viracocha story, heard not later than sixteen years after the arrival of Pizarro, and probably even within a decade of that event, either represent the origin of that mysterious individual from Lake Titicaca (not necessarily from the island of that name) or make him appear on the Bolivian plateau from the south and to direct his steps toward the north where, on the shores of Ecuador, he disappears, together with his companions, on the waters of the ocean. In the heart of Peru a similar tradition was found among the Indians at an early date, and while these tales must be accepted cum grano salis, they may have had their nucleus in original recollections that already had become veiled and distorted prior to the sixteenth century.

The traditions of central western Peru differ partly from the tales of Tonapa-Viracocha in that they also mention a settlement of strangers. The report of the Augustines on their investigations among the Indians of Huamachuco between 1552 and 1561, states that most of the settlers perished and that the few survivors were driven out of the country. But this part of the story appears to be distinct from the tale of white "teachers" of the Tonapa legend, and to refer to another set of individuals. The term "culture-heroes" has been introduced into American ethnology for such personages. In this case their labors would have left few, if any, cultural traces.

Almost parallel with the Tonapa and Viracocha lore is the myth of Bochica or Nemtheketeba (Nemtherequeteba), also called Zuhe, among the Muisca or Chibcha Indians of Columbia. The four names apply, according to Piedrahita, to one individual. Fray Pedro Simon, who wrote somewhat earlier, discriminates between Bochica and Nemtherequeteba. Piedrahita asserts that, according to Chibcha tradition, Bochica "came" to the plateau of Bogota---whence, he does not state. He describes him as with a long beard and wearing long garments, as having walked with bare feet and gone about preaching and teaching the Indians a better mode of life. At Sogamoso, in the Columbian highlands, Bochica lived two thousand years, and died there after performing many miracles, among which the opening of the cleft of Tequendama is most conspicuous. There is a certain analogy between this personage and Tonapa or Viracocha. In Peru, as is well known, the Indians called and still call the whites Viracochas. Piedrahita asserts that the surname Zuhe, given to Bochica, was used by the Chibcha to designate the first Europeans they saw.

Simon has Nemtherequeteba (whom he also calls Zuhe) reside east of the Bogota plateau, in the Orinoco region of Venezuela, for fourteen hundred years. Thence he went to the Columbian tableland, disappearing about Sogamoso. His personal appearance is described in the same manner as by Piedrahita, but the miracle at Tequendama Simon ascribes to Bochica. The former remarks: "And some say that there was not one stranger alone, but three, who at distinct times entered preaching, but the most common and usually believed is that there was but one with the three surnames mentioned."

Elsewhere I have called attention to the possibility of these traditions not being fully primitive.

The Jesuit missionary Father Anello Oliva was a contemporary of both Simon and Piedrahita. He spent forty-five years of his life in Peru and in what is now Bolivia, the latter being the scene of his apostolic labors for many years. It is not known that he ever paid attention to Columbian topics. It is strange, therefore, that Oliva represents the peopling of South America as having taken place

from the side whence the mysterious white men are said to have reached the Bogota plateau, namely, from the east. The chief sources of his work were, according to his own statements, some writings of Father Blas Valera from the second half of the fifteenth century, and especially stories related to him by an Indian from Cochabama in central Bolivia. This Indian, whose name was Catari (an Aymara word signifying "snake," "viper," a venomous scorpion in general, distinguished from the innocuous kinds which the Aymara call asuru), was particularly well versed in ancient lore of the Inca tribe; hence it appears unlikely that Oliva should have gathered information, at least directly, from Colombian sources.

According to Oliva the first settlers of South America landed on the coast of Venezuela near where the city of Caracas now stands, whence they gradually spread over the continent, reaching, among other places, Santa Elena in Ecuador, where they settled. Of these settlers some bands in course of time traversed the coast southward, occupying Tumbez and Lima. While these immigrants from eastern South America were establishing themselves on the coast of Ecuador and Peru, there took place at Santa Elena a landing of "giants." What Oliva says of the fate of these giants appears to have been taken almost literally from Cieza and Zarate. To this I shall refer later. After the reputed destruction of the intruders by fire from heaven, the settlers on the coast continued to extend their excursions with more or less success: some went in the direction of Chile and the straits of Magellan, and were not heard of again; others settled at various points on the Peruvian shore; still others penetrated inland and reached Lake Titicaca and the Cuzco region. It is noteworthy that these reputed settlers from the coast found the interior already inhabited and the shrine on Titicaca island in full operation.

Assuming, for the present, that Oliva reported primitive, hence genuine, Indian lore, the following appear to be the essential points of his tales:

- (1) The earliest landing in Venezuela, therefore in northeastern South America.
- (2) A gradual spread over the northern sections to the westward as far as the coast of Ecuador.
- (3) Coast voyages thence to the south as far as the southern extremity of the continent.
- (4) After the settlement on the western coast had been effected and some of these voyages were in progress, there took place a landing, from parts unknown, of strange people who were destroyed by some cataclysm and left no impression beyond some remains and recollections of their appearance.
- (5) A gradual spread from the coast to the eastward into sections that were already peopled.

The first part of this story recalls Colombian traditions, while the landing of the so-called giants is a local tale heard by the Spaniards on the shores of Ecuador at a very early day. The coast voyages also, as I shall show, were mentioned by Spanish sources half a century prior to Oliva's time.

Oliva acknowledges another source of information---"original papers" given to him by a Dr. Bartolome Cervantes, of Charcas, Bolivia. Under any circumstance all his knowledge is derived at second hand. It bears the stamp of compilation from various sides, as well as the impress of adaptation to the favorite belief in the peopling of America from the old world. Parts of his material, so far as based on local tales, may contain a nucleus of primitive Indian recollection, but it is manifestly woven into a general story highly colored by European ideas.

Among Indian lore collected soon after the conquest, and therefore presumably genuine, there are traces of the drifting of tribes into the interior of Peru from the western coast. On this point Cieza states:

"They also relate what I have written in my first part, that on the Island of Titicaca, in former centuries, there were white men, bearded like ourselves, and that, sallying from the valley of Coquimbo, a captain whose name was Cari, he came to where now is Chucuito, whence, after making a few more settlements, he passed with his people over to the island and made such war on the people of which I speak that he killed all of them."

If the word "Coquimbo" is correctly rendered from the original text, and not one of the clerical mistakes that so frequently crept into copies of old manuscripts, then Cari and his men came from the coast of northern Chile. But, as in the case of those who, according to Oliva, would have reached Lake Titicaca from the Peruvian coast, they found the shores and islands of that lake already inhabited. Concerning the white men exterminated by Cari, Cieza fails to state whence they came, but he assures us that he heard the tale from an Indian who may have been well versed in ancient lore.

Montesinos, a contemporary of Simon, Oliva, Calancha, and Piedrahita, treats of the peopling of America in a general way, making the earliest settlers appear from every quarter of the globe, hence also from the South sea. In his own words:

"At that time, which as far as I have been able to ascertain was six hundred years after the deluge, all these provinces filled up with people. Many people came from the direction of Chile, others by the Andes, others by the mainland and the South sea, so that its coasts became settled from the island of Santa Elena and Puerto Viejo to Chile; this can be gathered from the poetry and ancient songs of the Indians," etc.

Salcamayhua, an Indian writer of the same period, bases, as he claims, on original lore preserved by the Indians of "Orcasuyo, between Canas and Canchis of Collasuyo," the traditions which he says he heard from his father and other old men. He relates:

"They say that, in the time of Purunpacha, all the nations of Tahuantinsuyo came from the direction of above Potossi in three or four armies ready for war, and so they came settling, occupying the places, every band remaining on unoccupied lands."

This hints at a movement of tribes from south to north, in upper Peru and Bolivia. How far the tales are genuine, that is, wholly precolumbian, is not yet easy to ascertain. Salcamayhua makes most fervent protestations of Christianity, so fervent, indeed, that there arises a suspicion of the infiltration of many European elements in his version of native lore. It is particularly marked in what he relates of the person, travels, and deeds of Tonapa. And he merely mentions some migrations to the interior of the continent, without stating whence the settlers originally came.

Pedro de Cieza remarks in a general way: "In Peru the Indians speak of nothing else than that the ones came from one part [direction] and the others from another."

Similar to the stories preserved by the Augustine missionaries, in the sixteenth century, are tales recorded by Miguel Cabello Balboa in his "Antarctic Miscellany" concluded in 1586. But he also furnishes a long story to the effect that South America, or at least the coast of Chile, was peopled originally by pirates from the East Indies. To Balboa I shall return later, having yet to refer to some traditions found in the interior of Peru, likewise in the second half of the sixteenth century and recorded in the year that Balboa finished his work, hence they are either a coincidence or Balboa obtained them from the same source or was told of them by the authorities of Guamanga, who wrote the report on the "Repartimiento de los Recanas Antamarcas," dated January 27, 1586. This report contains the following statement:

"The old Indians say that they have notice from their forefathers, by hearsay,

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that in very remote times, before the Incas ruled them, there came to this country people whom they called Viracochas, not many of them; and that the Indians followed them, listening to their speech, and now the Indians say they were Saints."

I call attention to the last phrase---that now the Indians call these people "Saints."

Returning to Miguel Cabello Balboa, it is noted, as before stated, that he attributes the settlement of southern Chile to pirates from the East Indies, whom he calls Nayres. He traces the career of these people over nearly the whole eastern world, making a part of them finally land near the southern extremity of America. According to Balboa they were "the origin and trunk of the Indians of Chile, from whom also descend the Chiriguanaes, or (rather) Chiliguanaes. By these were made those strange fortifications that in Ayavira and Tiaguanaco (and in other parts of this section of the world) are seen," etc. After the "Nayres" had "conquered the austral regions, they penetrated inland and were never afterward heard from. Their intrusion in these our Indies is conjecture, for the reason that old Indians state they have it from ancient traditions of their forefathers, who told them that from that part of the world there came these pestiferous tyrants (the Nayres), and those of Chile say the same, pointing out that they came from this side of the straits which we call of Magellan."

While the eagerness displayed by Balboa to defend a favorite theory renders his statements liable to suspicion, it is worthy of investigation whether the tales are genuine or not, but I have not at my command the material necessary. While in Peru Balboa joined the order of the Jesuits and was a contemporary of Acosta and of the Dominican Fray Gregorio Garcia. Neither of these in their classical works on America, makes any mention of his story, a lack manifestly due to their being unacquainted with the "Miscellany," only a part of which, to this time, has appeared in print as a French translation by Henri Ternaux-Compans.

But Cabello Balboa does not confine himself to ancient lore of a general character; he also has preserved what bears every mark of being a genuine local tradition of Indians from the northern Peruvian coast. According to him, the aborigines of the villages of Motupe and Lambayeque said that "in times very remote, so remote that they cannot count them, there came from the upper parts of this Piru, with a great fleet of rafts, a mighty warrior, of great valor and many qualities, called Naymlap, and he had with him a number of concubines, the principal of whom they say was called Ceterni; and with him and in his company he brought many followers whom he led as captain and leader. This chief Naymlap, with his entire retinue, landed and disembarked at the mouth of a river (now called Faquisillanga, where they abandoned their rafts and penetrated inland."

This indicates a coastwise expedition, possibly from some point on the shores of Ecuador, as far as the vicinity of Chiclayo and Lambayeque. It recalls the coast voyages told of by Oliva, and seems to confirm them. There is no apparent connection, however, between the sources of Balboa (who alludes to direct Indian information from tradition) and those mentioned by Oliva; nor is it said that the people led by Naymlap were of extra-American issue.

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The only traditional record of a landing on the western coast of South America is that of the "giants," near Punta Santa Elena in Ecuador. According to Zarate, it was known to the Spaniards prior to 1543, but not credited until the discovery of large fossil bones in that year furnished, in the light of knowledge of the times, an apparent confirmation. The finding of fossil remains of unusual size was not altogether accidental. The captain Juan de Olmos, lieutenant governor at Puerto Viejo in the year aforesaid, hearing of "all these things, caused excavations to

be made in that valley, where they found such large ribs and other bones that, if the skulls had not appeared at the same time, it would not have been credible they were of human persons. . . . Teeth then found were sent to different parts of Peru; they were three fingers broad and four in length." Although these remains were found beneath the surface, it is possible that some skull had previously been seen by the Indians who founded thereon an "observation myth." On the other hand, the tale may probably be a distorted reminiscence of some precolumbian occurrence on the coast of Ecuador.

It is not likely that the earliest Spanish discoverers of Peru had already heard of the tradition. Oviedo surely would have mentioned it, as he carefully recorded everything that came to his notice at the time. He conversed with Diego de Almagro on the return of the latter to Panama from the first expedition in 1527; in 1534 he questioned several of the returning members of Pizarro's corps, on the island of Santo Domingo, and in 1536 conversed with Pedro de Alvarado. Had any of these mentioned the "giants," Oviedo would not have failed to note it in his voluminous work. It is therefore likely that the Spaniards first heard of the tradition between 1536 and 1543.

The earliest reports on the "giants" are by Cieza and Zarate, printed in 1553 and 1555, respectively. The former says:

"The natives tell, from what they heard through their forefathers, who heard and had it from far back, that there came by sea in rafts of reeds after the manner of large boats, some men who were so tall that from the knee down they were as big as the full length of an ordinary fair-sized man, and the limbs were in proportion to their bodies, so misshapen that it was monstrous to look at their heads, as large as they were, and with the hair that came down to the shoulders. The eyes they give to understand were of the size of small plates. They affirm that they had no beards and that some were clad in skins of animals, while others came as nature made them, and there were no women along. Arriving at this point, and after making on it their settlement in the form of a village (even at the present day the sites of the houses are known), they did not find water, and in order to supply the need thereof, made some deep wells, a work that is certainly worthy of remembrance, performed by as strong men as it is presumed they were, judging from their size. And they dug these wells in the live rock until they found water, and afterward lined them with stone to the mouth, in such manner that they will last for many ages, in which [wells] there is always good and savory water, and always so cold that it is a great pleasure to drink it. Having thus established themselves, these tall men or giants, and having these wells or cisterns out of which they drank, they ate and wasted all the food they could find in the land, for each one of them consumed more than fifty of the natives of the country, and as the supply was not sufficient for them, they killed much fish in the sea by means of their nets and contrivances which, it stands to reason, they must have had. The natives abhorred them, for they killed their women in making use of them, and the men they killed for other reasons. The Indians did not feel strong enough to kill these new people that had come to take their country and domain, although great meetings were held to confer about it; but they dare not attack them. After a few years, the giants being still in the country, and having no women, and those of the Indians not suiting their great size, or because it may have been by advice and inducement of the demon, they resorted to the unnatural vice of sodomy, which they committed openly in public, with no fear of God and little shame of themselves."

Then followed the punishment of which I shall treat at length in a subsequent paper---an angel appeared in a mass of fire from heaven and killed them all. Cieza is fully convinced of the truth of the story and refers to the large fossil bones in evidence, showing that he obtained his data after 1543.

Agustin de Zarate differs but little from Cieza in his main statements,

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except that he does not mention their landing on the coast.

After these two primitive sources, the tale was often repeated, with slight variations. I shall refer to only a part of one of the later versions, contained in an anonymous description of the "government" of Guayaquil, dating from about the year 1605, apparently an official document by one who was intimately acquainted with the district. It says:

"They drink water out of wells, especially of one they call of the Giants which, according to the sayings of the ancient Indians, lived in that country, not as original inhabitants, but from other parts."

The fossil remains of large size are also alluded to: "They are chiefly preserved in the deposits of pitch, of which there are few."

It thus seems that the tale of the landing of so-called giants on the coast of southern Ecuador is a genuine Indian tradition from a period antedating the sixteenth century. It appears also that it refers to people entirely distinct from the American natives; but we are at a loss to find even an inkling as to whence these people may have come.

Under these circumstances it is at least premature to attempt conjectures as to the part of the globe whence the so-called giants came. If their original home lay beyond the American continent, some of the island groups of the South sea might be considered as affording the answer. How far the craft in use by the islanders might have enabled such long voyages, and in what manner oceanic currents and winds might have favored or impeded them, are subjects for investigation on the islands themselves.

It is possible that the strange beings came from some point on the western coast of America, although the marked difference in appearance between them and the coast Indians of Ecuador would rather indicate an extra-American origin.

The large stature attributed to the intruders should not be taken too literally. During the course of many ages traditional personages easily assume exaggerated proportions. The Indians of Ecuador and Peru are of low stature, comparatively speaking, and anyone above their average height becomes, in their eyes, first a tall, later a very tall man. If to unusual size, hostile demeanor is added, after a lapse of time aboriginal lore converts him into a monster, morally and physically, and it is in some such sense that the term "giant" should be understood--- a being with superior physical power and destructive tendencies. As for the manner in which the "giants" came to be exterminated, it may be said that, while the natural phenomenon described in connection with their destruction seems to indicate the fall of a meteorite of unusual size, the possibility of some volcanic disturbance should not be excluded.

Lengthy notes keyed to the text follow. They are almost entirely Spanish quotations and are not reproduced here.

A-001 TRADITIONS OF PRECOLUMBIAN EARTHQUAKES AND VOLCANIC
ERUPTIONS IN WESTERN SOUTH AMERICA

Bandelier, Adolph F.: American Anthropologist, 8:47-81, 1906.

The information contained in this paper is limited and fragmentary. Colombia, Ecuador, and Chile were necessarily included in the writer's documentary investigations, but as he did not visit these countries, what is said about them is incomplete. Nor can the subject be treated from the standpoint of physiography, through lack of specific knowledge, hence the paper will be devoted to a record of the Indian traditions preserved from the time of the earliest Spanish occupancy or by modern investigators, with an attempt to determine in what degree they may be accepted as purely primitive lore.

In Colombia, the most northerly country of South America on the Pacific coast, traditions regarding a mythical personage, or personages, called Bochico, Nemquethaba, and Zuhe, in the Muysca of Chibcha idiom of Bogota, may possibly refer to violent seismic disturbances in precolumbian times. The Bishop of Panama, Lucas Fernandez Piedrahita, in his work published in 1688, states:

"Of the Bochica, they refer in particular to many favors he conferred upon them, as to say, that through overflows of the river Funzha, in which the artifices of Huythaca played a part, the plain or level of Bogota had been flooded, and the waters so increased that the natives were compelled to settle on the tops of the highest mountains where they remained until Bochica came, and, striking a mountain range with a stick, opened an outlet for the waters, which forthwith left the level land, so that it became habitable as before, and the forces of the repressed waters in damaging and breaking the rocks was so great that they formed the fall of Tequendama, so famous as one of the wonders of the world." (p. 47)

This could be construed as evidence of a world-wide flood. Legends of this type abound almost everywhere. Lake Titicaca, in fact, shows some evidence of marine incursion at some time in the past.

The tale of giants having landed, in precolumbian time, at Punta Santa Elena, west of Guayaquil, has been discussed in a paper previously published in this journal, [MLG-002] and I return to the subject because of the report of Agustin de Zarate on the manner in which the story became confirmed in the eyes of the Spaniards, and for the reason that a somewhat different version of the tale has been obtained subsequent to its publication.

Zarate, who was an administrative officer of high rank, went to Peru in 1543. My translation of his statements not being literal, I give the original text in a note. He says:

"Withal, what the Indians told about these giants was not fully believed until, in the year 1543, when the captain Juan de Olmos, a native of Trujillo, was lieutenant governor at Puerto Viejo, he caused excavations to be made in the valley, having heard of these matters. They found ribs and bones so large that, if the heads had not appeared at the same time it would not have seemed credible [i. e., that the remains were] of human beings. And so, after the investigations were finished and the marks of the thunderbolts seen in the rocks, what the Indians said was held to be true: and of the teeth found there, some were sent to various parts of Peru and found to measure, each, three fingers in width and four in length."

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There is hardly any doubt concerning the precolumbian origin of the traditio for it cannot be a distorted account of the first appearance of Spaniards on the coast of Ecuador in 1525. [See Note 13 below.]

Note 13. Zarate, Historia del Descubrimiento (p. 465): "Vieron los espanoles en Puerto Viejo dos figuras de bulto destos gigantes, una de hombre y otra de muger." It should not be lost sight of that the "giants" had no women with them. It might also be asked whether the stone "seats," or benches, of which there are several in various museums, representing usually a human figure on all fours, bearing on the back a seat of some form, are perhaps related to the "Bulto destos gigantes" alluded to by Zarate. These seats come from the same region. The earliest notice the Indians had of the appearance of the Spaniards was a short time before the death of Huayna Capac, or about 1528. The manner in which the whites were then described was, that they were quite natural beings, except for the beards, which appeared strange. The Indians from the mountains had even a very poor opinion of the physical qualities of the Spaniards until the affair at Caxamarca convinced them of the contrary.

The large human-like skulls dug up were those of mastodons, as Prof. H. F. Osborne of the American Museum of Natural History has informed me, judging from the close outward resemblance of the skull of the elephant with that of man. Hence the statement of Zarate has also the merit of being the earliest mention of fossil remains in Ecuador thus far known. Pedro Gutierrez de Santa Clara was a soldier of the same sort as Cieza, that is, he not only observed and inquired but recorded his observations and the results of his investigations very carefully. He wrote what is now being published in five volumes, embodying a detailed account of the civil wars in Peru, from 1544 to 1548, of which he was an eyewitness, as well as much valuable material on the manners, customs, and traditions of the aborigines. He appears to have been an honest recorder, but, like Cieza, not a critical one---a consequence of the times. His version of the "giant" story is too long to be given here, except those parts that diverge from the texts of Cieza and Zarate; and even then only in a condensed or synoptic form.

Gutierrez places the arrival of the giants in the time of the Inca war-chief Tupac Yupanqui, that is, in the second half of the fifteenth century. They arrived on the coast of Ecuador in "barks or rafts of great size made of dry timber and canes, propelled by lateen sails, of triangular shape, and from the direction of the Moluccas or of the Straits of Magellan." They at once began their depredations. The natives threatened them with the power of the Incas, and they settled peaceably, out of fear of the great might the natives represented the Inca to have. For the remainder of the tale Gutierrez is fairly in agreement with his predecessors. The immoral customs, the wells cut into the rock, the destruction of the monsters by some meteoric (or volcanic?) phenomenon, are told in the same manner as by Zarate and Cieza. But he says also that Francisco Pizarro saw the gigantic bones of mastodons which were taken for those of human beings, and that similar ones were discovered in the valley of Trujillo in Peru.

The approximate date of the arrival of the giants and the statement that Francisco Pizarro saw the large fossil remains throw suspicion on the tales of Gutierrez. He went to Peru about 1543 (certainly not before), and was probably misled by the statements of persons who had already begun to "elaborate" the Indian tradition by additions and modifications. If the "giants" had arrived on the coast during the time of Yupanqui and had some intercourse with the Inca as Gutierrez asserts, it would have been preserved in Inca lore, which is or begins to be somewhat reliable only from the time of Tupac Yupanqui; and as to Pizarro having seen the fossil remains, it must be remembered that the latter were dis-

covered in 1543, whereas Pizarro was killed at Lima two years before. The information Gutierrez purports to give is therefore of doubtful character.

The authenticity of the giant tale as precolumbian Indian lore is beyond doubt, but its connection with volcanic phenomena is by no means certain. The "angel" descending from the skies in fiery garb and shooting fiery darts at the monsters would rather recall some meteorite of unusual size and brilliancy. It would be very unusual for fragments of a siderite to penetrate deeply into hard rock. The tradition might, therefore, though with less probability, be a distorted version of some volcanic display in the interior, but witnessed on the coast or having taken place on the coast itself. Of any such disturbance near Puerto Viejo I have as yet found no trace, unless the asphalt pools of Colonchen be a survival. Of the great volcanoes in the interior of Ecuador, Tungurahua, Sangay, and the long extinct Chimborazo lie nearest to Cape Santa Elena, but it would be a matter of surprise, to say the least, if any solid material ejected by them had reached the foot of the coast range. Sangay, which is the most active at present, is somewhat more than 17,000 feet in altitude and rises on the eastern declivity of the Andes. Tungurahua is active at intervals, and its elevation is a few hundred feet less than that of Sangay. Chimborazo is by far the tallest (20,500 feet) and also the nearest, lying in a direct line nearly 140 miles from Cape San Lorenzo; but while the fact of its being an extinct volcano has been lately established, and ashes ejected by other mountains have drifted to much greater distances, incandescent rock or lava is not known to have been thrown such a distance as that from Chimborazo to Puerto Viejo. As to Tungurahua, it lies at least 160 miles inland, while Sangay is 200 miles from the coast. Unless geological investigation should reveal other evidences of volcanic action than those now known, the luminous phenomenon connected with the extermination of the "giants" must be attributed to a large meteorite in precolumbian times. (p. 53) [See Note 23 below.]

Note 23. So far as I know, there is no allusion in Indian tradition to meteorite falls in western South America in precolumbian times, except the luminous display connected with the tale of the giants, provided this should eventually be established to have been a meteor. (p. 71)

The stories of giants in the olden days are also world-wide in scope. As for the luminous phenomenon that exterminated the giants, there are many possibilities other than meteorites, particularly those electrical phenomena, such as ball lightning, depicted in the Series G sourcebooks. To be completely general, the luminous phenomena might have been artificial. Note that there are strange areas of fused rock in many places, including South America.

The Indian Salcamayhua has preserved the following fragments of lore which may relate to volcanic phenomena in the fifteenth century, in southwestern as well as in southeastern Peru. At the time of the Inca war-chief Yupanqui (possibly the same as Tupac Yupanqui)-

"They say that news came how a miracle had happened at Cuzco, how a yaurca or amaro [large snake] had come forth from the height of Pachatusan--- a very ugly beast, half a league long and big, two and one-half fathoms in breadth, and with ears and teeth and beard. And [it] comes by Yuncaypampa and Sinea, and thence enters the lagoon of Quibipay; thereupon there come out of Asoncata two sacacas of fire and pass [over] to Potina of Arequipa, and another [one] comes from lower down than Guamanca, which is three or four very tall heights covered with snow, the which [it is said, or they say] were

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animals with wings and ears and tails and four feet, and on the shoulders many spines like of fish, and from afar [they] say that it appeared to them all fire."

Analyzing this rather incoherent statement, it reduces itself to the following: The two sacacas (an Aymara, not a Quichua word,) aflame, are represented as going from the nevada of Ausangate, east of Cuzco, to southeastward of Arequipa. Another fiery object is said to have come from Huamanca (Guamanga), or Ayacucho, between Lima and Cuzco, in the mountains; hence the presumption is that several eruptions occurred almost simultaneously in central and southern Peru during the course of the fifteenth century. The simultaneous appearance of several comets (which the description of Salcamayhua might also recall) is not easily conceivable, and it seems more probable that the fiery serpents, etc., indicate streams of lava. Later on a famous fetish is mentioned (in the northern sections of the present department of Arequipa) as vomiting fire, which might be another allusion to some volcanic outbreak. (pp. 62-63)

The above accounts have the attributes of modern UFO reports and are also reminiscent of the intermountain fireballs seen in the Euphrates Valley (See Series G source-book.) The "snake" sounds like a "conventional" dragon!)

Vidaurre relates the following tradition current among Chilean aborigines during his time:

"Among the fables which these Indians tell, some knowledge of the universal deluge is disclosed, as clearly shown by the following practice during the great earthquakes. When one of these occurs, all run at once to the mountains called by them tenten, that is, to such as have three points [end in three summits]. To these [tops] they carry food for many days, and wooden platters on their heads. They say that in ancient times there came a great deluge which inundated the whole land except the tentenes, for a certain virtue [faculty] they have of floating on the waters. For this reason they [the Indians] seek to escape, fearing lest the sea, after such a violent movement of the land, should turn again to drown it; also that they carry these wooden platters on their heads because it might happen that the waters should rise so high that the tentenes would strike the sun and their heads be burned if they did not use that precaution." (p. 66)

MLW-001 THE BEARING OF ASTRONOMY ON THE SUBJECT

Lagar, Stansbury; American Anthropologist, 14:43-48, 1912.

The "subject" here is the origin of the American Indians in both North and South America.

The study of the astronomy of the American Indians does not afford any definite evidence of their unity or diversity, or of the period or place of their origin. It neither proves nor disproves their origin in America or in Asia or in any other region. But it does present facts of value bearing upon the development of their culture, of relations between the peoples of America, and of their relations with the races of other continents in the prehistoric period of America.

Astronomy is not a primitive science. Long periods of years indeed must have elapsed before the really primitive man began even to observe the stars with anything less than utter ignorance and indifference, for they were related in no manner that he could apprehend with those material needs to which his attention was practically confined. Primitive astronomy began with the systematic observation of the stars to indicate direction upon night journeys, to indicate the hunting seasons to the hunter, and later to indicate the sowing and reaping seasons to the farmer. The cosmic and the religious element of astronomy---the question as to the nature of the stars and their relation to the nature and life of man and of the cosmos---form, no doubt, one of the earliest bases of religious thought, if not the earliest, but such speculations, when they pass beyond mere wonder, surely imply a higher culture than the practical uses of stellar observation, and therefore cannot be earlier in time. It is evident, then, that the evolution of man must antedate the beginning of astronomy by a very long period of time. Even if we could trace astronomy back to its earliest source in time and place it would afford us little or no information upon the origin of the earliest man, unless, indeed, he had remained in one spot during the whole of the long intervening period---a manifest absurdity.

Applying the above deductions to the American Indian, if he originated in America, astronomy cannot say when or where. We seem to see several foci of astronomical development, in Peru, Mexico, and Yucatan, corresponding with general culture centers in regions having a climate and topography peculiarly favorable to the advancement of culture. The astronomical lore of all these regions is too nearly identical in complex concepts to be satisfactorily explained as due to similarities of race and of environment. There must have been an interchange of ideas between them either directly or through intervening nations in pre-Columbian times, hence we cannot be certain that this lore is indigenous to any one of the three regions named. Evidence of extensive migrations and of extensive change of climate in comparatively recent times adds to the uncertainty upon this point and prevents us from determining, at least in the present state of our knowledge, even the region of the earliest astronomical development in America.

If the American Indian migrated into America from another continent in primitive times, astronomy would still be helpless to aid us in the search for the time and place of such migration because it cannot reach back to such an early period. But if this migration took place in later times or after the development of astronomical traditions, then indeed we may find in this field concepts sufficiently complex to render it possible for us to trace them back towards their birthplace. It is evident, however, that these concepts bear upon the origin of the American race only if they can be shown to be associated with the earliest race known to have existed on this continent---otherwise they will pertain merely to a later influx of an alien race into an already populated region. Pursuing this

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inquiry, then, let us ask first whether the concepts of American astronomy present such analogies with the astronomical concepts of other continents as to indicate intercommunication between them.

In the field of scientific astronomy the pole star was generally known throughout North America as the pivot of the sky, and the position of the South Pole was noted by the Peruvians. At least four of the planets were known and distinguished from the fixed stars by the Peruvians, Mexicans, Mayas, and some of the other tribes. The Peruvians had observed the sun spots and a few among them were perhaps acquainted with the true cause of solar and lunar eclipses. All three peoples had divided the sky into true constellations and possessed a true solar zodiac. The Mexicans had ascertained the period of the apparent revolutions of the planets with remarkable accuracy. But nothing in these facts implies any foreign influence. The lunar and solar calendars of these three advanced nations from the standpoint of the writer's cursory study of them present little more evidence of intercommunication so far as their time periods are concerned, though the system of successive years governed by successive zodiacal signs recently discovered by Boll in Egypt and the Orient certainly suggests certain features of the Maya and Mexican calendars. The presence in Peru, Mexico, and various other parts of America of the Pleiades year of two seasons, divided by seed time and harvest, with its associated myths and rituals presents a stronger argument for intercommunication, one that has been elaborated by the late Robert Grant Haliburton, and Mrs. Zelia Nuttall has published evidence in favor of intercommunication based upon cosmogony and concepts which she believes to have been associated with the celestial North Pole.

When we enter the field of symbolic and traditional astronomy the evidence of intercommunication increases. We find among the common concepts the division of the cosmos among the four so-called elements, fire, earth, air, and water, the use of the swastika to express celestial revolution, of the cross and circle to represent the fourfold division of the sky and earth, of the serpent and egg with certain astronomical associations. Among the extra-zodiacal constellations the Bear, formed by some of the stars of our Great Bear, has been generally recognized by the tribes of the north-eastern portion of North America, probably from prehistoric times. It may be a legacy from the Northmen. The Milky Way as the Path of Souls of the northern tribes and the Celestial River farther south likewise finds European and Oriental analogies. But from the writer's standpoint the crux of the argument for intercommunication rests upon the symbols associated with the zodiac in Peru, Mexico, and Yucatan, for here we are considering not isolated analogies but an interrelated series in which the element of sequence affords an impressive guaranty against both chance and imaginative manipulation.

In Mexico the study of the elaborate system of judicial astrology may yield interesting results. So far as the writer is aware, little or no attention has yet been paid to this subject. In Peru evidence as to the zodiac is derived from the Star Chart of Salcamayhua, which names and pictures the signs, the monthly ritual which reproduces the attributes of the sign through which the sun is passing when the festival is held, and the celestial plan of the sacred city of Cuzco, which was supposed to reproduce the observed design of the sky including the signs. This plan in varying aspects seems to have been typical of several and perhaps of many of the sacred cities or theogonic centers that form such a characteristic feature of American civilization. In Mexico the signs are named and pictured by Duran, Sahagun, Tezozomoc, in the Codices, and on the mural paintings of Mitla; their attributes are described in the monthly ritual and embodied in the plan of Teotihuacan and in the day signs. In Yucatan the signs appear in the Codices, the ritual, the day signs, and the plan of Ixamal.

As to possible European influence in these sources, the writer can only

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state his conviction that an examination of them will convince the student that such influence is either insignificant or totally absent. The following table will briefly indicate the correspondence between some of the concepts associated with the American zodiacal signs and with the signs we have received from the prehistoric Orient. It should be understood, however, that this table refers to only a few of the more obvious analogies:

SIGN	ENGLISH	PERUVIAN	MEXICAN	MAYA
Aries	Ram	Llama	Flayer	
Taurus	Bull (Originally Stag)	Stag	Stag or Deer	Stag
Gemini	Twins	Man and Woman	Twins	Two Generals
Cancer	Crab	Cuttlefish	Cuttlefish	Cuttlefish
Leo	Lion	Puma	Ocelot	Ocelot
Virgo	Virgin (Mother Goddess of Cereals)	Maize Mother	Maize Mother	Maize Mother
Libra	Scales (Originally part of Scorpio)	Forks	Scorpion	Scorpion
Scorpio	Scorpion	Mummy	Scorpion	Scorpion
Sagittarius	Bowman	Arrows or Spears	Hunter and War God	Hunter and War God
Capricornus	Sea Goat	Beard	Bearded God	
Aquarius	Water Pouser	Water	Water	Water
Pisces	Fishes (and Knot)	Knot	Twisted Reeds	

Granting that these sequential analogies, if verified, establish intercontinental communication, we must now ask whether, if these concepts were brought into America from abroad, they seem to be associated with the earliest migration to this continent. We shall have to seek light on this point outside the field of astronomy. Professor Edward S. Morse and others have called attention to the significance of the facts that wheat was unknown in America at the time of its discovery by Columbus and that maize was then unknown outside of America; moreover, that there is little if any similarity between the more complex artifacts of America and of other continents. It is practically certain that the cultivation of these cereals and the manufacture of the higher grades of artifacts must have preceded the creation of a zodiac, and its transmission around the world, and it is not reasonable to suppose that a migrating race having knowledge of either cereal or of artifacts would have carried with them the knowledge of the zodiac without that of their food and tools. The inference is obvious. The knowledge of the zodiac was not brought to or taken from America by the earliest inhabitants of another continent, but must have been transmitted in later times.

We must still explain how such knowledge could have been transmitted in later times without the cereals and artifacts. There seems to be but one consistent answer. The transmission was accomplished by accidental or sporadic communication with individuals of an alien race who were able to impart their mental concepts but who brought with them few or no material products. There was no general migration at this time. Let the reader suppose himself unexpectedly thrown by shipwreck among a people with whom his race has never before communicated. Grant him a few companions only, and imagine the result. How much of their civilization would they be able to impart? Probably only a few ideas. They had no cereals and their attempts to introduce their artifacts

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eventually failed to overcome the force of conservative habit and custom opposed to change. This is admittedly theoretical, but it seems to be the only theory which reconciles the otherwise inconsistent facts. But if this explanation is correct we see that even if the American Indian is a migrant from another continent astronomy cannot help us to say when or whence he came, because as soon as we find astronomical concepts of sufficient complexity to afford a possible means of tracing them back to an alien home they imply an advancement in culture inconsistent with the known characteristics of early American peoples, and therefore they cannot have come here with them. Astronomy reveals that there has been intercommunication with America in probably late prehistoric times, but it is silent as to what has taken place at an earlier stage.

The author makes a rather good case for the diffusion of astronomical ideas, such as the naming of the signs of the Zodiac. He is, however, a prisoner of the concept of gradual evolution of culture.

MLW-002 SOME UNSOLVED PROBLEMS IN MEXICAN ARCHEOLOGY

Nuttall, Zelia; American Anthropologist, 8:133-149, 1906.

The only pertinent portion of this article is that relating to an "affinity of concepts," as described below.

I therefore merely present the foregoing data with my doubts and perplexities and the hope that they may receive the attention of those interested in the history of the origin of ancient Mexican civilization. It will be for them to meditate, as I have done, upon the striking contradiction between Brinton's dictum that, in America, "the simple theory of the four elements naturally presented itself to the primitive mind," and Lewes' conclusion that in Greece the identical theory, evolved after centuries of speculation, "bears indubitable evidence of being a later conception and modification of its predecessors." The idea that the Mexicans might, by mere chance, have formulated the theory without associating it with philosophical or cosmological speculations, is refuted by the positive facts that on the most important of native monuments the symbolized elements are enclosed in the sign for movement; that the deity was named "the All-embracing One," and that the four elements were incorporated in a cyclical system of marvelous ingenuity and perfection, which was used to regulate and control communal life under the tetrarchical form of government. Will future text-books maintain that this whole group of cognate artificialities is a "universal trait of culture," an Elementargedanke, such as naturally presents itself to primitive man, and that its presence in ancient America merely proves that, in prehistoric times, this country produced its own school of philosophy, its mathematicians, its Pythagoras, and its Empedocles? To what natural causes will future autochthonists attribute the remarkable circumstance that the primitive aborigine of America hit upon the "Empedoclean elements" instead of the five equally spurious elements of ancient Chinese philosophy, viz., earth, water, fire, wood, and metal? Will the parallel development of the ancient Mexican and Greek tetraktos be cited as an instance of the psychic unity of mankind; or will it be recorded that the internal evidence furnished by the ancient Mexican civilization corroborates native tradition and reveals that its admirable

artificial organization is attributable to a small band of learned foreign enthusiasts from over the sea who, at a remote and unknown period attempted, on American soil, what might well be described as a realization of the dream of Greek philosophy, namely, the establishment of "an ideal republic or polity" based on abstract philosophical, mathematical, and cosmological ideas?

In conclusion, the question: Does not Montezuma's evidence, in conjunction with the internal evidence supplied by the Mexican civilization itself, account for the incongruous elements it exhibits? Do they not explain the existence of positive proofs of highly advanced intellectual culture, such as the artificial, ingenious, calendric and governmental systems, along with barbarous and primitive superstitions and customs, an inconsistent combination which, years ago, was recognized and commented upon as follows by the eminent German anthropologist, Prof. Theodor Waitz? (p. 148-149)

The similarity of Greek and Mexican world models is taken as evidence of the ancient diffusion of concepts, implying intercontinental communication.

MLW-003 PRIMITIVE TRADITIONS AS TO THE PLEIADES

aliburton, R. G.; *Nature*, 25:100-101, December 1, 1881.

In Dr. Tylor's recent review in *Nature* (vol. xxiv. p. 529) of Mr. Dawson's work on the "Folk-Lore of the Natives of Victoria," he refers to their tradition of "the lost Pleiad," and assumes that it must have been borrowed by them from Europeans. The indefatigable Astronomer Royal for Scotland, conceiving that my researches as to the Pleiades, and especially as to traditions respecting those stars among the Australians, had been improperly ignored, wrote a letter to the Editor of *Nature*, which, having been submitted to Dr. Tylor, was sent to my Canadian address, with his reply, by Prof. Piazzzi Smyth, and has only reached me within the past week.

Dr. Tylor states that he has frequently heard of my researches respecting the Pleiades, but has never met with any publication of mine on the subject; and that he would be much surprised if I could show that the story of the "Lost Pleiad" is really a primitive and original myth of savages.

.....

As my researches are unknown to most persons, and only imperfectly known to a few through my privately printed journals of investigations, letters, &c., having been partially published by others, permit me to explain the course of my investigations, and the grounds for my conclusions as to the Pleiades and their influence on the calendars and mythologies of nations.

It is now almost a lifetime, some thirty years ago, since I first noticed the universality of the number seven on ancient symbolism. As seven stars frequently met me as an architectural symbol, or a religious emblem in the New World, as well as in the Old, sometimes too in connection with the prehistoric cross, I suspected that these stars must have been the Pleiades, and that they must have in some way consecrated that symbol and the number seven, a number, too, which I had noticed as being prominent in the grouping of some prehistoric structures. Why such apparently unimportant stars should have once acquired such world-wide significance I was utterly unable even to offer a conjecture.

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After corresponding with Mr. Prescott, Sir Austin Layard, and others on this subject, I made up my mind that I had got hold of the wrong end of a very important inquiry, and that for years to come I must carefully collect facts and religiously avoid hasty generalisation.

On subsequently paying my first visit to England the late Sir Henry Ellis, the editor of "Brand's Popular Antiquities," requested me to prepare a paper on the coincidences of customs among savages and civilised nations, and I accordingly selected those connected with the Feast of Ancestors, as I found that my references and notes on it were very numerous.

I had previously noticed that a Spanish Jesuit missionary had expressed surprise that the Peruvians and Christians observed the feast of the dead on the same day---the second of November. I of course looked on the coincidence as purely accidental, but when I had written a paper giving the results of my notes, to my great amazement I found that this coincidence was very widely spread, and that the feast of ancestors was very generally held about the beginning of November. Here then was a truth not hitherto "dreamed of in our philosophy"; and I therefore thought it prudent to defer reading my paper until I could solve the mystery.

How could this singular coincidence have been caused and preserved throughout the world, in the northern as well as in the southern hemisphere? It was plain that this festival must have been regulated by something very simple and plain, such as the rising of some star. If this was the case, then it was equally clear that that star must have been very carefully observed throughout the world, and may therefore have become an object of peculiar reverence. I at once thought of the widely read symbolism of the Seven Stars, which I had long before noticed, and therefore, as I was not an astronomer, I asked Prof. Everett, F.R then a professor in King's College, Windsor, Nova Scotia, whether the Pleiades could ever have risen in November. He of course replied in the negative, for it must have been at least twelve thousand years since those stars rose heliacally at that time of the year. I had, however, my conjecture fully confirmed by finding that in one of the most ancient calendars in the world, that of the Brahmins of Tirvalore, the name of November was Kartica ("the month of the Pleiades"). I subsequently found a year, still in use in Polynesia, regulated by the rising of the Pleiades at sunset, or by their being visible all night long, and I also discovered that the three days' feast of the dead was also held in November by the Australian savages as a great annual corroboree in honour of the Pleiades. Since then I have found this primitive calendar, or fossil traces of it, all over the world.

I also found that early astronomers constructed great years or cycles on the basis of this simple calendar, which were also regulated by the Pleiades. With this calendar and its festivals and these cycles I found flood traditions and primitive myths associated, and that the key to some of the most remarkable features in early religions and traditions is to be found in the year of the Pleiades.

In 1863 I printed privately a paper of 103 pages on the Feast of the Dead, and the calendar of which it was a new year's festival, and in 1864 a second paper on the connection of the Pleiades with the cycles of the ancients and with prehistoric chronology.

As Prof. Piazza Smyth, in 1865, was intending to carefully measure and examine the Great Pyramid, I sent him a copy of my papers, as I believed that my early impressions as to the connection of the Pleiades with primitive architecture would prove to be well founded. In his work on the Pyramid he republished seventy pages of my first paper, my request that it should not be published having fortunately reached him too late.

My excuse for this long delay is the desire, before publishing my conclusions, to work out many interesting problems connected with the Pleiades and early

myths and religious beliefs, and the great difficulty of such inquiries; for the era when the Pleiades thus left their impress on the calendars and traditions of nations must be very remote, so much so that such researches are like investigations into the fossils that tell of organisms that lived in a world and breathed an atmosphere different from our own.

I am, however, preparing at last to bring out a work which will deal with the connection of the Pleiades, first, with the calendars, festivals, and cycles of nations; and next, with the myths and traditions associated with the year of the Pleiades. I had recently intended to have published some articles which I had prepared on the connection of the Pleiades with primitive ideas as to Paradise, but it seemed prudent to defer doing so, and to bring out the whole subject in one volume. To show, however, how widely spread these traditions as to the Pleiades are, I may attempt to give the information which Dr. Tylor invites, as to the myth of the lost Pleiad being a heritage among savages. Those stars are only apparently six, yet all the world over, among civilised and savage races, in Europe, in India, China, Japan, America, and Africa, this diminutive star group is not merely regarded as seven stars, but what is still more surprising, as "The Seven Stars," though the far brighter seven stars of the Great Bear might seem to deserve the title.

There are various myths to account for the missing Pleiad, but one I think will suffice to show that the Australians did not borrow the idea from Europeans.

I once asked a native of the Gold Coast, a negro Hercules in strength, who had therefore been christened (probably by some pious naval officer) Fivehorsepower, whether he knew anything of the stars. "No!" he replied, "I know nuffin about de stars." "But don't you know anything of 'the seven stars'?" "Oh yes, of course," he answered; "every nigger knows de seben stars." "Why do you call them seven?" I asked him; "can you count seven stars?" "No," he replied, "you count one, two, three, four, five, six; then toddler one hide herself, no let you count her." There is also a savage tradition, which I can recollect, that the Pleiades are young women, six of whom are very beautiful, but the seventh is so plain that she conceals herself from sight.

Some tribes of the Australians dance in honour of the Pleiades, because "they are very good to the black fellows." Was this borrowed through Europeans from "the sweet influences of the Pleiades" which Job celebrates?

Ask a negro in the Southern States to look through a telescope, and he will invariably turn it towards the Pleiades, "for they are berry good to the darkies." The natives of America, both North and South, regard the Pleiades as beneficent stars, and dance in their honour. "Oh what do we owe to thee!" is the grateful salutation of one tribe. Whence then did this arise? It was not merely because those stars announced spring, and were "stars of rain," or because they were "for signs, and for seasons, and days, and years," but also because they were connected with the idea of Paradise and the abode of the Deity. The problematical theory of Moedler, that Alcyone, the brightest of the Pleiades, is the central sun of the universe, is most interesting on account of the singular fact that such was actually the belief of early ages. -I have within the past year found unexpected, and I think conclusive, proofs that the name Alcyone (or rather, Alkyone), meaning a centre, pivot, or turning-point, was not given without some reason to that star, for the ancients in very remote ages undoubtedly believed that it was the centre of the universe, and that Paradise, the primaeva home of our race and the abode of the Deity and of the spirits of the dead, was in the Pleiades, traces of which ideas we even find among savages.

The Alkyonic Lake, the waters of which led to the world of spirits, must have meant simply "the waters of death" leading to Alkyone or Paradise, and reminds us of Ulysses' voyage to the abodes of the dead and to the Gardens of Alkyonoo.

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With the Pleiades, too, sacred birds (birds of paradise) were connected. In my journal of researches (1863) I expressed my conviction that Manu (a word meaning, in the Indian Archipelago, a fowl or bird) would be found to have been connected with the Pleiades. I have been recently gratified at finding that in far-distant Samoa there is a sacred bird called, not Manu-alii, the royal bird, as some European writers have assumed, but Manu-lili, the bird of the Pleiades.

What a singular link we have here between the folk-lore of these savages and that of the Old World, for to this very day, from Britain to Japan, the Pleiades are popularly known as "the hen" or "hen and her chickens."

In Mexico the beautiful kingfisher was a sacred bird. May not the name of the same bird in Greece have been a survival of similar ideas, as it was called the Halcyon, i. e. belonging to Alcyone, or a bird of paradise?

The bright sunny days, too, at the end of autumn, that shining season of the Pleiades, called in America the Indian summer, were Halcyon days among the Greeks, which we should now render heavenly days.

Even if the theory of prehistoric astronomers and of some modern men of science, that the Pleiades are the centre of the universe, should prove to have been unfounded, I am persuaded that the day is coming when the learned will admit that those stars are the "central sun" of the religions, calendars, myths, traditions, and symbolism of early ages---an era, however, so marvellously remote, that investigations respecting it bear the same relation to the study of anthropology and to the science of religion that palaeontology does to natural history.

I shall be greatly disappointed if I cannot satisfy even so cautious and careful an observer as Dr. Tylor, that there is a mass of original and primitive traditions as to the Pleiades among isolated savages in various quarters of the globe.

Some modern popular books employ such evidence to "prove" that the human race and/or god-like visitors to earth come from the Pleiades.

MLW-004 PRIMITIVE TRADITIONS AS TO THE PLEIADES

Tylor, Edward B.; Nature, 25:150-151, December 15, 1881.

Mr. Justice Haliburton's letter of December 1 (vol. xxv. p. 100) will have been read by many as calling attention to a curious subject. As it refers especially to me, and indeed arises out of my remark on the story of the "Lost Pleiad" in Dawson's "Australian Aborigines" (Nature, vol. xxiv. p. 530), I now write a few lines in reply. But it will not be possible to discuss properly Mr. Haliburton's ideas as to the Pleiades till he publishes them in full, with the evidence on which he grounds them. It must not be supposed that the subject has been unnoticed till now by anthropologists. That the Pleiades are an important constellation, by which seasons and years are regulated among tribes in distant parts of the world, that they are sometimes worshipped, and often festivals are held in connection with their rising, that their peculiar grouping has suggested such names as the "dancers," or "hen and chickens," and that numbers of myths have been made about them---all this has long been on record, though in a scattered way, and at any rate it is well known to students. Mr. Haliburton's letter shows that he has new information to add to the previous stock, and furthermore that he has formed a theory that the Pleiad beliefs go back to a marvellously

remote period in the history of man, when these stars were, as he says, the "central sun" of the religions, calendars, myths, traditions, and symbolism of early ages. If the astronomical evidence is to support so fast a structure as this, it need hardly be said that it must go far beyond what Mr. Haliburton mentions in his letter. But when his contemplated book is published, he may be sure of his facts being appreciated and his theories fairly dealt with. Though, as I have just said, this cannot be done here, I may be allowed one suggestion. Mr. Haliburton is good enough to speak of me as being a cautious person. May I in that capacity express a hope that verbal coincidences, when not close enough really to prove connection, may be kept out of an argument which ought to go on a more solid footing. Why should the name of the star Alkyone have anything to do with the name of Alkinoos, king of Corfu? They look indeed rather more alike in Mr. Haliburton's letter, where the latter name is misspelt with a y, but doubtless this is a slip of the writer or printer.

A word about my remarks on the Pleiades-myth which has led to this correspondence. The question is only a small one, belonging to comparative mythology, whether a particular Australian tale about the Pleiades, one of a dozen such known in that quarter of the world, is a genuine native myth or a spoilt version of a story borrowed from the white men. I doubted its being genuine, because it says that the lost one of the seven was the queen or chiefess. This is hardly according to nature, for we should expect the star supposed to have gone away to be one of the insignificant ones of the group, not such a bright one as a storyteller would call the queen. Of the many Englishmen who have heard of the "Lost Pleiad" it is curious how few know the probable explanation of the classic tale, as a nature-myth derived from the difficulty of making out more than six stars with the naked eye. It has been suggested by some that there may have been a loss of brilliancy in one of the smaller stars of the group since ancient times. If any of your astronomical readers think there is anything whatever in this supposition, it would be interesting to have their judgment on it.

The "Lost Pleiad" refers to a common ancient tale that one of the original seven stars in this constellation disappeared or, as Tylor suggests, lost its brilliancy.

MLW-005 PRIMITIVE TRADITIONS AS TO THE PLEIADES

Haliburton, R. G.; Nature, 25:317-318, February 2, 1882.

My conclusions as to the Pleiades having been believed to be in early ages the centre of the universe, were not in any way based upon the singular name Alcyone for the principal star in that group. I can hardly account for my having so long forgotten the meaning of that name, and its connection with the belief I had found vestiges of, as to the Pleiades being the centre of all things. It is probable that at first I regarded its significance as a mere accident, as Dr. Tylor evidently does, and dismissed it from my mind. The best proof of the widespread traces of the belief in question is to be found in the fact that even since this correspondence took place I have met among the Berbers of Morocco a name for Alcyone, which has precisely the same meaning, and which, they tell me, was given to that star because Paradise is in them, and they are the centre of all things. I have also found that the idea, which, as I stated in my last letter, I have for many years entertained, that those stars were observed by means of openings or passages in temples in early ages, is manifestly well founded.

I find that in the Sahara there are temples or ancient mosques, in which the year is still regulated in this way, there being a tube from the top of the building,

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very small above and larger below, through which the southing of those stars is observed. I have this not only from natives of the Sahara, but also from a European here who has often heard of the system, though he did not know which were the stars that were observed.

Even the Moors have a vestige of the practice in the singular belief that those stars "rest on the top of the mosques." In the feast of tabernacles, too, which is to be found in the Sahara as well as in far-distant quarters of the globe, the Berber tribes build their temporary tents with a hole at the top, so that the young men who are being instructed may see the Pleiades passing overhead. The Jews here have the same custom, and endeavour to explain it by a curious legend as to Jonah's journey to Nineveh. They forget apparently that Moses wrote a good many years before Jonah was swallowed by the whale.

We can now understand the vestiges in Egypt of a popular belief that the Pleiades are in some way connected with the Great Pyramid, the existence of which was observed with a very natural feeling of surprise by Prof. Piazzzi Smyth.

.....

MLW-006 THE FIRST "SIN"

J. ; *Nature*, 21:154, December 18, 1879.

After suggesting that man's concepts of good and evil may have originated in his experiments with intoxicating beverages, J. offers some interesting explanations of the serpent motif and Joshua's stopping of the sun and moon.

May I add a suggestion concerning the serpent always connected with the tree as on the early Babylonian cylinder figured on p. 91 of George Smith's "Chaldean Account of Genesis"? It appears to have represented the principle of evil very early, probably long before it was connected with the tree, and to have been at first the sea, which in a storm was the chaos out of which everything was formed, and which, as it seemed to swallow up sun, moon, and stars, and to bring forth the storm-clouds---those monsters with which the sun-god fought with his arrows the lightnings---came also, not unnaturally to represent the destructive principle. But how did it become a serpent? May it not have been the singular resemblance that the edge of the sea---as seen from a moderate height in a calm---bears to a huge serpent---now blue, now white, according to the amount of foam---winding and writhing about the earth, and eating out its rocks and shores, that caused its destructive attributes to be transferred to the serpent? A common name may have been the means. The resemblance is especially striking when the eye looks along the shore, as in the bend of a bay.

Another suggestion. Some years ago, when reading the description of the locality of the Battle of Beth Horon in Dean Stanley's work on Palestine, it seemed to me to point to the origin of the tradition of the sun and moon standing still at the command of Joshua, and I do not think it has been noticed. In any valley lying north and south, if one goes up the western hills as the sun sets to the valley, when one reaches the summit the effect of a new day and a fresh supply of sunlight is very striking. This sensation must have been strongly felt by the warriors of Israel, when, after pursuing their enemies up the pass, the still sunlit valley beyond broke upon their sight; and I cannot but think that, figuratively expressed, as it would be, and with much exaggeration, in the triumphal song sure to have been made and sung after the victory, it may well have originated the tradition of a standing still of the sun; the moon would follow suit. The songs are said to be the oldest parts of the Bible, and "Jasher" or "The Upright" may have been the singer or recorder of the lost song of triumph.

SECTION MM: MANUFACTURED ARTIFACTS

All artifacts are "manufactured" in the general sense. Here, however, the emphasis is on utilitarian objects deliberately exploiting nature. Coins, tools, weapons, and technologies, such as metallurgy, are collected here. Items are selected on the basis of their tendency to show precocious technology, outstanding and unexpected skills, and inexplicable processes, such as some ancient stonework.

- MMC Coins, metallic items. Armor and anomalous weapons using metal are included.
- MMF Flints, celts, etc. Carefully fashioned objects made from stone, particularly the stranger items, such as pygmy flints, celts, bannerstones, etc.
- *MMP Pottery, seals, etc. Objects manufactured from clay and other substances.
- MMT High technology. Anomalous artifacts that may indicate precocious technology.

*This subsection not represented in Volume M1.

MANUFACTURED ARTIFACTS

MMC-001 AN ABORIGINAL COAT OF MAIL

Anonymous; American Antiquarian, 11:196-197, 1889.

Some two years ago Mr. J. H. Hungate, now a banker in La Harpe, Ill., was in Washington Territory. He discovered in Almota, in Walla Walla valley, on the Snake river, a group of eight or ten mounds and among the mounds a grave which contained some interesting relics. The relics seem to have constituted the coat of mail and war implements of some Indian chief, a chief who had contact with the early Spanish settlers or discoverers. There was in the grave a long, rusty steel sword, the head of a lance or dirk, and the coat of the chief. The dagger or dirk is about eleven inches long and three and a half inches wide, and has a crescent-shaped guard above the blade, but a tang which contained a socket for a handle, which should be at right angles with the blade. The coat was made of a vast number of copper tubes which were strung on twine cords and woven into shape of a coat, small tubes forming the collar and long tubes forming the main part of the coat. On the breast there were several large perforated disks made from sea-shells, the wide part of the *Bucyon perversa*. The coat was large enough to cover the breast and back and the tubes were so near together as to serve as a protection against arrows. It is probable that there was a fringe below the tubes, but this had disappeared. Along with the coat were several copper rings, one a heavy ring designed for the wristlet; another a light ring for the nose; several others designed as ornaments for the coat; also eight elk teeth, stained blue by the copper. The mounds contained some steatite mortars and pestles, though it is uncertain whether they belonged to the same age as the grave. The grave was on a terrace in a dry place and was so situated that the perishable material was likely to be preserved for a long time. This is an important find, since it connects history with prehistory, as the iron belonged to the historic period, but the copper tubes were of prehistoric character.

It would have been safer to say that the iron "probably" belonged to the historical period.

MMC-002 [MOUNDBUILDER IN COPPER ARMOR]

Anonymous; Nature, 45:157, December 17, 1891.

According to the "World's Fair Notes," sent to us from Chicago, the party which, under the direction of Mr. Putnam, has been making excavations in the mounds of Ohio, made an important discovery on November 14. While at work on a mound 500 feet long, 200 feet wide, and 28 feet high, the excavators found near the centre of the mound, at a depth of 14 feet, the massive skeleton of a man incased in copper armour. The head was covered by an oval-shaped copper cap; the jaws had copper mouldings; the arms were dressed in copper, while copper plates covered the chest and stomach, and on each side of the head, on protruding sticks, were wooden antlers ornamented with copper. The mouth was stuffed with genuine pearls of immense size, but much decayed. Around the neck was a necklace of bears' teeth, set with pearls. At the side of this skeleton was a female skeleton.

MMC-003 COINS, METALLIC ITEMS

MMC-003 IRON AXE IN A MOUND

Duer, G. U.; American Antiquarian, 11:188, 1889.

I read with much interest, your article on "Archaeology and Ethnology of Michigan," in the January (1888) number of The American Antiquarian, and heartily confer and agree with him that different tribes or races occupied this country in prehistoric times.

The many tokens that we have, point to indicate thus. It is of my opinion that the paleolithic age was one. The Mound-builders, another and probably the Indians followed. It is only conjecture.

You also give some accounts of implements found in mounds which causes me to inquire whether anything similar to what I recently added to my cabinet of archaeological relics has been found in other cases and by what tribe or race was it used. It is an iron tomahawk, very fine and perfect; the axe part being similar to the blade of an axe used for hewing logs, and is eight inches wide by seven inches in length, tapering to where the handle is inserted (which is similar to any ordinary axe), and the other part is eight inches long by two inches wide, in the shape of a half moon, only the point is blunt. It weighs four pounds, and was taken out of a mound in Wayne County, Ohio, last summer. A number of stone implements, pottery, and a copper breast-plate were also found. I am of the opinion it was used by some warrior or leader of a tribe as a battle axe; but by whom, I can not tell, and would like to hear from some of your readers.

Iron again, but quite likely one of the "trade axes" manufactured in the East.

MMC-004 AN ANCIENT ROMAN COIN FOUND IN ILLINOIS

Anonymous; Scientific American, 46:382, June 17, 1882.

A farmer in Cass county, Ill., picked up on his farm a curious bronze coin, which Dr. J. F. Snyder sent to Prof. F. F. Hilder, of St. Louis, who writes about it as follows to the Kansas City Review:

Upon examination I identified it as a coin of Antiochus IV., surnamed Epiphanes, one of the kings of Syria, of the family of the Seleucidae, who reigned from 175 B. C. to 164 B. C., and who is mentioned in the Bible (first book of Maccabees, chapter 1, verse 10) as a cruel persecutor of the Jews.

The coin bears on one side a finely executed head of the King, and on the obverse a sitting figure of Jupiter, bearing in his extended right hand a small figure of Victory, and in his left a wand or scepter, with an inscription in ancient Greek characters--Basileos Antiochou, Epiphanous, and another word, partly defaced, which I believed to be Nikephorou; the translation of which is, King Antiochus, Epiphanes (Illustrious), the Victorious. When found it was very much blackened and corroded from long exposure, but when cleaned it appeared in a fine state of preservation and but little worn.

Coins such as the one described above have been found in several places in North America. Like the Roman items found in Indian mounds, most (but not necessarily all) were probably brought to this continent after Columbus.

****F-001 EVIDENCE OF THE WORK OF MAN ON OBJECTS FROM QUATERNARY
CAVES IN CALIFORNIA

nam, F. W. : American Anthropologist, 8:229-235, 1906.

In the investigations of the Quaternary caves of California which have been carried on by the Department of Anthropology of the University of California during the last few years, there have been discovered a considerable number of bone and several stone fragments apparently indicating the work of man. If these specimens are actually the evidence of man's work, it is of the utmost importance to have the facts brought out, as the objects in question have been found associated with a fauna which represents an epoch considerably antedating the end of the Quaternary period, and would indicate human occupancy of this portion of the continent at a very remote period.

The specimens that seem to exhibit evidence of human handiwork of the Quaternary period include a number of polished and pointed bone fragments in most respects similar to the rougher instruments from the shell-mounds, and several other fragments with perforations of such a character that it seems impossible to explain their presence excepting by the agency of man. With these more definite evidences of man's presence there are found in the same strata large numbers of splintered bones, such as elsewhere form a considerable part of the deposits in caves or in shell-mounds that have served as places of human habitation in prehistoric time.

Papers such as this are forerunners of the modern controversies dealing with the supposed human artifacts from the California Calico site.

MMF-002 RECENT CAVE EXPLORATION IN CALIFORNIA

Merriam, John C. : American Anthropologist, 8:221-228, 1906.

The fauna of Potter Creek cave is considered by Dr. Sinclair to represent the middle or later Quaternary. The fauna of Samwel cave is certainly Quaternary, but is evidently later than that of Potter Creek. The age of Potter Creek cave is, according to commonly accepted correlations, not far from that of the earliest deposits containing human remains in Europe. Though a reasonable doubt might arise as to whether man could have reached America as early as the date of the Potter Creek deposits, the age of Samwel cave appears to be within the period of man's existence in the old world.

From the evidence at hand it seems that both Mercer's cave and Stone Man cave were in existence in Quaternary time, and in all probability some of the deposits in both caverns were formed in that period. (p. 228)

See MMF-001 for evidence of human occupation of these caves. Only the information on dating (an opinion, of course) is reproduced above.

MMF-003 FLINTS, CELTS, ETC.

MMF-003 THEORY ON STONE TOOLS DOUBTED

Sullivan, Walter: New York Times, July 29, 1973.

Compiler's Summary: Sullivan, the science editor for the Times, reports on the doubts of Vance Haynes, a Texas geology professor, concerning the 1968 findings of Leakey at the famous Calico site in the Calico Mountains of California. Leakey and his colleagues had identified some two hundred pieces of chert or chalcedony---forms of flint-like rock---as having been worked by men. Many other specimens in the area also appeared to be man-made. [Discoveries such as these, especially in the "auriferous gravels" of California, have been claimed and controverted for decades.] The deposits in which the questioned finds were made consists of relatively recent material, in which, Haynes agrees, genuine artifacts are definitely found; and a deeper region, approximately 100,000 years old, in which the controversial objects reside. Haynes believes them to have been chipped by natural forces. Haynes argues that the specimens used by Leakey were selected "for their worked-on appearance, from among thousands that display various degrees of chipping." He goes on to say, "None of the finds are as clearly manmade as those, for example, from the Chellean period in Europe, traditionally regarded as the oldest of stone age cultures 300,000 years ago. Nor are they as impressive as the artifacts of the subsequent Levallois and Mousterian cultures, in the European chronology." "No specimen from Calico," he says, "is as obvious an artifact as, for example, a typical Chellean hand ax, a Levallois flake or a Mouseterian point."

In a 1970 conference on the subject, the existence of a hearthstone was advanced as evidence of human occupation of the Calico site. The magnetic properties of the stone suggest repeated heating by fire. Haynes counterproposes that lightning strikes caused this effect.

[Both Haynes' article and the original work of Leakey were reported in Science and will be found in the M series of sourcebooks. The central point of contention in both articles---the emotion-laden point---is whether man has been in America longer than 10,000-20,000 years. If he has, the Bering Land Bridge dogma may have to be revised.]

MMF-004 MAN'S AGE IN U.S. PUT AT 100,000

Anonymous; Baltimore Sun, p. A3, August 11, 1973

San Diego (AP)---A professor says stone tools found in a San Diego canyon, where a 1970 rainstorm exposed an ancient stream bed, appear to be at least 100,000 years old.

The age estimated by Professor George F. Carter, of Texas A&M University, is about nine times the normally regarded length of man's first appearance in North America.

Similar claim criticized. After a similar claim 20 years ago, some critics attacked Dr. Carter's thesis that artifacts found in a remnant of river deposits laid down before the last glacial period almost 80,000 years ago were at least that old or older.

Dr. Carter was joined in the new excavations started about six weeks ago, by James R. Moriarty, history professor and archaeologist at the University of San Diego.

Carbon deposits, burned rocks and nine distinctly different forms of what the two scientists contend to be manshaped tools have been found.

200 artifacts found. In a draw not far from the Spanish Padres' Mission San Diego de Alcalá, about 200 of the artifacts have been uncovered, Dr. Carter said recently.

An amateur archaeologist, Herbert L. Minshall, found the first artifacts.

"On the last day in February, 1970, we had about 2-1/2 inches of rain in less than two hours. This caused a flash flood that opened a gulley along the canyon floor, exposing an ancient stream bed," he recalled in an interview.

"I explored the canyon about a week after the rain and immediately began finding artifacts like this," he said, holding a thin slab of rock about the size of his palm. One side of it was raggedly sharp as if chipped, the other smooth and hand-fitting.

Dr. Carter said, "All the geomorphic evidence is that this site is interglacial. That is to say, it is more than 80,000 years old and, more probably, more than 100,000 years old."

Professor Carter, who was curator of anthropology at San Diego's Museum of Man in the 1930's, said he first found an artifact at the Mission Valley site 22 years ago.

The California evidence for very early dates for man in the New World has always been controversial; viz. the remains found in the "auriferous gravels." See MES-006, MGT-004, MGT-005.

MMF-005 ARTIFACTS OR GEOFACTS?

Brewer, Frederic; Science, 181:1202, 1204, September 28, 1973. (Copyright 1973 by the American Association for the Advancement of Science)

Charles Dawson, presumed architect of one of the greatest scientific boaxes---Piltown man---devised in the early part of his century a simple experiment that now could be used to support one facet of the argument Vance Haynes advances (27 July, p. 305) about the origin of the chipped flints at the Calico site.

A lawyer, Dawson belonged to a local society of science hobbyists and antiquarians in Lewes, East Sussex, England. He was annoyingly insistent that the stone artifacts proudly displayed by fellow members could have been the result of geologic processes. One day, Dawson arrived at a meeting of the society, a sackful of flint in hand. He placed the sack on the floor and then proceeded to jump up and down on the rocks, crunching them to fragments. In a little while, he removed the stones and, with a triumphant smile on his face, showed them to

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his incredulous colleagues. Many of the newly splintered rocks exactly resembled the so-called hand tools.

Thereafter, Dawson was snubbed by the society. A few years later, in 191 he made an amazing discovery that propelled him to fame---the skull and jaw fragments of the Piltdown man.

It is curious, and refreshing, to note that K. P. Oakley---mentioned in Haynes's article as having examined the Calico specimens---defrocked the spurious Euanthropus dawsoni, using a fluorine dating technique, in 1949.

MMF-006 CELTIC REMAINS IN JAMAICA

Pattison, S. R. ; Notes and Queries, 2:8:24, July 9, 1859.

A West-Indian friend, on whose accuracy full reliance may be placed, has brought to me two stone implements found in the superficial soil of the island of Jamaica. They are celts of the ordinary description, and of medium size and careful workmanship, undistinguishable from the common types of the later stone period in Europe. The material is a hard greenstone, unlike as I am informed any rock found on the island. Both bear traces of the lateral attachment of a haft, made probably by bending a supple stout wand horizontally round the middle of the tool, and tying it on with fibres; just as the granite quarrymen on the Cornish moors now do with their small steel chisels. A third implement of larger size, but of the same kind, has also been exhumed. I have not heard of any pottery or other objects of art. The fact and fashion of the tool connect it with the aboriginal tribes of western Europe, or rather with the first traceable wave of the Indo-European migration. Will one of your correspondents who is gifted with leisure for the investigation follow up the subject by noting the vestiges of the westward course of the great original stream of Celtic population? I have some recollection of the occurrence of similar implements in the United States being recorded, but have not time to pursue the inquiry, though it assumes the more interest at present from the analogous, though different, phenomena of the flint implements now under such copious discussion among antiquaries and geologists. No reasonable doubt can be entertained by anyone who sees the articles found near Amiens and Abbeville, and in the Sicilian and Brixham caves, that they are of man's workmanship, and intended for different uses: in fact, that we have the cutlery of the early stone period. At St. Acheul, as at the former find in our own country, the abundance of these remains within a narrow space points to more than a settlement, and shows the existence of a manufactory. Just as future archaeologists will find at Brandon proofs of the fabrication of gun-flints for the million. The occurrence of the bones of extinct mammals interspersed with the implements, and of undisturbed beds of brick-earth with land shells above, and intercalated with implement-bearing drift, are phenomena so remarkable that I prefer waiting for further facts in confirmation before attempting either to found conclusions or alter present landmarks. There is a well-endowed band of explorers on the quest, and they will doubtless unkenel the truth, which is always well worth the hunting. I recollect a collection of flint implements in the museum at Beauvais, which should be examined. An arrow-head of flint has been found in a Cornish stream-work.

MMF-007 CELTIC REMAINS IN JAMAICA

n Lennep, J. H. and Heward, R.; Notes and Queries, 2:8:91-93, July 30, 1859.

I fear the remains mentioned by Mr. Pattison are neither Celtic nor celts. They are only stone implements, such as are found all over the world; and bearing testimony to the truth that everywhere the individual members of mankind, when placed in the same circumstances, must take to the same resources and come to the same results. It was necessity taught them, and taught them to use first, what was within their immediate grasp. The human race indeed (and in deeds) is one!

I have now before me a Report, made up by Dr. C. Leemans, the Director of the Leyden Museum of Antiquities. In it he refers to the several acquisitions made, in the year 1858, by the collection under his care. Under the heading "Asiatic Monuments," he writes:-

"Our division of Javanese Antiquities was greatly enriched with a present, offered by Mr. J. A. Kraijenbrink, and sent by him from the Tegalwaru-lands. Krawang Residence, in Java, to the Ministry of Inland Affairs.

"This gift is the more important, because it was accompanied by an exact account of the circumstances and particulars which attended the sundry discoveries. A farther illustration was also given in a minute sketch of one of the sites, where some of the antiquities were found.

"The collection contained nine stone wedges of different forms and sizes, and consisting of quartz, chalcedony, agate, green jasper, flint, and brown jasper. These wedges or hatchets were long from 4 (Dutch or French) centimetres, 5 millimetres, to 11 centimetres; broad from 2.1 to 6 centimetres, and thick from 8 to 30 millimetres; they were discovered in 1853-1856 at Pangkehan, Sirba Telukdjambée, Tegahwaru, Tjehaskana, and Ulekkam, all places situate in the Tegalwarulands.

"But of particular importance are six objects, which, in 1851, were dug up near the desse Tjilledock, not far from the river Lossarce in the Residence Cheribon. Though at different depths under the trodden soil, the pieces of antiquity I am going to describe were found lying in each other's vicinity. They afford us the first instances, as far as our knowledge goes, of stone and metal implements of this kind discovered contiguously, and thus seemingly descending from the same period. They are: a flat, oblong wedge, neatly and smoothly worked and ground, and apparently never used, long 16, broad 6.5, and thick 1 centimetre; and a second chisel-shaped wedge, outside convex, inside concave, also of very neat, smooth, and sharp workmanship. This second implement, as the first, is of lava, and was, it seems, never used. Its dimensions are length 22, breadth 5.5, thickness 4 centimetres. In the third place: a finely preserved bronze spear-head, 18 centimetres long, and 6.5 wide. These three objects were found at about the same depth. Nearly four yards above lay a fourth object, being part of an iron sword, still 35 centimetres long, 5 wide, and 1 thick."

Farther:-

"For the division American Antiquities, we received three objects, whose relative value is heightened by the circumstance that they came from the soil, trodden by the earlier inhabitants of Guyana, now in part the Dutch colony Surinam; and thus afford us the first opportunity for opening in our Museum a subdivision of antiquities from the Dutch West-Indian possessions. They consist in a beautifully polished wedge of yellowish quartz, grooved at both sides of the upper end, in order to admit of its being fastened to a handle. This implement has a length of 13 centimetres: its breadth, at the upper part, is of 9, and its thickness of 3 centimetres. Together with another wedge, ---about which pres-

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ently, ---it was found under one tree, and was presented to Lieutenant Jonkheer C. A. van Sypesteyn, then adjutant to the Governor of the Colony, by the director of the plantation Berg en Dral, the place where the hatchets were discovered. The second wedge, of which a plaster cast was made for the Museum, is 6 centimetres high, and has from 6 to 8 centimetres breadth. It is made out of peculiar kind of quartz, in Dutch kwartsiet, and differs in form from the instrument just mentioned, by looking more like a battle-axe. In fact, the narrow sides diverge towards a fan-like edge. For the rest, the implement has, like the other hatchet a groove at both sides, to facilitate the fastening of the handle.

"The third object is a flat-round grinding-stone of quartz, 6 centimetres, 5 millimetres by 5 centimetres, 4 millimetres: it was obtained by Mr. van Sypesteyn from the plantation Bleijendaal, where it was stated to have fallen from the sky after a meteorical explosion. To this kind of implements, which the natives distinguish from the stone hatchets or wedges by the name of thunderstones (dondersteenen), the barbarians of Guyana ascribe a great medical power."

Mr. Lecmans farther supposes (though to us it seems improbable) that the aborigines may have translated into their language the name of dondersteenen, which perhaps Dutch settlers gave to such stones in their hearing: and he then infers that, also from the Dutch, the natives may have adopted their belief in the healing properties of this kind of antiquities.

"It is remarkable," says he, "that, as well in the East as in the West-Indies, the same appellation and superstition are found to exist, which still are prevalent amongst our illiterate countryfolks. It is well known that, in Holland, the stone wedges are called donderbeitels [thunder-chisels], whilst, in Java, they are named lightning-teeth [bliksem-tanden]."

Now, to us, this is no cause of wonder at all. Man wants always to assign a cause for everything and, rather than confess his ignorance, he will invent a cause. For instance: how lightning can split a gnarled oak, the illiterate do not understand. But if near this oak is found a stone wedge, of course to this wedge is ascribed the phenomenal destruction. The hatchets are mostly found near trees: for to fell trees they no doubt were most used. And, of course, near very old trees, which already existed in the stone period; and these, as highest, are most subject to being struck with lightning. The stone implements were either forgotten or left there, because, in our age of unsafety, man has often suddenly to leave his peaceful occupations never to come back, or even sometimes is killed over his instruments of peace.

In the north of Europe the name of donderbeitel perhaps still echoes a faint reminiscence of Thor's mighty hammer, and not less mighty thunderbolts, whilst, almost everywhere, the memory of the stone period has vanished, and more civilised mankind is hardly able to represent to itself an age in which iron was not known.

But in the current belief, spread all over the world, that the stone implements of antiquity are the wedges of lightning, we again see a proof of the individuality of the human race!

The healing power, assigned by the natives of Surinam to the ancient grinding-stones, may perhaps be a faint reminiscence that once medicaments were ground with them, instead of with pestle and mortar. But, may be, I ascribe too much civilisation to an uncultivated period!

In conclusion I may as well note down that a German haymaker once told me that he remembered having seen a thunder-chisel which always sweated when a thunderstorm was approaching.

With reference to Mr. Pattison's inquiry concerning the discovery of stone celts in Jamaica, I beg to state that I have in my possession one that I brought from that island some years since. I obtained it from a negro woman, who kept

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it in a porous water-jar; informing me that the fluid was much cooler in consequence of the charm of this peculiar shaped stone, and I had some difficulty in persuading her to give it to me. She could not give any account as to how she became possessed of it: she had never remembered it being anywhere else except in the water-cooler.

It is precisely similar in shape (pyriform) to similar implements that I have seen in museums. It is two inches nine-tenths in length, and one inch six-tenths in the widest part, where it has a cutting edge. It shows no mark of having been attached to a handle, like those described by your correspondent. The stone is dark green (porphyry?), and apparently of precisely the same kind as some New Zealand war clubs (pata-patoos) that I have.

The possibility of Pattison's implements being celts is dismissed by von Lennep without even seeing them. If similar megalithic structures are found everywhere, why not celts?

The wedges or thunderstones mentioned above have a fascinating history, some of which is related in the Series G sourcebooks, where numerous connections between meteoric phenomena and thunderstorms are also presented.

MMF-008 [CURIOUS ARTIFACTS FROM LA PLATA ISLAND]

onymous; Nature, 65:231, January 9, 1902.

In Publication No. 56 of the Field Columbian Museum Dr. G. A. Dorsey describes the results of a fortnight's digging in the island of La Plata, Ecuador. It seems probable that for a very long period the island was visited by people from the mainland for ceremonial purposes, as none of the pottery appears to have had any utilitarian use, practically all being of the nature of images of the human form ranging in height from six to twenty inches, and most of them were provided with whistles. There were found numerous engraved and plain rectangular and circular discs and other problematical objects. In a tongue of detrital soil near the shore was found a grave which, from its contents, belonged to another occupation of the island, and there can be little doubt that invaders from Peru previous to the Spanish conquest were buried in this little island so remote from their home. In the grave excavated by Dr. Dorsey were found two gold human figures, one of silver, one of bronze and one of copper, besides a gold cup and several objects in gold, silver and copper, twelve earthenware vessels and a magnificent ceremonial highly polished stone axe, 19-1/2 inches long and less than three-quarters of an inch thick, which may be considered as one of the most remarkable stone implements ever found.....

MMF-009 CURIOUS GEOLOGICAL FACTS

Anonymous; American Journal of Science, 1:2:144-146, 1820.

After describing some marble quarries in England which contain large clay-filled cavities, the author continues as follows.

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The perusal of the above brought to my recollection a fact if possible still more astonishing: it is mentioned by Count Bournon in his *Minerology*, and as that work has (I believe) never been translated, I will here give the passage entire.

"During the years 1786, 7, and 8, they were occupied near Aix in Provence, in France, in quarrying stone for the rebuilding, upon a vast scale, of the Palace of Justice. The stone was a limestone of a deep grey, and of that kind which are tender when they come out of the quarry, but harden by exposure to the air. The strata were separated from one another by a bed of sand mixed with clay, more or less calcareous. The first which were wrought presented no appearance of any foreign bodies, but, after the workmen had removed the ten first beds, they were astonished, when taking away the eleventh, to find its inferior surface at the depth of forty or fifty feet, covered with shells. The stone of this bed having been removed, as they were taking away a stratum of argillaceous sand, which separated the eleventh bed from the twelfth, they found stumps of columns and fragments of stones half wrought, and the stone was exactly similar to that of the quarry: they found moreover coins, handles of hammers, and other tools or fragments of tools in wood. But that which principally commanded their attention, was a board about one inch thick and seven or eight feet long; it was broken into many pieces, of which none were missing, and it was possible to join them again one to another, and to restore to the board or plate its original form, which was that of the boards of the same kind used by the masons and quarry men: it was worn in the same manner, rounded and waving upon the edges.

"The stones which were completely or partly wrought, had not at all changed their nature, but the fragments of the board, and the instruments, and pieces of instruments of wood, had been changed into agate, which was very fine and agreeably coloured. Here then, (observes Count Bournon,) we have the traces of a work executed by the hand of man, placed at the depth of fifty feet, and covered with eleven beds of compact limestone: every thing tended to prove that this work had been executed upon the spot where the traces existed. The presence of man had then preceded the formation of this stone, and that very considerably since he was already arrived at such a degree of civilization that the arts were known to him, and that he wrought the stone and formed columns out of it."

MMF-010 [PYGMY FLINTS]

Anonymous; *Nature*, 65:372, February 20, 1902

The current number of *Man* contains several interesting papers. Prof. Flinders Petrie gives a plate illustrating two dozen hitherto unpublished prehistoric Egyptian figures of men and animals. The Rev. R. A. Gatty describes his finds of pigmy flints from Lincolnshire; perfectly similar flints have been found in various other localities in England, as well as in Belgium, in France, and in India. These problematical implements are of very delicate workmanship but more information is required before any definite statements can be made as to their use or their users. Mr. Gatty believes that they were actually made at Scunthorpe in Lincolnshire from flint river pebbles.

Pygmy flints are found in many countries. Their real purpose is unknown, although the common archeological reaction is to term them "ceremonial." Pygmy flints represent an incredible amount of delicate, almost microscope, workmanship.

MMT-001 WEAPONS AND POLITICS OF THE ANCIENT HINDUS

Anonymous; Nature, 24:581, October 21, 1880.

Because so much has been said lately in the more sensational literature about the war machines of the ancient Hindus, the following book review from Nature will appear sober by comparison.

On the Weapons, Army Organisation and Political Maxims of the Ancient Hindus, with Special Reference to Gunpowder and Firearms. By Gustav Oppert. (Madras: Higginbotham and Co.; London: Trubner and Co., 1880.)

"While pursuing my researches into ancient Indian history," says Dr. Oppert, "I lighted upon two ancient Sanskrit manuscripts containing interesting information on many new and important topics. One of them, the Nitipraka sika, has been, I believe, up to now utterly unknown, and the other, the Sukraniti, though known to exist, has never been described and published." The manuscripts relate to the weapons and military organisation of ancient India, a subject upon which fresh light was much needed. If for no other reason, therefore, they deserved to be edited and translated. But one of them at least also contains statements sufficiently novel and startling to claim for them a special hearing. If we may believe it, not only was gunpowder invented in India long before the days of Berthold Schwarz or Roger Bacon, but firearms, including both cannon and guns, were known and used. The guns were even provided with sights and flints. "The tube" of one of them, it is said in the 'Sukraniti', "is five spans long, its breech has a perpendicular and horizontal hole, at the breech and muzzle is always fixed a sesame-bead for aligning the sights. The breech has at the vent a mechanism which, carrying stone and powder, makes fire by striking. Its breech is well-wooded at the side, in the middle is a hole, an angula broad; after the gunpowder is placed inside, it is firmly pressed down with a ramrod. This is the small gun which ought to be carried by foot-soldiers... A big gun is called (that gun) which obtains the direction of the aim by moving the breech with a wedge; its end is without wood; but it is to be drawn on cars... The ball is made of iron, and has either small balls in its inside or is empty." Dr. Oppert believes that the Nitipraka sika also contains references to firearms, though the passages he quotes seem rather to refer to supernatural weapons or to fire-machines like those used by the Greeks of the Eastern Empire. A work, too, which mentions the Hunas ("Huns," or Europeans) cannot be of the antiquity to which he would assign it.

Dr. Oppert seeks further support for the early use of firearms in India in a passage from a portion of the Atharvanarahasya, which he renders: "the fire prepared by the combination of charcoal, sulphur, and other material depends upon the skill of its maker." It is plain, however, that there is no necessary allusion to gunpowder in these words, much less to firearms. A quotation from Manu, in which fighting with "darts kindled by fire" is forbidden, is equally inconclusive.

The statements of the 'Sukraniti' must therefore stand by themselves. In spite of Dr. Oppert's arguments to the contrary, it is difficult to admit that in its present form it can be earlier than the thirteenth century. The prohibition to use firearms in "fair" fighting would not account for the total absence of any reference to them in the lawbooks and epics and other literature of ancient India, and had they existed in the seventh century, or had the Hindus been acquainted with gunpowder at that time, we can hardly suppose that the fact would have remained unknown to the inquisitive Buddhist pilgrims from China who have left us accounts of their travels in the Peninsula. The Greek fire had nothing to do with gunpowder, and we do not therefore see why Dr. Oppert introduces it into the discussion, while there is no proof that the manjanik or machine employed by Mohammed

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Kasim at the siege of Daibal (A. D. 711) was propelled by gunpowder. The flaming thunderbolts launched by the Indians against the army of Alexander, according to the pseudo-Aristotle, belong to the region of myth, like the storms of lightning with which Herakles and Dionysos were received when they invaded India, as related in the romance of Philostratos. Gunpowder may indeed have been invented in India, as Beckmann believed, but if so we want further evidence before we can admit that the invention was earlier than the twelfth or thirteenth century of our era.

Among other interesting points noticed by Dr. Oppert are the (ideal) rate of pay received by the officers and privates of a Hindu army at the time the Nitipraka sika was composed, and the identification of Manipura, the capital of the Pandya kings, with the modern Madura. He also points out that the boomerang is well known in many parts of India, especially in the south, and that he himself possesses four wooden ones, besides an iron one, which he obtained from Pudukota. Two ivory ones, from the armoury of the late Rajah of Tanjore, are preserved in the Madras Museum. The Tamil name of the boomerang is yalai tada, or "bent stick," and it is employed in hunting deer. It is one of the weapons described in the Nitipraka sika under the name of astara or "scatterer."

MMT-002 FIRST MASTERS OF THE AMERICAN DESERT: THE HOHOKAM

Haury, Emil W.; National Geographic Magazine, 131:670-675, May 1967.

Haury dwells at length on pottery and similar homely artifacts of the Hohokam. Only the technologically ambitious ventures of this tribe have been selected for quotation below. As usual in Geographic articles, magnificent photographs accompany the text.

The National Geographic Magazine kindly gave permission to quote the above article providing that only 700 words were used. Consequently, some of the rather poetic description of the Arizona countryside, as it now is and as it likely was 2000 years ago, is omitted.

Haury notes in the early pages that the Hohokam not only conquered the desert but were the first irrigationists in what is now the United States---all this done several centuries before the Christian era.

The author also provides two fascinating observations gleaned from his thirty years of professional experience around the Hohokam ruins. First, unlike the other American Indians the Hohokam cremated their dead and as a result we have no real idea about their physical appearance. Second, the most beautiful of the Hohokam artifacts, stone vessels and clay figurines, are almost always found destroyed---apparently deliberately. No one knows why.

Compiler's Comment. Might there not be some connection between the deliberately destroyed artifacts and the ruined towers found in the southwest that were apparently defended to the death by their makers?

From other imported shards we were able to estimate that the last three phases of Hohokam history at Snaketown---beginning about A. D. 500---had lasted around 200 years each. Yet there were four earlier phases here! Even a conservative estimate pushed the beginnings of the settlement toward the opening of the Christian Era.

There were strong affinities with Mexico in addition to the ball court. Aptly enough, one of the enduring favorites of the Hohokam craftsman was the snake. We found him writhing around the sides of pots, forming the circlet of a shell bracelet, coiling at the rim of a stone incense burner. Quite often a bird is attacking the snake, a very old motif south of the Rio Grande---and one that survives to this day on Mexico's flag.

Among the many thousands of artifacts gathered, we found countless stone tools and arrowheads, but it was a small number of decorated marine shells, dated to about A. D. 1000, that intrigued us most. We were baffled by the incredible fineness of the working of horned toads, snakes, and geometric forms that adorned them.

Our study pointed to only one plausible hypothesis: The shells were etched. We knew full well that this meant crediting the Hohokam with the first etched artifacts in history---hundreds of years before Renaissance armorers in Europe came upon the technique.

We speculated that an Indian artisan accidentally discovered the corrosive power of fermented cactus juice, which produces a weak acetic acid. Shells soaked in the vinegar would be eaten away unless protected by a resistant substance, such as pitch. Hence the procedure, by simple reasoning: Form a design of pitch on a shell, soak it in acid, scrape off the pitch, and the result is an etched design.

Recently I was able to prove this theory with the finding of a shell prepared for an acid treatment never completed (page 680). The invention of etching enabled the Hohokam to create some remarkable works of art.

A final major surprise of that first dig into the Hohokam past was the excavation of a canal system that implied a long period of technological growth. The canals stretched for miles along the upper terrace of the river valley, safe from sudden floods yet near at hand for maintenance and water control and for directing water to the fields.

A cross section of the prehistoric canals showed one imposed upon another as changes were made over a long period of time. The earliest we had found thus far, dated to A. D. 800, seemed every bit as well planned and executed as the latest, dug about 1200. (pp. 676-679)

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Among our finds were two examples of monumental architecture. The first was a platform mound, a low structure filled with dirt and trash and capped with a thick pad of clay. It dated to about A. D. 500, the time when mounds were rising out of the Mexican jungles to serve as stages for ceremonial dances and religious rituals. At Snaketown the footsteps of the dancers, if any, long ago vanished, and the sounds of the bells, flutes, and drums were gone with the desert wind.

Not far from the platform mound, archeologist Jim Sciscenti was removing a thin veneer of earth from another structure that gave me a deep sense of nostalgia. At the very beginning of my career as an archeologist, I had worked at Cuicuilco, near Mexico City. One of the major remains there had been a 90-foot-high conical mound, preserved by a lava flow that partially covered it.

MMT-003 HIGH TECHNOLOGY

At Snaketown, on what I vowed would be my last dig, Sciscenti uncovered a strikingly similar truncated cone, though much smaller. This one was made of clean desert soil. Perhaps by now the Hohokam had come to realize that the gods merited something better than a refuse heap!

In Mexico, such dirt structures gave rise to the famous temple pyramids. At Snaketown, we found a single step going up to a surface 50 feet across and only 3 feet high. (p. 685)

MMT-003 BERTHELOT AND THE METALS OF ANTIQUITY

Gladstone, J. H. ; Nature, 65:82-83, November 28, 1901.

One paragraph in this review of the Berthelot studies stands out.

The last paper that has been communicated by Berthelot contains a description of a very curious case, or shrine, found at Thebes. It is of the time of Queen Shapenapit, daughter of King Piankhi, who lived in the latter part of the seventh century B.C. This inlaid case is remarkable as containing, in addition to the ordinary metals of the time, a small piece of crude platinum, weighing between five and six milligrammes. It had evidently been worked with the hammer, and had probably been mistaken by the artificer for silver.

MMT-004 ANCIENT METALLURGY IN RHODESIA

Rickard, T. A. ; Nature, 126:758, November 15, 1930.

My attention has been directed to an article on "Early Man in N. Rhodesia", by Prof. Raymond Dart, which appeared in the Times of Aug. 22 and was noticed in Nature of Aug. 30. Echoes of the statements made in the article are finding their way into our local Press, and the unprotected public is being told that iron was being fabricated "3000 to 4000 years" ago by a people of Palaeolithic culture dwelling in central Africa.

On the face of it, such an accomplishment is highly improbable, because the oldest man-made iron of known date is that of the discovery made by Sir Flinders Petrie at Gerar, in Palestine, in 1927. The date of this iron, as determined by associated scarabs and amulets, is 1350 B.C. It is probable that the smelting of iron was begun a little earlier, say, 1400 B.C., in the Hittite uplands, between the Taurus and the Caucasus, a region to which classical tradition points as the cradle of metallurgy. All iron earlier than 1400 B.C. is probably of meteoric origin; many older relics have been tested for their nickel content (which is the criterion) and have proved to be of celestial metal. It is unlikely that the smelting of iron was known long before 1350 B.C., because the knowledge of the art would have been of supreme importance, in trade and war, to any primitive people; it would have sufficed to give them instant dominance over their contemporaries.

We must meet Prof. Dart's conclusion, therefore, with justifiable scepticism. He says: "These facts reveal the extreme age (3000 to 4000 years) of the knowledge of smelting and the working of metals in Northern Rhodesia". This dictum

is based upon the finding, by an Italian scientific expedition, of a foundry, slag, and ashes at a depth of six feet in a deposit containing implements characteristic of the Stone Age. The deposit lies within a limestone cave at Mumbwa, near the Kafue river, a tributary of the Zambezi. The find is said to prove that "the smelting is coeval with the later phases of the Palaeolithic period in Northern Rhodesia", and shows that "the knowledge of metallurgy was introduced by a superior race into an Africa still in the throes of the Stone Age". This is true enough, but it does not prove an antiquity of 3000 or 4000 years, that is, so long ago as 2070 B. C. What it does prove, I submit, is that foreigners, versed in iron-making, established themselves for a time in the cave, possibly for self-defence, and during their sojourn they made iron weapons for use against the natives, who then were using the "quartz flakes and quartz implements of the Late Stone Age type"---in short, were the savages that Livingstone, Cameron, and Stanley found in that part of the world seventy years ago.

The invaders probably were slave-hunting Arabs, and the date of their incursion may be anything from A. D. 1200 to A. D. 1900, but no B. C. chronology is permissible. The Italian expedition has not finished its exploratory research; perhaps when all the information available is collected we shall be given a more convincing interpretation of the facts.

Apropos of early iron-making, I may mention that sundry writers have imputed the ancient Egyptians' knowledge of art to a borrowing from their southern neighbours, the Ethiopians, this idea being lent some colour by the fact that the natives in central Africa, more particularly the Kenya and Congo regions, know how to make iron in a crude manner. Crudity of method, however, does not prove antiquity of origin. The denial to any such supposition is found in the description by Herodotus of the weapons used by the Ethiopian contingent in the army of Xerxes. Their armament consisted of "long bows, on which they placed short arrows made of cane, not tipped with iron, but with stone that was made sharp, and of the kind of which we engrave seals. Besides these they had javelins, tipped with antelope's horn that had been made sharp, like a lance. They had also knotted clubs." All of which indicates a complete ignorance of metallurgy.

MMT-005 WHEELS AND LIGHTNING-RODS

Anonymous; American Antiquarian, 16:50-51, 1894.

Several items have appeared in books within a few years conveying the idea that certain inventions which are very common among historic races might also have been known to pre-historic or at least to proto-historic races. Among these inventions the most notable are the wheel and the lightning-rod. Mr. Desire Charnay maintains that the wheel carriage was known in America and Herr Brugsch that the lightning-rod was known in Europe. An article in Biblia, for November, 1893, repeats the opinion of the Egyptologist, and now the article by Mr. C. Staniland Wake, in this journal, makes allusion to the wheel and its motion as if it possibly may have been used as a symbol in this country. The subject is an interesting one, but the specimens of the symbol of a wheel in this country are so rare that it becomes a question whether it was ever used as a symbol here. We, however, give a cut here which was loaned to us some years since by the Smithsonian. On this plate there are two figures of wagons with a tongue, and a peculiar figure resembling a sphynx on the wagon and other figures resembling wheels with spokes, and still others resembling human beings playing

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with lightning. How shall we explain these figures? The Zunis had wagons with tongues and solid wheels; they also had symbols of the circle with four and six parts, and they pictured the lightnings as symbols of the nature powers. Now shall we say that the wheels with the spokes and hubs and the wagon and the sphy were pre-historic, or shall we discriminate and separate the historic from the pre-historic, the American from the Egyptian? We ask similar questions in reference to the lightning-rod in Egypt. The only evidence is that given by the flag-staffs which were placed in front of the propylae of the Egyptian temples. These staffs were capped with a sheath of copper, and were about one hundred feet high. There are inscriptions, which date at the time of the Ptolemies---323-320 B. C. ---describing the staffs at Edfu, which read as follows: "At the main entrance of the life-giving horn, there is a pair of tall posts to cut the lightning out of the sky." The staffs are made from the wood of the ash tree. Now it is from evidence of this kind that some of the Egyptologists maintain that lightning-rods were used by the Egyptians. The Chinese symbol of the Tai-ki, the Hindoo symbol of the suastika, and the Egyptian symbol of the Lotus, were very ancient, but wagon wheels in America and lightning-rods in Egypt are anomalies which we should be slow to accept.

Wheeled toys are known from prehistoric South America. Ivan Sanderson has also noted in various issues of Pursuit that several Egyptian frescoes seem to picture electrical apparatus.

MMT-006 NOAH'S ARK FOUND AT LAST

Garbett, E. L.: English Mechanic, 56:184, October 14, 1892.

We read that a dignitary of the Chaldean Church, Archdeacon J. J. Nouri, professes to have climbed near the top of Ararat, and on 25th April last to have discovered Noah's Ark, which he walked round with five or six companions, and contemplated from various points of view. He "was almost overcome. The sight of the ark, thus verifying the truth of the Scriptures, in which I had before had no doubt, but which, for the sake of those who did not believe, I was glad, filled me with gratitude."

M. H. Cadoux, who ascended the mountain with Mr. J. W. Brown on the 25th of June, says it is held inaccessible in April; that he saw no trace of human work but what the Russian explorers had left, and "diligent inquiries from the Kurds, who in summer swarm over mountains, failed to elicit any new facts." Of course, the Kurds may yearly swarm after game, but what is there to catch above the summer snow-line? Why should they ever climb above it? The Ark, if existing, is too big a thing to be missed, we are told. The plain answer is, Dr. Nouri has not missed it. Who cares how many have missed it? If it is there, why cannot others next summer equally find it?

He professes to be travelling to all museums and libraries for the next five years, preparing a great ecclesiastical history. We may regret he has not been more explicit as to the site, but really I cannot think we can hold him bound to lead another journey, or to give us more information. Why cannot half a dozen of our Christian countrymen next summer undertake to search the snow-cap, which does not extend beyond six or seven miles from the summit in any direction?

The Ark, like the UFO, is found and lost frequently.

SECTION MS: STRUCTURAL ARTIFACTS

The most obvious remains of ancient civilizations are made of stone---the only construction material capable of surviving thousands of years of neglect. The stone artifacts bequeathed us are worldwide and span the spectrum from rough, undressed standing stones to the meticulously shaped stone spheres of Central America. These lithic remains pose several problems, such as (1) how did the ancients quarry and transport such immense objects over great distances, (2) how did they work the stones and fit them with such great accuracy, (3) what was the geographical extent and character of the so-called "megalithic culture," and (4) how and why did the ancients accurately align and orient structures and systems of structures in geometric and astronomical patterns?

- MSB Buildings. Temples, towers, houses.
- MSC Canals and waterworks. Aqueducts, irrigation systems, drained fields.
- MSD Dolmens and standing stones. Menhirs, rocking stones, and similar solitary plain stones.
- MSF Forts. Stone and earthen types, including vitrified works, apparently defensive in nature.
- MSG Graves and mounds. Chamber tombs, barrows, tumuli.
- MSH Henges, organized structures. Stone and wooden circles, alignments, and other purposeful arrangements, including Central American stone spheres.
- *MSO Obelisks and stellae. Columns and other solitary well-worked stones, usually engraved or carved.
- MSP Pyramids. Including pyramidal mounds and stepped pyramids.
- MSS Systems of structures. Cities and geometrically arranged groups of structures. In essence, large-scale groupings or macroforms.
- MST Tunnels, mines. Includes dene holes and catacombs, all underground construction.
- *MSW Walls. Earthen banks and ditches included.

MS is subsection not represented in Volume M1.

STRUCTURAL ARTIFACTS

B-001 THE OLDEST CITY IN THE NEW WORLD

Trill, A. Hyatt; Travel, 53:12-16, September 1929.

A. Hyatt Verrill was a prolific writer in many fields. Fascinated by the ruins of South America, he wrote many books (fiction and nonfiction) based on these mysterious remains. His title in this article represents, of course, an assumption.

To me---and I have found that others feel much the same---Lake Titicaca gives the impression of great age. Voyaging across this great lake on the roof of the world, one seems to be navigating waters that belong to a dead world, that hold the secrets of the ages in their impenetrable depths. And even the fact that one is traveling on a luxurious modern steamer, a miniature liner, does not dispel this sensation. Neither is it far from being the truth. On every side are the bare brown hills with scarcely a trace of vegetation; in the distance tower the endless snow-capped Andean peaks. Everywhere the steep shore slopes are covered with ancient Incan walls, with abandoned terraced plateaus reaching, from the water's edge to the topmost summits of the hills. Ruins of great temples and palaces rear their massive walls here and there, but all seems deserted, dead, for the low stone or mud huts of the living Indians are scarcely discernible and rarely does one catch a glimpse of a human being. And beneath the waters lie countless relics of bygone races, of forgotten civilizations---idols and images and unknown, incalculable treasures in silver and gold and precious stones---the offerings to the mysterious gods of the lake, cast into its depths for countless years, countless centuries, by ancient people---by the pre-Incans and the Incans---who looked upon the lake as sacred. Ancient, too, is that mysterious spot, the Island of the Sun, whence, according to Incan allegory, came Manco Capac, the first Inca, with his sister-wife, Mama Oello, and who, so Incan mythology avers, were born of the sun and the lake.

Even Guayqui, the tiny port on the Bolivian side of Lake Titicaca, looks very old (although as a matter of fact it is quite modern) despite the presence of railway tracks, locomotives, motor-boats and automobiles. The low adobe houses seem almost a part of the surrounding red-brown plain. The Indians' reed boats, or balsas, with their matting sails are the same as those of a thousand years ago, and the Indians themselves, in their bright-colored ponchos, their sandals, their gaudy mantas and their voluminous brilliant skirts, might well have stepped out of the distant past.

Hence it seems quite fitting that, near at hand barely twelve miles from the port, there should be the oldest city in America. This city was old at the time of the fall of Rome---perhaps before the fall of Babylon. For all we know it was thriving and populous in the time of Moses, and in many ways it is the most mysterious, puzzling city in the entire world. Here at Tiawanaco was the center of a civilization unlike any other; a civilization that rose to great heights in art, in engineering, in industries and in religion, so far back in the dim past that no tradition, no legend, no myth of its origin or its people remains, but which left its influence upon countless other cultures and civilizations over an area of hundreds of thousands of square miles of South America.

Everything connected with Tiawanaco seems to be mysterious and inexplicable. Even the site of the city is most unusual. It stands upon an almost level plain in a far from fertile area, with no available water near it, and almost midway between the two ranges of hills that provide the only stone in the vicinity that is suitable for buildings. Yet within a dozen miles is the vast, navigable lake, abundant water, arable land and easy transportation. Many authorities have claimed that, when the city was built and occupied, it stood upon the borders of the lake and that, during the countless centuries that have passed, the waters have receded.

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Many lakes all over the world stood much higher in the past. See Series E Sourcebook

In support of this theory they point to the remains of what they claim were d and quays. But there is no valid geological evidence that the lake has receded appreciably for hundreds of thousands of years, and careful observations made by the engineers of the Guayqui-La Paz Railway extending over a number of years prove conclusively that, at the present time, the mean level remains almost constant and that, if anything, the lake's level is rising rather than falling. Finally, the so-called quays might just as well have been structures erected for some entirely different purpose. Moreover, there is nothing in the sculptures, pottery, decorations or other features of the remains to indicate that the Tiahuanacans were a lake-faring race.

Hence the mystery remains as to why this great city was built in such a spot, and even greater is the mystery of its downfall, its abandonment. Who were these people, where did they come from, why did this marvelous civilization spring up, develop and vanish in this one spot in an almost desert land in the heart of the Andes?

Tiahuanaco seems to have had no beginning and no end. There are no traces of an archaic or evolutionary culture leading by regular steps to the zenith of the civilization, nothing to show that there was a gradual decadence or a decline. Judged by appearances, by what we know, Tiahuanaco and its civilization might have been brought bodily, wholly perfected, from some other planet, whither, centuries later, its inhabitants returned.

At the time of the Spanish Conquest, Tiahuanaco was a far more imposing city than today. At that time many if not all of its gigantic buildings were standing, its magnificent temples and marvelous palaces were nearly intact; its titanic statues were in place. But nothing, not even the imposing wonderful city, escaped the Spaniards' greed. And what the treasure-hunting Dons did not destroy the fanatical Padres did. To them it was a holy duty to destroy everything that savored of Paganism, and the wonder is that any idol, sculpture or image remained after their zealous crusade. Possibly they grew weary of destroying stone images, and it must have seemed a rather hopeless task, or perhaps they had neither the time nor the money to complete the job. And it did cost both time and money. It is recorded that at one spot, near Willcas Huaman, the Spaniards found an image, carved from a single block of stone, that measured nearly sixty feet in length by fourteen feet in diameter. To destroy this titanic statue required the united labor of thirty men working steadily for three days! Whether such stupendous images ever existed at Tiahuanaco no one knows, but even today several immense monolithic statues remain standing, chipped, scarred, defaced by vandals and by the rifle fire of Bolivian soldiers, but still gazing calmly across the plain towards the rising sun as they did thousands of years ago when Tiahuanaco was in its prime.

Even the name of the city has been a matter of mystery and has caused much discussion. Its origin has been explained in various ways, the commonest and most widely accepted being that an Inca, who was staying at the spot, was brought an urgent message by a runner. In compliment to his fleetness of foot, the Inca compared him to a Guanaco, and bade him be seated, using the words, "Sien te Guanaca." This, however, is a far-fetched and highly improbable explanation. In the first place, the words are a hodge-podge of Spanish and Indian, and no Inca would have used Spanish when addressing one of his own race. In the second place the Guanaco is not a native of Peru or Bolivia but of Chile and the Argentine, and an Incan, wishing to praise a fleet-footed courier, would be far more likely to compare him with a Vicuna, an even faster creature. Finally, the word Guanaco is not identical with Huanaco. As is so often the case, those striving to explain the name of the city have overlooked the real and simplest solution. In the ancient

Quichua or Hualla dialect, "Huanacu" means "dead," and Tiahuanaco would signify a place of the dead or a dead city. The use of the word Huanacu or its derivatives or root, as applied to anything devoid of life or associated with dead persons, was very prevalent among the Incas. Thus the statues of the Incas in the Temple of the Sun at Cuzco were known as the "Chuqui-huancas," the burial ground was called "Huanacu-Pampa," etc. So we may be quite certain that the name Tiahuanaco or "the city of the dead" was bestowed upon the ruins by the Huallas or Incas who knew the place only as a deserted, forgotten city of an ancient vanished race.

Originally Tiahuanaco must have presented a most imposing appearance. Though doubtless the houses of the common people were of adobe and thatch, and have long ages ago vanished, yet the great public and ceremonial edifices were of almost incredible dimensions. As the ruins are today they may be roughly divided into three sections, known as the Akapana, or Fortress, the Kalacasaya, or Temple, and the Tunca-Puncu, or place of Ten Doors. But originally, the entire area between and about these three principal groups of ruins was covered with structures, idols, immense stone monoliths, and other works of these people, who, judging by the remains they have left, might well have been supermen, giants who would have made Goliath puny by comparison. Just how the city may have appeared, even at the time of the Incas, no one can positively state.

Through the ages that had then passed since Tiahuanaco had become a veritable "Place of the Dead" and, through the centuries that have passed since the days of Incan dominion, this most ancient American city has been desecrated, looted, literally torn to bits. Choice portions of its magnificent sculptured stone work have been carried off by the natives and used to build their own miserable huts, and there is scarcely an Indian dwelling within miles of the ruins that does not possess a doorstep, a lintel, or some portion of its walls formed of fragments of Tiahuanaco. Even the rough, narrow, filthy streets of the villages are, in places, roughly paved with pieces of carved or worked stone filched from the ruins. The little Spanish church at the modern village of Tiahuanaco is almost entirely constructed of portions of the ancient town, and flanking the entrance are the heads and shoulders of two colossal stone images that were ruthlessly knocked from the bodies of Tiahuanaco's stone gods. The Indian farmers have surrounded their stony thin-soiled fields with walls constructed of stonework from the ruins, and vandals, collectors and curio seekers have done their part. But the greatest damage of all, the most ruthless and inexcusable destruction, was caused by the railway whose tracks run directly through the center of the ancient city. Thousands of tons of stone, idols, statues, monoliths, carved columns, magnificent doorways, immense slabs and priceless sculptures were broken up, crushed and used for ballasting the tracks.

As a result of all this, the ruins today are in pitiable shape, and at first glance seem scarcely more than meaningless piles of hand-worked stone. But even so their immensity, their perfection and the classic beauty of their sculptures cannot fail to arouse the wonder and the admiration of even the most indifferent observer. And as one examines them more closely and becomes accustomed to the surroundings, one can, in a measure, reconstruct Tiahuanaco in one's mind, and can--- inadequately---visualize the buildings as they were in the long ago when the Condor-God was worshiped in the great temple.

Parts of the ruins may be viewed from the railway, and several of the great stone columns and images are within a few yards of the tracks. But to see the best of the ruins, to obtain any idea of their extent and their titanic proportions, one must walk about amid the remains.

Nearest to the railway, and most prominent of all, is the so-called fortress or Akapana, a pyramidal hill of artificial origin that rises to nearly two hundred feet above the fairly level plain. It is accurately placed so that its four sides are in line with the cardinal points of the compass, and at the base measures about seven hundred by five hundred feet. Originally, no doubt, its sides were completely faced

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with cut stone, like the pyramids of the Mayas and the Teocalli of the Aztecs. A few of these blocks remain, the greater portion having been broken up for use or the railway. Once, too, a magnificent stone stairway led to the summit of the hill where there was an immense basin, apparently for holding water, and, from this a conduit or pipe line of beautifully cut stone troughs led down the pyramid. Why the ancient Tlahuanacaos should have devoted such an immense amount of labor and time to erecting this great mound merely to place a basin at its summit, or why, once they had done so, they should have installed a drain, are unsolved mysteries. Assuredly it had some very important and definite purpose. Possibly it was a sort of reservoir to be drawn upon in time of drought or necessity; but in that case the question of how water was conveyed to the summit is as great a mystery as the pyramid itself. Unless the climate of the district has vastly changed, the rain alone could never have been counted upon to keep the huge cistern filled, but possibly thousands of toiling human beings may have carried water up the steep stairway by hand. At any rate, whether it was a reservoir, a fort, the site of a temple or the residence of the Tlahuanacan monarch, today it is scarcely more than a stone-littered hill, and the casual passerby would never give it a second glance or dream it was raised by the hands of men.

About one thousand feet from the base of this former pyramid is the so-called Temple of the Sun, or Kalasalasaya, perhaps the best preserved of the ruins. Here is an immense rectangular terrace nearly five hundred feet square with its edges outlined by rows of cut stone columns from fifteen to twenty feet in height. Originally the entire area within the boundaries of these columns was paved with carefully cut and fitted stones, but between the natives and the railway builders, who found these paving blocks most useful for their purposes, scarcely a trace of the ancient pavement now remains. Originally, also, the upright columns were connected or capped by timbers or other stones, for the tops are carefully and accurately mortised, evidently with the purpose of supporting lintels. At a short distance from the ruins, and facing the east, is a solitary huge stone image, its face marred and scarred by vandals and time, but still gazing with an enigmatical smile towards the rising sun, though it alone remains of all the hundreds of similar statues that once flanked the temple. Access to the Kalasalasaya is now easy from any side, but in the days when it was in use the only entrance was by way of a flight of great stone steps on the eastern side. Each step is a single slab of cut stone nearly twenty feet in length by ten feet in width and over three feet in thickness, and the whole is flanked by two huge, sculptured stone monoliths.

But by far the most interesting object in the temple, in fact the most interesting and remarkable object in the entire city, is the Gateway of the Sun, as it is called, and which, in all probability, served as the portal to an inner temple in Tlahuanacan days. This magnificent piece of sculpture measures nearly fifteen feet in length by eleven feet in height and two feet in thickness and is pierced by a rectangular doorway nearly five feet in height and over two feet in width. It is cut entire from a single block of andesite rock--the largest single piece of stone sculpture in the world. But remarkable as it is for size, and as an example of the ancient stone cutters' skill, one scarcely notices this in view of the far more remarkable sculptures that cover it. Upon one side, the upper portion above the doorway, it is completely covered with a beautifully-carved facade in low relief. Although no one can decipher the carving, yet it unquestionably had a very real significance to the inhabitants of Tlahuanaco, and its motif is easily recognized. The largest and central figure is that of the Tlahuanacan supreme god, commonly known as a sun-god. In all probability, however, it was more in the nature of the Pre-Incan Pachacamac or the Condor-god, creator of the universe, maker of the lake and "He who Upheld the Heavens." Rays or feathers encircle his head, and these terminate in beautifully designed miniature heads of the jaguar, the symbol of the Night or Moon-god.

On either side the chief deity is flanked by forty-eight other figures, twenty-four to a side, all facing the god and depicted as running towards him. In all probability these were symbolic of the god's supreme power and the homage paid to him by the lesser deities. Beneath the throne on which the god himself is seated is a row of sixteen carved figures showing small replicas of the god's head, as well as the heads of condors, separated by ornamental designs.

The opposite side of the portal, though wholly different, is even more remarkable. Here, the surface of the stone is bare of ornamental bas-relief carvings, but is decorated with a severe geometrical design. On the upper portion, at the opposite ends of the gateway, are four rectangular niches, two to a side, and on the lower portion there is a rectangular niche on either side of the doorway. These niches, which are cut into the hard rock to a depth of nearly six inches, together with their ornamental frames or borders, are so accurately cut and so mathematically perfect that even by means of a steel square and a millimeter scale I could not find a deviation of more than one-fiftieth of an inch in their angles or surfaces. This is perhaps the most astonishing feature of the Tiahuanaco stone work. At the Tunca-Puncu ruins, nearly a mile southwest of the temple, such geometrically and mathematically cut squares, rectangles and crosses are abundant. Often they are carried into the rock in a series of concentric steps to a depth of a foot or more, the final, deepest niche being only two or three inches square. In places, too, there are cross or key-shaped sculptures in high relief which obviously fitted into recesses of the same forms, thus locking the stone together, and the most painstaking measurements prove that the greatest variation in size between these recesses and the projecting crosses is less than a millimeter! How any human beings could have performed such amazingly accurate work in a hard refractory rock with only stone tools is a mystery that no one has been able to explain.

Even today, our most skilled stone-cutters, equipped with steel tools and machinery, would find it a difficult undertaking to duplicate the feat, and yet, as far as known, the ancient Tiahuanacans had no knowledge of steel, and no bronze or copper implement has ever been found that will make the least impression on the rock.

But regardless of how they did it, the ancient inhabitants of Tiahuanaco accomplished it, and, judging from the remains, did not find it a very difficult undertaking at that. To many, however, the immense masses of cut stone upon the low mound of Tunca-Puncu are more remarkable than the sculptures. Originally the mound, like the Akapana, was faced with stone, and immense stone steps led from the plain to the summit where there was a stupendous stone building the exact purpose of which is unknown. But, unlike Akapana, the stones that surfaced the Tunca-Puncu mound were of colossal size, while the structure that surmounted it was built of stone slabs that are far larger than any others known in prehistoric architecture.

Some of these are estimated to weigh over two hundred tons each, while slabs weighing sixty to one hundred tons are abundant, and all are as accurately and smoothly cut, trued and squared as though cut and planed on some gigantic machine.

Several of the largest of these immense slabs formed huge platforms or floors, and about their edges are numerous niches or recesses cut into the rock. Originally these probably served as resting places for idols or statues. Although called the "Place of the Ten Doors" yet there is little evidence to show that the structure ever had ten doors. Far more probably there were no doors whatever, the building being more in the nature of an open colonnade with columns supporting sculptured lintels.

It was probably roofless, for in many places there are basin-like hollows and drains cut into the rock, with gutters evidently designed to carry off water that fell within the structure. With the place in the regrettably ruinous state it is in today it is difficult to say what it was like originally or what purpose it served.

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But that the stones were not cemented together, but were locked or keyed in place by immense metal staples is evident. Everywhere about the edges of the mammoth blocks of stone are T-shaped recesses cut deeply into the rock, and sometimes with a perforation extending entirely through the slab. In places, two of these mortises still remain in line so that it is easy to see how the metal staples held the two slabs together.

It has been assumed by many that these staples were of copper, but last year an employe (sic) of the railway discovered one of them intact, and, instead of being of copper, it proved to be of solid silver. This is not, however, surprising. Silver is abundant in Bolivia, it was widely used by all the ancient races, and as it had no intrinsic value to them and was far stiffer and stronger than copper it was far more suitable for locking the great stones in position. And the fact that the staples were of silver explains in great measure why the massive structure collapsed. To the Spaniards, copper would have meant little---it was far too worthless to pay for the time and trouble necessary to tear the staples from the stones. But silver was a different matter. Each of the great staples weighed many pounds; there were hundreds, perhaps thousands of them, and the rapacious Dons wrenched and pried them loose, thus allowing the massive stones to fall apart and tumble to the earth. Possibly, very probably, many of the silver staples still remain in the lower portions of the stones, buried beneath the mammoth slabs, but even with modern devices and steam power it would cost far more to move one of the masses of cut stone than the metal would be worth, even though there were hundreds of them.

Where the Tiahuanacans secured the stone they used, or how they transported it, have always been mysteries. No similar stone exists within six miles of the city, and it would appear to have been an Herculean, an impossible task to have dragged these blocks, weighing one hundred to two hundred tons, across the san plain. And the theory that they might have been brought on rafts across the lake is even more improbable.

The problem has been the more perplexing because it has always been held that no ancient American race ever discovered the wheel. But last year, while carrying on investigations at Tiahuanaco, I discovered two immense stone disks that might well have served as wheels. Both of these were at Tunca-Puncu. One was concealed beneath a fallen mass of stone, the other was partly covered with a fragment of a slab and was deeply embedded in the earth. They were approximately seven feet in diameter by eighteen inches in thickness, and were pierced with square holes in the centers. At first sight they might have been mistaken for Spanish mill-wheels, or arastras, but as far as known no Spanish mill ever was situated near the spot, and there is no reason why one ever should have been there. Moreover, they differed materially from any mill-wheels I have ever seen, and they were of the same stone and the same class of workmanship as the structure itself.

With such wheels, fitted to a fixed axle, it would have been a fairly simple matter to have transported the blocks of stones from the hills to the site of the city. Their width would have prevented them from sinking deeply into the sandy soil, and, by slinging the stone beneath the axle by means of ropes, they could have been dragged along by man power. Having no wood of any size the Tiahuanacans would have been forced to use stone wheels if they used any. As a stone wheel, rotating upon a wooden axle, would have ground through the latter in no time, it would have been quite natural to fit a fixed axle with squared ends, and allow this to rotate in a greased sling. Perhaps these great stone disks were never used as wheels. Perhaps they belonged to a later epoch than the Tiahuanacans. But personally I believe they were wheels, and that they were used in transporting the immense stones. Who can say? Who will ever know?

Of the inhabitants of this oldest American city we know little. Although many skulls and skeletons have been found in and about Tiahuanaco, it is doubtful if any are those of the builders or the original denizens of the city. More probably they are the remains of the later pre-Incas and Incans, for we know that these races occupied the district for many years. At all events, all the skeletal remains thus far discovered are not different, anatomically, from those of the living Indians of Bolivia.

However, that the Tiahuanacans were a highly cultured and civilized people, and that their arts and industries were not confined to the erection of stupendous buildings and to amazing sculptures, is proved by the pottery, the metal work and the other artifacts that have been obtained from the site. In their ceramic ware the Tiahuanacans had few equals and no superiors among the prehistoric races of South America, and throughout Peru, Bolivia and even in Chile, one finds pottery, textiles, carvings and other objects showing the strong influence of the Tiahuanaco art and culture.

Not only was their pottery beautifully modeled and magnificently decorated with painted designs, but in addition, they were past-masters in the plastic art, and modeled most lifelike and accurate figures of men, birds, reptiles, beasts, gods and inanimate objects. Many of their jars are of the effigy type, others are of the portrait type, and the features, the expressions, the very characters of the individuals depicted are truly marvelous. Often, too, they modeled large, life-sized hollow images, some apparently representing gods, others heroes, others monarchs and individuals. And from these and their portrait jars we can obtain a very good and no doubt accurate idea of the personal appearance, the costumes and the habits of the people. Judged thus, the Tiahuanacans were obviously of the so-called Indian race.

Though Tiahuanaco may be shrouded in mystery, though we may know nothing of its origin or its past, though no one can decipher the sculptures and the hieroglyphs that decorate much of the pottery, though even the Incas and their predecessors knew so little of the ancient race that they referred to the city merely as the "Place of the Dead," yet we may be sure that the oldest of American cities was built and occupied by real Americans.

MSB-002 ASIATIC ARCHITECTURE IN POLYNESIA

Sterndale, R. A.; Living Age, 187:387-394, November 15, 1890.

This testimony reads like an adventure story and, in parts, seems eerie and unreal. A great variety of megalithic architecture is described, including, toward the end, pyramidal structures.

The following pages are the outcome of observations made by my late brother, Mr. Handley Bathurst Sterndale, who spent many years in exploring the Oceanic group. He contributed much to the Australian press, something to the Royal Geographical Society, and was requested by the government of New Zealand to draw up a report on the South Sea islands, which was published in one of their bluebooks, and from which I notice that a recent writer has drawn, *verbatim*, much inspiration.

In addition to the pen of a ready writer, he possessed much skill as an artist; and some of his drawings, ---executed during a long residence on one of the remote

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islands, ---are marvels of delicacy in finish, although they were drawn by sharper edged bullets, and worked up by pens of fishbones and tinted by the sepia taken fresh from the cuttle-fish. He left also seventeen small books of information concerning Polynesia in general, but Samoa in particular, written closely on pages five inch square, composed of scraps of paper floated from a wreck, which he had pieced and gummed together.

He had great influence among the natives with whom he lived, having the knack of attaching them to himself by strong bonds of friendship; and I was told recently by the captain of a steamer trading in the South Seas, that in certain places the name of "Tanali," which was their rendering of Handley, is still woven into the songs of the people.

He was particularly interested in the prehistoric architecture of the islands, and left numerous illustrations of cyclopean ruins at various places, and also of cromlechs similar to those found by myself in central India.

The theory that these islands were peopled by two races of Asiatics is a commonly accepted one, to which of course he lays no claim; and his observations are merely corroborative, and of value as being recorded by one who had travelled extensively, not only in Polynesia, but in those parts of South America which were likewise affected by the Asiatic migration. He says:-

"It was to me a question of the deepest interest. One reason why the remarkable architectural remains existing in the many islands of the Pacific have as yet attracted so little attention, has been the prevailing idea of their comparatively recent construction; combined with the fact that very few of them have been examined by such travellers as have studied the architecture and economy of primitive races; thus the few who have seen them have commonly attributed to them an erroneous origin, or otherwise have believed them to be the work of existing races; even as Dumont d'Urville, in his description of some of the great ruins on the Seniavines, calls them a fortified city of Spanish buccaneers---a mistake of the absurdity of which (although to a certain extent justified by corroborative circumstances) a more careful survey of the locality would have convinced him."

The early people of the Carolines were builders of Cyclopean towers and pyramids; in fact, they are still very skillful in building great walls of rude stone. Structures of this kind are to be found in intermediate isles in the track of this migration. The idea of attaching a dwelling or place of worship to a cavern's mouth, corresponds to the plan of existing ruins in the north Pacific, as at Ponapa (sic), and Lele; at the latter place one still in use as a temple having been erected across and immediately over the entrance of a subterraneous passage of great extent, to which access is afforded by steps descending through the foundation. In the case of buildings erected for religious purposes in these seas, caverns were frequent. There is said to be one in the old Marai of Raiatea, of which the entrance is known to but few (if now any), and has been carefully concealed. I am of opinion that these isles have been anciently populated by two distinct tribes from the north-west Pacific, one of them, a people industrious and fierce, builders of strongholds for purposes of defence, and of edifices for the celebration of religious mysteries; the other, a family of barbarians, milder and more indolent, acknowledging neither gods, priests, nor kings, having no idea of subjection to invisible powers or conception of the necessity of worship, having no cares beyond the wants of the body---sensual, voluptuous, and proud, but withal valiant, order' and polite, exhibiting a remarkable sense of propriety and many generous sentiments. Many men of science suppose that all the great islands of the Pacific, and many of the smaller ones, were first inhabited by cannibal Papuans; and that from admixture with them did the Malayo-Polynesians derive their man-eating propensities. This I imagine to be an error. As well might one say that the aboriginal

Mexicans contracted their anthropophagy from the Botocudos, who may be regarded as the American prototypes of the Papuan. But I perceive sufficient evidence to convince myself that the copper-colored man-eaters of the Pacific brought this predilection for devouring their kind from the continent of Asia, although, in whatsoever isles they have amalgamated with the Papuans there have their evil inclinations become enormously aggravated---forasmuch as we see that where such mixture has taken place, there cannibalism and devilry are paramount. Take for instance Fiji, where the inhabitants have exceeded in horrible depravity even the vilest of their sable predecessors. But wherever, throughout the Pacific, the copper-colored races have been found unmixed with the black (I do not include the New Zealanders, who may or may not have a tincture of Papuan blood), we perceive them to have been influenced by better instincts, exercising both towards one another and to strangers a certain degree of hospitality, frequently of the most disinterested nature, friendliness in their social relations with neighboring isles and villages, compassion for the helpless and unfortunate, family affection and decency in some respects, especially in the disposal of the dead---clouded, however, in some instances by cupidity and treachery, as in the case of the Tongese, whom Cook, in his ignorance of their real character and intentions toward himself, misnamed the Friendly Islanders; or cannibalism, as was the usage of the Rarotangans and Marquesans, or hideous vices such as were practiced by the Hawaiians and Tahitians. But, as far as is actually known, none of them were man-eaters from morbid appetite, as is proved by the fact that among such of them as were cannibals, it was only upon certain occasions that they exhibited this propensity; none were slain among them for food alone. The bodies of enemies killed in war, or victims sacrificed to idols, furnished the feast, of which only certain of the initiated, as warriors and priests, were allowed to partake. It is said that in Tahiti the heart and liver were the portion of the latter; the eyes were given to the king, as was expressed in one of his titles of honor, ai mata, the eater of the eyes.

However, to return to the architects of the Pacific Isles. The conclusions I arrive at are as follows: that although many of the Pacific Isles, especially the coral atolls, have been peopled by accidental castaways, the settlement of the great mountain groups was effected by organized migrations of savage navigators, sailing, in some instances, in fleets, fighting their way from land to land, and carrying with them their families, household gods, and the seeds of plants and trees; that these expeditions mainly originated in three causes: famine, the result of over-population, ---war, in which the defeated party had frequently no choice but between the unknown sea and the oven of the ogre,---and volcanic convulsions, which rendered their native isles unpleasant to abide in.

Possibly on many islands it came to be regarded as the duty and destiny of large sections of the community to depart in periodical exodus in search of new lands. The copper-colored autochthones of eastern Asia, ---a race unacquainted with metals, who tattooed their bodies, and recognized the existence of evil spirits, ---whose stone weapons are still found, and whose descendants still exist in mountainous localities difficult of access, ---were probably driven out by migrations of Turanians, and established themselves in the Malayan isles, driving or being driven out by the primeval Papuans and spreading in the course of ages to the Caroline group, forming the progenitors of the Palaos, Barbudos, Hombres Blancos, and other families of gentle and hospitable barbarians visited in the early part of the sixteenth century by Diego de Roches, Saavedra, and Villalobos; that there they encountered or were followed by another exodus of a kindred race by Formosa and the Ladrones---a race of Asiatics ferocious and pugnacious in the extreme, possessing some institutions and organizations, such as vassalage to kings, and a religion the product of priestcraft and diabolical superstitions; canni-

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bals also, from whatever motive, and cyclopean builders on a monstrous scale. That the milder race came first, might be inferred from their having no gods, which presupposes the greater antiquity; that the second race were cannibals is to be gathered from Caroline tradition; that they came by Formosa, from Chinese tradition and from what is known of the ferocious savages who still inhabit the eastern half of that island. That they were the cyclopean builders, for the reason that their remains are said to begin in Formosa, and are seen to extend down the Ladrões and eastern Carolines, missing the western portion of that group. That their wars were frequent and destructive seems most probable from the style of their castles and strongholds, some of them being built upon the escarpments of steep hills rendered still more inaccessible by art, others being surrounded by enormous trenches or canals lined with stone walls, into which the waters of rivers or tides of the sea were admitted. In some of them are to be seen covered sally-ports and subterraneous galleries of singular construction, all pointing to the conclusion that war with them was the business of life.

From the great extent and importance of these works, many islands appear to have been in a perpetual state of siege, as is the case in Hogoleu. This is an immense coral atoll, one hundred and thirty miles in circumference, having four entrance passages. On the reef and within it are seventy islands, four of which, near the middle, are high basaltic masses about thirty miles each in circumference, magnificently fertile, yielding spontaneously many valuable products, situated in the midst of a rock-bound lake ninety miles long by half that width. This unknown ocean paradise has been for ages an arena of combat between two hostile races, one copper-colored, inhabiting the two western or the great interior isles, the other upon the two eastern, a darker people with long, straight hair. The two tribes are supposed to number over twenty thousand. In the Seniavines particularly are evidences of many generations of strife, as at Lele. Here a volcanic island has been scarped and walled to the summit, while on the neighboring shores is a wilderness of ruinous castles, the walls in some cases twelve feet thick, and from thirty to forty feet in height. They are in the form of parallelograms two hundred feet by one hundred feet, some very much larger. Many of them are erected upon islands entirely artificial, surrounded by canals lined with stone, crossing each other at right angles, into which the tide flows. It was this place which Dumont d'Urville supposed to have been a fortified settlement of Spanish buccaneers. But he was mistaken, as others have been who have seen these ruins, but have not been able to examine them thoroughly and ascertain their vast extent, in consequence of the hostility of the natives to inquisitive strangers who have at any time sought to investigate these remains, and the positive injunctions of the late piratical king Keru, that such examinations should not be permitted. D'Urville was likewise in error in supposing the huge stones of which these buildings are constructed to have been squared by art and brought to this place in ships from some distant land; they are prismatic basalts, quarried in the interior of the island of Ualau, where they abound, and, according to native traditions, were brought from the mainland on rafts, the larger blocks being raised into their places by levers and skids. That these people were greatly impressed with their religion is evident from the architecture of their temples---immense quadrangular, paved enclosures surrounded by lofty walls containing within them terraces, pyramids, and frequently artificial caverns and subterraneous passages. Their plan is precisely identical with that of similar remains in Guatemala and Costa Rica; it is also unmistakably the grand original of which all the Morais, great and small, of the Hawaiian, Marquesan, Tahitian, and other isles of the South Pacific have been rude imitations.

Some of these structures were mausolea as well as temples. They are spoken of by the present race of natives as the sepulchres of the ancient deities, whom

they called Anii, a word which is found with modifications of accent in every language of copper-colored Polynesia. Anii, Arii, Ariki, signifying lords, rulers, kings, gods. In the language of all these copper-colored tribes the consonants h and s, t and k, m, r, l, and f, are used, disused, or transposed in a most arbitrary manner---thus: Samoa, Hamoa, Savaii, Havaii, Hawaiki; Ura, Kura; Tapitua, Kasikuca; and so on to infinity.

We have so far dwelt upon the defensive architecture of the copper-colored races. Now I turn to my brother's notes regarding certain sepulchral and religious remains found by him.

Perhaps the earliest form with which we are acquainted, is one which is familiar to us in northern Europe, and which I myself have found in central India, the cromlech, or kistvaen. He writes:-

"Here is an account of a tumulus (one of three, and all alike) which I lately opened at Fararanga (Penrhyn's Island). Within a large conical mound of gravel, overgrown with grass and appearing very ancient, was a stone cist, formed of four great smooth slabs of hard coral, perfectly square, and about a foot thick, with a similar large overlying slab for a cover. Within the cist was a layer of five white pebbles containing the skull and bones of a man. Beneath the skull lay a pearl oyster, very large, and hollow like a bowl; beside the bones lay an axe, seemingly of basalt. The cist was placed exactly east and west; the feet of the skeleton westward. In this interment the pearl shell under the head was a peculiar feature; the same has been noticed in the case of skeletons found at Pitcairn's Island. The axe of basalt was remarkable on a coral atoll, but not unaccountable. I have dug up such axes upon several coral motus in this latitude. I imagine them to have been the property of savages who had wandered away from the islands near the equator (in fact, local traditions bear witness to their having done so), where basaltic stones are obtained from the drift wood, attached to the roots of great trees which are carried thither by the equatorial current."

The above description agrees marvellously with the account of some exhumations in the Hebrides and on the western coast of Scotland, reported by Mr. I. S. Phene (Transactions British Association, 1870). The slabs, the layer of fine white pebbles, and the position of the skeletons are identical.

I now proceed to the description of a more imposing form of burying-place. My brother was exploring the mountain ranges of Upolu, which was at that time, as it has been even recently, the theatre of a sanguinary war between rival factions of Samoans. He was on such good terms with both sides that he was enabled to pass from one war party to another, being hospitably received on both sides, and witnessed one of their engagements. These last took place chiefly on the low lands; and passing through the ranks of the combatants he found himself seen in a wild and desolate region, little, if ever, visited by the natives; but where, amid the solitude of nature, he was confronted by the stupendous remains of those cyclopean builders of that mysterious, energetic race that preceded the more voluptuous Samoan of the present day.

He describes the scenery on the way up as grand and magnificent, the timber in places being enormous, with waterfalls and huge crevasses, and in one place a remarkable circle of Druidical stones.

"There was no path, although in places I could perceive that there had in former times been one, several crevasses being artificially bridged over with causeways of rude construction. Everywhere were apparent the tracks of wild swine, some of the footprints being of large size. Before long I was brought to a standstill by one of these creatures in a disagreeable manner. A great sow having young ones under a stone, disputed the passage with ferocious determination. I had no wish to waste powder on the poor beast, and would have avoided falling out with her, but she was minded not to let me go at any price; and I, having no time to spare, despatched

her with several pistol balls. I much regretted this unhappy necessity, and wish the poor fighting men in the forest below could have had the carcass. However, cut out the most part of the ham, rolled it in leaves, and put in in my haversack for provender. Hearing the squeaking of her bereaved progeny, I looked into the hole, but could not see whether the creatures were big enough to live without their mother.

"By previous observations I had determined the position of a lofty spur (or radius from a great volcanic centre) which, on undertaking the journey, I had proposed to myself to ascend, in the hope of thereby reaching the summit of the great interior range at a point much to the eastward of where it had been accustomed to be crossed by the natives. Looking in that direction, I perceived this ridge separated from me by a broad and dangerous-looking ravine with a narrow canon (or chasm with perpendicular sides) in the bottom. Hazardous as was the appearance of this valley, I had to attempt it, and scrambling down to the brink of the crevasse which constituted its most inaccessible feature, I found, after some search, a fallen tree, whereby I effected the passage. Beneath me was a torrent flowing in darkness over a bed of black lava as smooth as glass. I knew this to be one of the head waters of a river called the Vai-vasa, which presents the singular phenomenon of exhibiting some miles inland a volume of water more than double in quantity to that which is visible in its bed where it disgorges itself into the sea, the remainder being absorbed by subterranean channels.

"About two hundred feet above me on the opposite side I observed the mouth of a rift or gully opening towards me, and seeming by its aspect to have been produced by an earthquake or some such cause. Having with great labor and with some risk succeeded in reaching the crown of the ridge at some distance below that point, soon came to the edge of the strange-looking crack. There was no way of cross it except by sliding over fallen boulders to the bottom, and in the same manner ascending the opposite side, where was an opening between the rocks, just wide enough for a man to pass through. As I believed that the end of this gully, which ran at right angles to the direction of the range, might afford me a prospect of the next valley to the eastward, I proceeded in that direction along the bottom; but had not gone far when I perceived to my surprise that it was not a natural fissure, as I had supposed, but a great fosse formed by the hands of man, being in some places excavated, in others built up at the sides; and that which was farthest from me (or next to the rise of the hill) had been still more heightened by a parapet wall. At the far end was nothing to be seen but a perpendicular cliff and the inaccessible face of the opposite mountain. Returning to the spot at which I entered, I climbed up the other side of the gully and passed through the narrow gap I had previously noticed, when my astonishment increased on beholding before me, upon a level space of limited area, a truncated conical structure or Heidenmauer of such huge dimensions as must have required the labor of a great multitude to construct. So little did I expect in this neighborhood to meet with any example of human architecture, and so rudely monstrous was the appearance of this cyclopean building, that from its peculiar form, and from the vegetation with which it was overgrown, I might have passed it by, supposing it to have been a volcanic hillock, had not my attention been attracted by the stone-work of the fosse. I hastened to ascend it. It was about twenty feet high by one hundred in diameter. It was circular with straight sides; the lower tiers of stone were very large, they were lava blocks, some of which would weigh at least a ton, which must have been rolled or moved on skids to their places. They were laid in courses; and in two places near the top seemed to have been entrances to the inside, as in one appeared a low cave choked with rocks and tree roots. If there had indeed been chambers within, they were probably narrow and still existing, as there was no sign of depression on the crown of the work, which was flat and covered with flat stones, among which grew

both trees and shrubs. It is likely that it was not in itself intended as a place of defence, but rather as a base or platform upon which some building of importance, perhaps of timber, had been erected, no doubt in the centre of a village, as many foundations of a few feet high were near it. The fosse, when unbroken and its inner wall entire, was probably crossed by a foot-bridge, to be withdrawn on the approach of an enemy; and the little gap, by which I had entered, closed, so that this must have been a place of great security. The Samoan natives, as far as I have been able to learn, have no tradition of what people inhabited this mountain fastness. At the upper end of the plateau was a broken reservoir, which had been fed from springs by a stone channel. I followed the course of the brook for a few hundred yards until I found it to disappear in a sheet of spray over the ledge of a frightful precipice. No food-bearing trees were to be found here. There could not have been more than a few acres (perhaps twenty) in the whole plateau. The mystery was, what the people could have lived upon. They could not have been at peace with their neighbors, or whence the necessity for these strong defences. They must have been numerous, from their works which remain.

"The path was paved and plainly visible. Beyond the springs the ridge became steep and narrow for a short distance, and then widened out into another flat. Here were a great number of cairns of stone, apparently graves disposed in rows among huge trees, the uplifting roots of which had overturned and destroyed very many of them. There was one great banyan-tree which I approached, and perceiving a cavity, entered. The darkness was profound. Tall creepers, which twined themselves about the columned trunks and lay in masses upon the summit of this giant tree, trailed in waving festoons on every side, and excluded even the faintest glimmer of the feeble twilight which prevailed in the sombre forest. I kindled a flame, and explored the interior. Some large bats flew out from an inner chamber, or cell, about ten feet square. The floor was of flat stones, the walls of enormous blocks of the same, placed on end; the roof, of intertwined trunks of the banyan, which had grown together into a solid arch. In the centre was a cairn, or rather a cromlech, about four feet high, formed of several stones, arranged in a triangle with a great flat slab on the top. Upon it was what appeared to be another small stone, but which on examination turned out to be a great conch shell, white with age, and incrustated with moss and dead animal-culæ. The atmosphere of this vault was heavy and oppressive, the light burned with difficulty, and the smoke was unable to rise, but rolled low down out of the entrance in a dense, serpentine volume. A great *kovi*, or land crab (*Birgus latro*), sat perched upon an angle of the wall, regarding me sideways with a look of great malignity as from time to time he struck his bony claw with the sound of a hammer on the stone, like some sinister spirit-rapper holding communion with the manes of the departed.

And his eyes had all the seeming
Of a demon that was dreaming,
And the lamplight o'er him streaming
Cast his shadow on the floor.

Now, what manner of men could have inhabited the stronghold below and have been laid to rest in this woodland necropolis? For the reception of what noble corpse had they constructed this ancient sepulchre? Its antiquity was manifestly great, from the banyan having grown around and over it. The enclosure had first been erected without a roof, the tree (perhaps purposely planted), whose age was beyond estimation, had afterwards enveloped and preserved it. Nay, it would even have altogether and forever enclosed it in its hollow base, had it not been that several of the great slabs which formed the entrance had been forced together at the top, and so retained a passage. (I have seen idol temples in the East so grown over by banyan-trees which are said to be older than the Mahomedan conquest.) That this was the tomb of a man of authority among his tribe there could

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be no doubt, for they had not interred him under a simple cairn, like his fellows there had been art and much labor in the manner of his burial. I am well convin that these remains were the work of a people anterior to the existing race of San ans. Their origin, like that of many other remarkable relics and ruins in the Pacific, is a part of the great mystery of the isles, i. e., of the early distribution of man throughout the Polynesian archipelagos. I much regretted that I had neither leisure nor appliances to dig in this place for skulls, so as to have them submitted for examination to some man of science (perhaps some future traveller may act upon this suggestion). Being the first civilized man who had been privileged to examine this singular mausoleum, I inscribed my name (as is the custom of les touristes anglais) upon a conspicuous place; and paying my respects to the great crab, who, like a guardian gnome, still kept his sullen vigil, I returned to the outer world.

"Dark as was the cave from whence I had emerged, the forest was scarcely more cheerful in its aspect. All the light which prevailed was a sort of misty gloaming, dying away into the obscurity of a 'pillared shade,' but of which the hoary trunk of some great maridi or mamala tree stood forth here and there like a dungeon column

massy and grey,
Dim with a dull imprisoned ray.

And I stumbled among graves, some huge tumuli, others, but three or four stones. Here were, doubtless, the bones of many generations. Whatsoever had been their deeds, the very knowledge of them was lost. With them indeed was 'no remembrance of the wise man any more than the fool forever.' King and counsellor, spearman and slinger, friend and foe, all alike had gone to eternal oblivion.

Illi motus animarum, atque haec certamina tanta,
Pulveris exigui jactu compressa quiescent."

The question has arisen, whether Polynesian architecture is of Asiatic or South American origin; and I think the preponderance of evidence is in favor of the Asiatic theory. Indeed, it seems probable that the American continent was influenced by the same migration from Asia which gave the copper-colored races to Polynesia. The subject is too extensive to be argued out at the close of this paper, so I will merely touch upon some points, though my brother, who reasoned out the matter, did not hold entirely to the theory, as I find in his notes the following remarks:-

"Although we have good grounds for believing that Easter Island was not the Ultima Thule of the barbarian voyagers of the Pacific, yet we have no warrant for supposing that they should after their arrival on the new continent have so rapidly and unaccountably advanced in intelligence as to have given birth to a civilization of which the pyramids of Cholulu and elsewhere, and the stupendous viaducts, canals, and cities of Mexico, Guatimala, (sic) and Peru were the products. Neither do the vast and extraordinary mound constructions of the valley of the Mississippi seem derivable from such a source, especially from the fact that we have proof that to the builders of all these works the art of pottery and the use of some metals were well known. Nay, even that of precious stones and gilding, as of making a gold surface to cover and adhere to one of silver or copper, as is found in goblet-pipes, etc., of these unknown people.

"No such traces of Polynesian intelligence exist. Sculpture, which though of a barbaric type, had arrived among the Central American races at great excellence, as far as complexity of design and elaborate execution are concerned, was entirely unknown to the Polynesian tribes, except as regards a few rude, chiefly zigzag, patterns of adornment in the carving of canoes and war-clubs, and the making of some hideous 'Teraphim,' or certain monstrous images like those of

Easter Island."

He proceeds to propound a theory of his own which is too lengthy for insertion here; but it is probable that Central America was the meeting ground of Eastern and Western civilization. We are concerned with the former only at present. In Ellis's "Polynesian Researches," we find a comparison drawn between the Polynesian and the Asiatic. Meru, or Mount Meru, the abode of the gods, the heaven of the Hindoos, is also the paradise of some classes of the South Sea Islander, Varuna and Vahni, Hindu gods, are spirits in Polynesia, the n being omitted in Varuna. In some parts, the word for god or spirit is dewa, which is pure Hindi---the word Teo, which is common in both Mexico and Polynesia, is evidently derived from Deo, used in India, especially in the central provinces, for God or spirit. Ellis also notices the practice of man and wife eating separately, and many other customs evidently of Asiatic origin; so that there is much evidence in favor of Polynesian architecture having been of Asiatic and not of American origin, but rather to a certain extent the reverse. My brother, who spent some time also amongst the Peruvians and Mexicans, writes:-

"Among some of the intertropical tribes of America are observable physical characteristics similar to those of the eastern Polynesians. Some barbarous customs and superstitions are identical, notably circumcision, and cannibalism in connection with religious worship, that is, the eating of human bodies which were offered in sacrifice to idols; which to my thinking goes very far to establish a connection---the idea itself being in a manner unique, a sort of diabolical sacrament as it were, the heart and eyes being bestowed upon the most honorable, and the carcase divided among the inferior worshippers. They used an altar with an inclined surface, and (although in the Mexican case possessing metal implements) they cut up the sacrifice with a knife of stone. ^

"Compare the accounts of the Mexican sacrifices at the time of the conquest, and the reported present practice of the Apaches, Navajoes, and Guatusos with what is known of the Tahitian sacrificial procedure, and the agreement in many important particulars is very remarkable. Other abominations peculiar to people who, as Paul says, 'liked not to retain God in their knowledge,' were, both in the islands and on the mainland, so prevalent as to confirm the impression of a common origin. I am acquainted with a Jesuit father who was a missionary in the Marquesas. He had also labored among the tribes of New Mexico and the Moquis and Zunis of the Rio Virgen; he told me that these last had words in common with the Marquesan tongue. I have seen these people, but know nothing of their language: one thing, however, attracted my attention, and that is, the existence in the Pacific islands and in Central America of one style of building---a pyramid, in most cases perpendicular on three sides, with an interior chamber opening always to the west. The Indian name, Teo calli, by which they are known, I believe to be of Polynesian origin, compounded of Fee, Fee, Keo, signifying a demon or deity, and Fale, house. These buildings are found in the Carolines and elsewhere, of great size. That some kind of cave ceremonies were performed in them is evident, from their being placed in such situations as to admit of the entrance being visible to a great concourse of people at the time; they are common also in Central America, especially where the Spaniard did not build towns, and so did not destroy them for the sale of their stones, as northward of the San Juan and to the south of the San Carlos. At Chontales is a whole street of them, and one on a hill at Castillo Viejo in Costa Rica."

My brother also alludes to the connection between the American Virgins of the Sun and the Samoan Toupou Saa, which, though unconnected with religion, they being destitute of any form of worship, he believes to have been borrowed in ancient times from the religious practice of some kindred people, probably in the Caroline group.

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In conclusion, I will, with reference to the defensive architecture of the Pacific isles, which my brother alludes to as mountain fastnesses, quote a paragraph from Mr. Ellis's work.

"Their places of defence were rocky fortresses improved by art. Several of these places were very extensive; that at Maeva in Huahine, bordering on a lake of the same name, and near Mouna-tabu, is probably the best artificial fortification in the islands, being a square of about half a mile on each side. It encloses many acres of ground, well-stocked with bread-fruit, containing several springs, and having within its precincts the principal temple of their tutelar deity. The walls are of solid stonework, in height twelve feet." In India, in the central provinces, I have found similar mountain forts, where the natural difficulties of access were increased by massive stone walls. The work was ascribed by the aboriginal Gonds to the demigods of old, the tradition proving them to be of great antiquity. One of these fortresses was in the vicinity of a large burial place in the jungle, where the graves were all cromlechs. Although the Samoans are not builders of cyclopean edifices, apparently the Tahitians kept up the practice, for Mr. Ellis mentions a fort built by Tamehameha, the king, in the beginning of this century, of which the walls were twelve feet thick at the base and twenty feet high. He also gives an account of an ancient temple containing a pyramid two hundred and seventy feet long, ninety-four wide, and fifty high, the summit being one hundred and eighty feet long by six feet wide, formed of coral and basalt blocks hewn with great care. The following remarks, taken from my brother's notes, will fitly close this paper:-

"In Cyclopean remains in the Pacific I recognize two distinguishing features, the terrace foundations of dwellings consisting of two or more steps, which seem to me identical with the style still adhered to by Buddhist people, and the truncated pyramid of successive steps, containing caves or chambers designed for interment or for the celebration of religious mysteries. The fashion of elevated foundation is sufficiently accountable in its origin, at first from necessity in localities malarious or infested by noxious animals, afterwards increased in dimensions and durability of material from a desire to impart an aspect of symmetry and dignity to the dwellings of individuals esteemed more honorable than the common herd. Thus, in places, we find the sides of the hills to have been excavated in terraces as the foundation of houses for chiefs or princes. The pyramid, or *teo-callis*, is a very different institution. Mysterious in its origin, widespread in its adaptations, slightly varying in form, yet everywhere bearing the stamp of one primitive, prevailing idea. The stupendous monuments upon the plain of Memphis and the mountains made with hands' upon that of Cholula seem like the two ends of a chain of human thought and intent, of which the connecting links are to be found throughout Tartary, the Eastern Peninsula, China, Japan, and the isles of the northern Pacific."

* The ancient Egyptian embalmers also used a sharp flint for making the incision in the body.-R. A. S.

MSB-003 THE ABORIGINAL RUINS AT SILLUSTANI, PERU

Bandelier, Adolph F.; American Anthropologist, 7:49-68, 1905.

The hacienda of Umayo lies five leagues in a northerly direction from the little city of Puno, capital of the department of that name in southeastern Peru, and not far from the northwestern shore of Lake Titicaca. Its elevation above the level of the Pacific ocean is nearly 13,000 feet. Situated on a narrow neck of land between two extensions of the Umayo lagoon, it nestles at the base of a rocky promontory called Sillustani, or Silustani. The origin of this name is not clear. If Sillustani, it may be derived from Sillu, 'Nail,' in Quichua as well as in Aymara. Before the conquest the territory was held by the Colla, a large group of Aymara Indians; to-day Quichua Indians inhabit it. It may be that Sillustani is the proper orthography and the term is of Aymara origin; but so far as known the place is not mentioned by name in any early Spanish document, printed or in manuscript, hence it may be a Quichua term introduced subsequent to the sixteenth century, when the Quichua Indians began to encroach on the Aymara range.

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The peninsula of Sillustani has been known for some time as the site of Indian ruins of remarkable construction, and about which no information was obtainable. As before remarked, the name Sillustani (or Silustani), so far as known, does not appear in any Spanish source. Rivero and Tschudi, in their Peruvian Antiquities, mention them and give a picture that is very inadequate. The best description is that by E. G. Squier in his work on Peru, and his views of the ruins are correct. Charles Wiener hardly deserves to be alluded to, his views of the towers of Sillustani being as inaccurate as the little he tells about them.

Ascending from the hacienda in the direction of the highest point of the peninsula, we are soon among vestiges of artificial facings of natural gradients, somewhat leveled by the hand of man so as to represent broad terraces, or andenes, common in Peru, and modern as well as ancient. There are several of these wide steps, but while there is much debris of fallen masonry, only a few huge blocks, set into the thin soil at intervals, remain to indicate that there may have been something akin to parapets raised along the edge of the facings. There are places where a narrow entrance may have existed, but the remains have been too much disturbed to permit definite conclusions on this point. The last third of the ascent is steep, and we noticed each time we went to the ruins, on every morning for seven days, that not only respiration, but the whole organism was affected, and this feeling of mountain sickness (called orocho in Bolivia and veta in northern Peru) continued as long as we remained on the plateau. A cleft (plate VII (3), e) with traces of stone steps by which access to the top is gained, is flanked on the right by two small round towers; on the left a quadrangular structure occupies the point, and beyond it, along the edge of the cliff, follows a line of circular edifices terminating in the largest structure of all, a stately inverted and truncated cone, one side of which has been torn down. As far as this chullpa the cliff has a low rim and the terrace below is fairly well preserved. South of this gateway the cliff becomes steeper and indented, while at the same time it recedes to the southwest until it reaches another crevice with a graded ascent to the plateau. To the left of this ascent stand two handsome stone towers. Westward along the southern edge of the peninsula, it is very rocky and steep, in places vertical; yet there is hardly any natural obstacle to scaling the rocks from the lake side, and if there were artificial defenses they have completely disappeared. Along the edge, and sometimes almost on the brink, towers and quadrangles are disposed at varying distances from each other. They form two larger

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groups and three smaller ones, the last one of which stands some 750 feet from the extreme northwestern point of the peninsula.

The central area of the plateau has fewer buildings. With the exception of the round ones at h (plate VII, 3) and a group lying west of m, they are quadrangular. But the northern edge, from a point 500 feet east of the western end to its eastern extremity, supports nineteen round structures, the most easterly group of which is connected with a wall, more than 280 feet long, running west to east, toward the edifice m. Near the lake shore and on the northeastern spur of the peninsula is a group of much ruined structures, and an isolated tower rises near the northern beach. In all (except the vestiges of what appeared to be small rectangular cists, which we were not allowed to open), the peninsula at Sillustani was found to support at least ninety-five buildings, more than eighty of which are circular, not including scattered walls and the so-called "sun circles" of which there are at least five.

It will be observed that the majority of the towers stand on the edge of the plateau, while most of the rectangular structures are away from it. The largest and best built occupy prominent positions. Low and indifferently constructed walls exist in connection with one or the other group of towers, and in a few places they also extend along the brink of the plateau. But, as already remarked, nowhere is there a trace of breastworks or walls of circumvallation. The andenes on the eastern flanks of the mesa (for the plateau is but a mesa) recall the terraced lines around ancient villages in the Bolivian cordillera, and could have afforded a stand for warriors fighting with the sling, but without protection. This is in harmony with the mode of warfare and the weapons of the aborigines.

East of the peninsula, on the ridge due south of the hacienda, are remains of quadrangular buildings (p) overlooking the lake from a sharp crest. Towers, no so well constructed as those on the mesa, are scattered through the valley east of the hacienda and on slopes and ridges far and near. They are usually accompanied by artificial terraces, but it is difficult to tell whether these are modern or ancient.

Of the circular edifices there are two kinds, according to the material and mode of construction. There is the circular tower, narrower at the base than at the top and built of stones carefully rubbed to smoothness. Of these only a few are complete. The largest one is marked a on the general plan. It is the best example of the circular stone structures at Sillustani.

This chullpa, which stands on a projecting point due west of the hacienda, is a most conspicuous object. Its height is 35 feet, its diameter at the base 24 feet, and at the top 28 feet, so that it presents the appearance of a steep, inverted, truncated cone. It is faced outside with handsomely cut blocks of andesite. As shown by the drawing (plates VIII, I; IX, 13), this outer shell consists of two tiers. The lower tier, which rests on the surface of the rock, is 25 feet high, 8 feet thick at the base, and 9 feet at the top; it is made of blocks superposed without binding material, is wider at the top than below, and no attention was paid to breaking joints. The inner surface of this lower tier is vertical. Upon this main structure rests another of cut stone, of less thickness than the lower one and forming the upper tier to the full height of the chullpa. So much for the outer shell. With the surface inclining outward and the projecting cornice, it was impossible to reach the top of the edifice from without.

The interior of this chullpa (pl. VIII, 1), as of all the others at Sillustani (pl. VIII, 2, 3, 4), is divided into two sections, corresponding to the exterior divisions. As far as or nearly to the top of the main tier, a dome-shaped chamber is built of common rubble. Sixteen feet above the floor, in the apex, is an aperture two feet in diameter, with a rim of projecting slabs, above which the opening widens for five feet or more. The upper tier has no core of rubble or other material, nor was it provided with windows or loopholes; the top is open,

but the hole in the core was probably originally covered with slabs.

At the base of the chullpa is a tiny rectangular entrance measuring about two feet in width and height (plate IX, 3, 4, 6, 7, 8). I could not crawl into any of these chullpas myself, and my wife had considerable difficulty in entering even the largest of them from the base. These structures were absolutely empty, nor could I learn that anything had ever been found in them.

The upper tier of this chullpa was probably never closed; only the lower chamber could have been used. It is not large, since the facing and the core have an aggregate thickness of eight feet below and ten feet above, so that two-thirds of the diameter of the structure are occupied by its walls.

Chullpa c (plate VIII, 2) also is completed to the top. Like the former, it stands on the brink of the plateau, but on the southern instead of on the eastern edge. It is much smaller than chullpa a, its elevation being only 22 feet, of which 16 feet form the lower or main part. Its width at the bottom is 16 feet, at the top 18 feet; its other dimensions are proportional. Like a, the upper chamber has for its sides only the armor of polished andesite blocks. There is a neck through the upper part of the core down to the hole in the apex of the main chamber; the hole has the same dimensions as that in chullpa a. These interior chambers with the necks recall the form of a bottle.

Several features of these chullpas attract attention:

1. The great solidity of construction, obtained by closely fitting the heavy blocks forming the outer facing or armor, and by the massiveness of the lower part of the structure.

2. The great thickness of the walls encasing the main chamber.

3. The diminutive size of the apertures, both above and below. A child alone could pass through the upper orifice, while the largest of the doorways are not four feet square.

From these facts it is apparent that the object which the builders of the chullpas had in view must have been the protection of their contents from moisture and the weather in general, as well as from depredation. This object they fully attained. When the interior was filled, ingress must have been almost impossible from the base; perforation of the massive walls within reasonable time was beyond any mechanical means at the Indians' command, and the smoothness of the exterior, the height of the wall, and the inverted cone shape would have rendered futile any attempt at scaling. Only by tearing down the towers was it possible to get at their contents.

The core of rubble was manifestly first raised---a comparatively easy process. Plate VIII, 4, 5, represent stone chullpas begun, the inner chamber being already inclosed in the dome-shaped vault. This was kept closed at the top until the andesite facing had reached a height sufficient to give it solidity. Then the upper opening was made as seen in d, which shows the chullpa reared to the elevation of the main tier. The most difficult part of the work consisted in obtaining the blocks of andesite for the armor, their transportation, shaping, raising to the height required, and final smoothing.

East of the hacienda of Umayo a small grassy valley opens. Following this trough for about half a mile one reaches the foot of a rocky slope of andesite that continues into cliffs of moderate elevation. These cliffs have furnished the material for the outer casing of the stone chullpas at Sillustani. Parts of the cliffs are constantly falling down through erosion, but chiefly from the effect of lightning-strokes, for hardly a thunderstorm passes without sending one or more bolts at the ridge and its rocky edge. The plateau of Sillustani is higher than the andesite cliffs and more isolated, but its situation between two extensions of Lake Umayo renders it immune, for the electric discharges strike the water instead of the promontories on which the ruins stand. This is a well-established fact, known to everyone familiar with the locality.

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It may therefore be said that the andesite used at Sillustani was quarried chiefly by lightning. At the foot of the cliffs many large stones lie about, rudely chipped and ready for transport. A number of such blocks are also scattered through the valley, between the cliffs and the hacienda, as if abandoned in transit. Plate IX, 16, 17, 18, represent three sides of the largest one seen by us, and figure 15 of this plate shows the front view of a smaller one. The former is nearly 12 feet long, 7 feet thick, and 6 feet in height. On its face (turned toward the ruins) protrude three knobs, about 18 inches long, curved upward so as to afford a fair hold. On the rear are three stubs. The knobs suggest the idea of pulling, wooden levers being applied behind. These knobs, protruding from the face of the blocks and also from the rear, are still seen on some of the partly cut stones lying about the towers. They seem to be, if not strictly peculiar to Inca architecture, at least a constant feature of it. I have here introduced a view of some of the ruins of Ollantaytambo, near Cuzco (plate XIII), on which the knobs are shown on many parts of the walls. The blocks thus abandoned on the way have stone props under them in the rear, so that by pulling, pushing, heaving, and up-setting, with the characteristic disregard of time consumed, the huge stones were moved from the cliffs to the plateau, where the work of cutting, placing in position, and smoothing was completed.

The tools employed in these processes no longer exist at Umayo and Sillustani, but we are sufficiently acquainted with the implements of the ancient inhabitants of Peru and Bolivia to safely assert that, for breaking and chipping, stone mauls and hammers were used. Andesite can easily be worked with bronze, or copper, and even with chisels of harder stone. Knowledge of the implements of the Quichua and Aymara, before iron was introduced by the Spaniards, sheds abundant light on the work performed at Sillustani. The smooth finish was obtained by simple patient attrition, and there is no necessity of resorting to hypotheses of artificial stone or tempered copper. Each block was finished on the ground as far as possible, but the final close fitting and the removal of the knobs were done after the blocks were placed in position in the walls. This is proved by courses of the masonry and even of sections of walls in which the knobs still protrude. That the curve was last effected is shown by the upper tier, where the outer edges of the blocks appear to form a circle, when seen from below, but on closer inspection it is seen that the courses are polygonal, with as many sides as there are blocks in each.

So long as the stones had not to be raised above the second course, their placement was easily accomplished, but they were placed as high as thirty-five feet above the ground. Windlasses were not known to aboriginal Americans, but the ruins at Sillustani fortunately preserve examples of the devices by which the raising of the blocks of andesite was achieved. Plates VIII, II, and IX, 1, exhibit the remains of inclined planes of rubble, one of them 215 feet in length (u), on which the blocks of stone were gradually moved up to the required elevation in the wall. The incline abuts against the tower and was raised as the building of the latter progressed. It must also be considered that the size of the blocks was reduced by cutting, and that the largest ones were always used in the lower courses. In addition, a device was adopted for diminishing the weight of the blocks. As seen in plates XI and XII, 1, the ends of each block were hollowed out, and, once in place, these cavities were filled with small pieces of stone. This allowed the blocks to be handled with greater facility, while the subsequent filling practically restored their original weight.

The round and handsomely constructed chullpas are the least numerous, and only one of them is ornamented on the outside. The tallest of all has the figure of a lizard carved on its surface about midway between the base and the top.

The condition of the stone buildings at Sillustani leads to the inference that work on them was abandoned before completion. This is particularly the case

with the quadrangular structures, all of which are unfinished. Their condition is not the result of demolition or of decay. The masonry is like that of the towers, well laid and nicely joined. The building m, shown in plates VIII, 7, and XIV, 2, was further advanced in construction than the others, part of its walls being 8 feet high. Some of the blocks are 9 to 11 feet long, 4 feet thick, and 6-1/2 feet high. Only two sides were reared, one of which measures not quite 28 feet and the other more than 35 feet in length. Inside, and touching the walls of the rectangle, is a circle of upright slabs, 38 inches in thickness, wet without mortar, alongside of each other. On the longer side of the rectangle is an entrance 52 inches wide.

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With few exceptions, the buildings at Sillustani were unfit for abode. Only groups o and p (provided the latter are ancient), and perhaps some of group r, bear the character of dwellings. All the others, except i, are so constructed as to indicate that they were designed to shelter and preserve, as carefully as possible, materials of the nature of which we have no knowledge. Had it been possible for us to open one or more of the white chullpas, we might know something of their contents, but permission was unobtainable. The belief that valuable objects of metal are therein concealed is deeply rooted in the minds of the people, although there is no authentic recollection of the finding of any "treasure" at Sillustani. Many of the towers were partly torn down and searched long ago, but no tradition in regard to what was found in them was obtainable by us. The universal opinion, published and unpublished, is that the towers of Sillustani were designed as sepulchers, burial towers, or funeral monuments, and we held the same opinion ourselves.

One point is certain: these towers were, so to say, hermetically closed, or were built with the view of so closing them as soon as filled. It is also evident that they could not be opened or entered except with considerable difficulty, and that they were carefully guarded against such intrusion is shown by their massive construction. The towers cannot be scaled, and the aperture above is too small to admit an adult person. The opening below is equally contracted, and if the interior were closely packed it was practically inaccessible. To break in from the outside was beyond the power of Indians within a reasonable time. Hence the contents of these towers must have been of such value to the builders that they exercised every effort to preserve them, as is evidenced by the massiveness of the walls, the smooth finish which made scaling impossible, and their inverted conical shape. Mortuary monuments they cannot have been unless, as is generally supposed, they were designed to receive a number of corpses. But the question arises, How could corpses have been introduced? The opening above is entirely too small, and while the aperture below might have given passage to an Indian of small stature, such a mode of burial is completely at variance with what is known of the mortuary customs of both the Quichua and the Aymara; and to fill the chamber with dead bodies would have been a very long and arduous task.

A question intimately related to that of the contents of these towers is that of the builders of the Sillustani structures. There is no known tradition in which the place is mentioned, and the name Sillustani nowhere appears in books or documents of the period of early Spanish colonization. Hence it might be supposed that these buildings, like those of Tiahuanaco, must be attributed to some tribe the record of which is lost. Although we search in vain for data in regard to Sillustani, we meet with positive information concerning a site called Hatun-Colla. This place (or rather Kolla) lay close to Umayo, and while there exist some ruins there which Squier has described, nowhere in the vicinity are there any of the type and importance of those at Sillustani.

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The architecture and masonry at Sillustani bear the stamp of Inca work. They resemble structural remains at Huanuco in central Peru, on the island of Koati, and also the quadrangular towers of well-fitted stones at Kalaki on the shores of Lake Titicaca. The edifices in the latter two localities are clearly of Inca construction---there is abundant evidence to that effect. In regard to Huanuco it is stated that the buildings (of large, nicely fitted, and smoothed blocks) are also of Inca origin. The Indians who inhabited Hatun-Kolla, before the Inca came in contact with them, built with much less care and regularity. It is more than likely that by the structures at Hatun-Kolla those at Sillustani are meant by Cieza. The two places are very near each other, and the remains of Hatun-Kolla can not be compared in importance with the former. Hence, also, it is not improbable that the name Sillustani is comparatively modern, otherwise Cieza would certainly have known of it, for he must have seen the ruins when at Hatun-Kolla. Even the white chullpas are of Inca origin.

I would also add that the larger proportion of the potsherds found are of the type of Cuzco pottery, which is sui generis among Peruvian and Bolivian ceramics. This is another indication in favor of the assumption that the builders of Sillustani were Incas.

Stone towers as military constructions are not common among the ruins of Peru and Bolivia. There are a few on the coast, in positions indicating that they were lookouts. It is manifest that those at Sillustani were not for observation, still less for residence. They must have been intended for either burial-towers or store-houses.

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The statement by Cieza that the Inca erected depositories near Hatun-Kolla is significant. The Sillustani buildings cannot have been anything else but such depositories. There is no evidence of their having been depositories of the dead and such was not the mode of burial either of the Aymara or of the Cuzco people; hence if they were depositories, it was of stores. The tribute which the Inca obtained on the tableland consisted of what could be raised on it, that is, potatoes (made into chunu), oca, quinua, and a little maize. The bottle-shaped interior of the chullpas is as if made for receiving just such produce. A chullpa could readily be filled from above with chunu and the like by pouring it through the orifice, and when the stores had to be used they could as easily be extracted from the small opening after removal of the block which closed it.

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We have yet to consider another class of structures---those marked g on plates VII(3); VIII, 12, of which there exist a group of four at the foot of the cliff on which the largest chullpa (a) stands, while an isolated one is on the slope of the northeastern promontory. These are called inti-huataña, translated "place where the sun is tied up." Leaving aside etymology, it first strikes one that these circles are on the flanks instead of on the plateau, where they might be expected if designed for astronomical purposes. It is also singular that they are not truly circular; indeed, they do not even approach geometrical accuracy. The "circle" proper is formed by upright slabs, little worked if at all. The total length of the curve is 84 feet, and the average height of the stones three feet. Around this "circle" was a ring of handsomely cut slabs laid flat and having an aggregate width of about two feet. Most of this stone ring is destroyed, but what remains distinctly shows a tendency to ornamentation. The entrance, with its upright stone-posts, is a little more than two feet wide, and the well-cut block in front of it has two low steps. The whole is not symmetrical, but is fairly accurate for work done by "rule of thumb."

It is difficult to understand how such contrivances as these circles, situated as they are, and of such inaccuracy in form, could have been of use for astro-

nomical purposes. It is conceivable that a slender cone (tall as at Cacha, or a mere stub as at Pisac) might have been serviceable for approximately determining equinoxes by noting the days when the sun shed its full light on the top about noontime; but, aside from the fact that it is very doubtful if the Indians of Peru ever paid much attention to the equinoxes, the "circles" at Sillustani exhibit nothing to indicate that they could have been used for such a purpose.

It is equally difficult to conceive that the circular structures could have had other than a ceremonial object, but what rites were performed within them can only be conjectured. There are a number of such circles, less carefully built, on the height called Kajopi, above the village of Huata in Bolivia. Kajopi is 1,600 feet above Lake Titicaca, toward which it descends in partly vertical cliffs. The top is to-day a resort for wizards, and the circles (which, be it said, lie entirely on the inclines and therefore could not have been of any use for astronomical determinations) are regarded with superstitious dread, offerings constantly being made there. The circles at Sillustani consequently seem to have been for some sacrificial purpose, and as such I shall regard them until evidence to the contrary is presented. These and the small building (i) appear to have been the only structures at Sillustani designed for ceremonial use.

Sillustani, therefore, presents the characteristics not of some ruin of very ancient date but of a cluster of buildings reared by and for the Inca of Cuzco for storage, and not earlier than the latter part of the sixteenth century. Few of the better constructed edifices are finished. The general condition, the evidences of mechanical contrivances for hoisting, the building stones abandoned by the roadside while under transportation, all prove that the work suddenly ceased for some cause unknown, but which was not necessarily the appearance of the Spaniards. Sillustani is perhaps one of the most instructive sites at which can be studied the strides made by the Inca in the art of building. The ceremonial structures, especially i, are of particular interest as the best-preserved specimens of Inca religious architecture thus far examined.

The significance of this paper is in the strange round towers constructed with great care and skill but with no obvious purpose. Also of interest is the precipitate abandonment of construction in the area--a common feature in much ancient architecture.

A fascinating possibility in connection with the "sun circles on inclined ground is that they were built on level land originally but were tilted by a later cataclysm (which perhaps also interrupted tower construction). The region around Lake Titicaca was apparently tilted in recent times. The assymetry of the "sun circles" is not unusual. Some in the British Isles are elliptical, apparently for a purpose.

MSB-004 [RUINS AT PONAPE]

Anonymous; Nature, 32:13, May 7, 1885.

Capt. L. U. Herendeen, of San Francisco, communicates the following notes on prehistoric structures in Micronesia to Science:-- A few years ago I visited Ponape Island in the Pacific, at E. longitude 158° 22', and N. latitude 6° 50'. The island is surrounded by a reef, with a broad ship-channel between it and the island. At places in the reef there were natural breaks, that served as entrances to the harbours. In these ship-channels there were a number of islands, many of which were surrounded by a wall of stone five or six feet high; and on these islands there stood a great many low houses, built of the same kind of stone as the walls about them. These structures seem to have been used as temples and

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forts. The singular feature of these islands is that the walls are a foot or more below the water. When they were built, they were evidently above the water, and connected with the mainland; but they have gradually sunk until the sea has risen a foot or more around them. The natives on the islands do not know when these works were built: it is so far back in the past, that they have even no tradition of the structures. Yet the works show signs of great skill, and certainly prove that whoever built them knew thoroughly how to transport and lift heavy blocks of stone. Up in the mountains of the island there is a quarry of the same kind of stone that was used in building the wall about the islands; and in that quarry today there are great blocks of stone that have been hewn out, ready for transportation. The natives have no tradition touching the quarry---who hewed the stone, when it was done, or why the work ceased. They are in great ignorance of the great phenomena that are going on about them than the white man who touches on their island for a few hours for water. There is no doubt in my mind that the island was once inhabited by an intelligent race of people, who built the temples and forts of heavy masonry on the high bluffs of the shore of the island, and that, as the land gradually subsided, these bluffs became islands.

MSB-005 CONFIRMATION OF A PREHISTORIC CIVILIZATION

Brown, Hugh A.; Research Release #70, August 2, 1968

Brown is an enthusiastic student of the cataclysmic school of geology. Here he applies his theory to archeology and arrives at some controversial dates. Private research reports, such as this one, and small newsletters and periodicals are rather common on the far frontiers of science.

The Temple of Serapis, on the Bay of Naples of the Tyrokenian Sea at Pozzuoli, marks the remains of what appears to have been a great marble building, which existed during a previous epoch of time and having been erected by the people of a civilization that existed 19,000 to 12,000 years ago.

The known facts are: (1) The temple was erected when it was above sea level. (2) It has been below sea level! (3) It is now again above sea level. (4) The creators of the still-standing great marble columns lived prior to the submergence of the temple; they used tools and their workmanship rivals that of the Egyptians and Greeks of our own epoch of time. Photographs appear in many textbooks.

The present latitude of Pozzuoli is approximately $42-1/2^{\circ}$ N. but was at approximately 30° N. latitude at the time the temple was erected (determined by the distance from the North Pole of that epoch). The earth did a cataclysmic roll-around caused by the eccentrically rotating mass of ice at the North Pole, which was then occupied by what is now the Hudson Bay Basin of Canada, and at that time Pozzuoli was moved to approximately 70° N. latitude, where the temple became submerged. The massive marble columns were then under water so that boring clams drilled the holes which are now seen in the columns 15 to 20 feet above the present sea level. Pozzuoli was then moved to its present latitude when the overweighted Sudan Basin Ice Cap rolled from the North Pole to its present tropical location.

Strand-lines and raised and lowered beaches of former sea levels are found on coastal areas all over the world, indicating the sea levels of the previous epoch of time. The globe careens periodically, and rolls sideways to its direction of rotation, so that both land areas and water levels are changed and rearranged by centrifugal force. They are moved to higher or lower levels on the bulge of the earth, which is about 13 miles higher at the equator than at the poles.

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MSC-001 ANCIENT CANALS ON THE SOUTH-WEST COAST OF FLORIDA

Douglass, Andrew E.; American Antiquarian, 7:277-285, 1885.

While exploring the South-west coast of Florida, I was much interested in two ancient canals which I examined, and whose object seemed quite inexplicable. The first occurs about three miles north of Gordon's Pass, an inlet thirty-three miles south of Punta Rasa, and twenty miles north of Cape Roman.

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I entered Gordon's Pass, and for some days was occupied in examining the evidences of Indian occupation in the shell and earth mounds to be found there, and while awaiting a fair wind for Punta Rasa, devoted a day to the examination of the Canal. With two of my men I walked northward along the beach, which was a perfectly straight line to the next Pass. For the first half mile this beach was skirted by a beautiful grove of cabbage palmetto, under whose shade was the ranch of Mr. Madison Weeks, an intelligent settler, who was cultivating the surface of an extensive shell mound, just north of the Inlet, and who courteously gave me much information about the country. The Palm Grove was on a plateau about eight feet above the sea level, but beyond the grove the land sank into a low marsh not more than half that elevation. The storms of many years had created a levee of sand, which defended this morass from the sea, and was at least one hundred feet in breadth. It was apparent, however, that erosion of the coast had here occurred to a great extent, for stumps of dead palms could be seen a hundred yards or so to sea, and suggested the probability of a great change in the contour of the land during not remote years. One of our party followed the line of embankment or sand-dune while the other two kept along the beach. At a distance of three and a-half miles from the Inlet the former announced the Canal, and we soon joined him and saw the object of our search before us. Where we stood it was buried in the sand embankment, but from that it was plainly visible straight as an arrow, crossing the low intervening morass and penetrating the sandy pine ridge, half a mile, or nearly so, away. The bottom was moist and full of tall grass; the sides and summit of the embankment covered with a dense chapparal of oak scrub and scrub palmetto. Its direction from our stand-point was about one point South of East. We could see in the distance, pines growing upon the inner and outer sides of its banks. With infinite labor we worked our way through the dense scrub for a hundred yards or so, and took our measurements. The width from the summit ridge upon each bank was 55 feet, and the depth from that summit level to centre of the excavation 12 feet. At the bottom the width was 12 feet, the banks being almost perpendicular for some 5 feet, and then receding on an easter angle at the summit. This summit was about eight feet above the level of the meadow, through which for nearly half a mile it was excavated, till it reached the higher level of the sandy pine land beyond. Owing to considerable indisposition on my part, this was the end of our exploration for that day, but on the day following we rowed up the Interior Lagoon with a view of examining its eastern terminus. Mr. Weeks, the resident settler, kindly accompanied us and gave us all the information he possessed as to its structure and peculiarities. He had often hunted through the pines, and had crossed it at various points not at present accessible to us. A long pull of about four miles from the Inlet along the Lagoon brought us to a little bay on the west shore where we landed, and penetrating the thickets reached a swamp of saw grass and water, where we found the Eastern terminus of the canal, though much reduced in dimensions, as probably it was here more exposed to the wash of the Lagoon in the rainy season. The banks were covered with a growth of cabbage palms, and as it progressed toward the pine barren, it increased in size and height. We found that at this end the trench curved to the South as it approached

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the Lagoon, and about two hundred yards from the shore it was intersected by a cross ditch or trench, as if to allow it to receive the waters from the level on either side. If this cross opening has not been a modern adjunct, designed to allow the swamps to discharge into the Lagoon, as we found was now the case, it would seem to indicate that the whole of these interior waters were expected to find an outlet to the sea by means of this very considerable drain or canal. Mr. Weeks gave us the following information about the canal in its passage through the pine land. The whole canal is about one mile and a half in length, reaching from the Lagoon to the Sea. With the exception of the curve at the Eastern terminus it is perfectly straight. In passing through the pine woods it intersects sand ridges, in which it is excavated to a depth of forty feet. The bottom is everywhere of the same width I have described, but at points where he has crossed it in hunting, he finds a trench about four feet in breadth, and at present, two feet deep running along the center, leaving a breadth of about four feet on each side. Mr. Weeks was of the impression that this supplementary trench was designed to accommodate the keel of a boat as it ran along the conduit. Leaving the Canal, we crossed the Lagoon and found and ascended a creek with rocky banks and bottom for some two miles, into the pine woods of the mainland. Mr. Weeks was of the opinion that it formerly connected with the Canal, and the latter was constructed to carry it to the sea, but I see no indication of that being even remotely possible, though it is as good a guess as any other that can be made in the apparent absence of any more plausible theory. The trench in the middle of the main canal appears to me to indicate that the canal has been made by civilized men, and within a comparatively recent period. It is a work of enormous labor indeed, but in trenching through the sands of these regions, it is quite usual to make an interior ditch, that the tables left on each side may intercept the drifting sands brought down the sides by heavy weather, rains or wind. But the question is, what was the purpose of such an expense of labor, and who in this sparsely settled country could have undertaken it. As regards drainage, the Lagoon already empties into the inlet, and through that into the sea. If for the admittance of vessels, the Inlet of Gordon's Pass gives far greater accommodation. And who would not be aware that an opening of the kind at right angles to the shore, without some very massive artificial breakwater and continually dredged channels, would be choked up by the sand on the first storm, and show the same obstruction at its mouth as we have just seen. My own idea is that by whomsoever constructed, it was designed to relieve the lowlands to the eastward of great accumulations of fresh water in the rainy season, at some remote period when there was no Gordon's Pass, and when the exterior conformation of the coast was far different from what it is at present. Inlets in the Florida coast, particularly on the Atlantic side, open and close unexpectedly. In St. Johns County a couple of miles south of Matanzas Inlet, an inlet, known as Hughes', closed up in heavy gales an hundred years since, and that region was rendered very unhealthy by the stagnant fresh water. A few Spanish soldiers with shovels, opened a channel through the marsh back of the Sand Dunes, and in a short time the waters had worn a course into the Matanzas river, which has so remained ever since. Heavy storms on the Gulf Coast may have choked up several Inlets on the west coast, and filled up channels among the Mangrove Islands, or on the other hand, the mainland which now confronts Gordon's Pass only a mile or so to the eastward, may have reached the sea in bygone ages, and enclosed a fresh water lake where is now the Northern Lagoon. Who were the constructors, is a question, even more difficult to settle. There is no record of such a work in any local tradition, or in any history that we now possess. Indeed, there is nothing more obscure than the history, whether ancient or modern, of the South-west Coast of Florida.

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The other canal I visited, is quite as inexplicable, and even more surprising for its extent and dimensions than this. It has been occasionally noticed in accounts of hunters and sportsmen, who have not infrequently encountered it in a more accessible and better known region. The sheet of water on the coast north of Caloosahatchee river known as Charlotte Harbor, Charlotte Sound and Carlos Bay, has on its eastern border a long island known as Pine Island. It is about 18 miles long, and from three to five miles broad, extending in a direction nearly north and south. On its east side it is separated from the mainland by a shoal channel, obstructed by oyster and sand bars, from half a mile to a mile in width. On the west, Charlotte Sound intervenes between it and the outside or coast-line of keys, with a width of from three to five miles. Just on the verge of Pine Island, a maze of mangrove keys or islets stretch along the entire distance, and some of these have been occupied by the Muspa Indians as late as fifty years since. Pine Island itself is clothed in pines, and is a sandy level fringed along the water by mangrove thickets. Some of the adjacent islets are occupied here and there, by a solitary settler, who finds cultivatable ground on the shell mounds left by the Indian inhabitants of prehistoric or more recent days. One of the largest of these shell mounds which I have ever seen, is found on the west coast of Pine Island, some four miles from its northern end. The heaps cover a space of several acres, and rise in steep ridges to the height of, in some instances, twenty-five feet. Their flanks run off frequently on very slight inclinations, and have been dwelt on by Indian residents long subsequent to the era of original construction, until the debris accumulated over the shells has resolved itself into a very fertile mould, tempting to the settler of the present day. This shell heap had been so utilized, that around the steep ridges rows of lime and lemon trees, with pomegranates and fig trees, spread out on the long levels. But all was now deserted and on landing I found it a maze of wild luxuriance; briars and the American Aloe, and cacti innumerable, filled up every vacant space, and these with the "Spanish bayonet," render it a danger as well as labor to explore.

I had but little time to spare, owing to the delays forced upon us by a long period of unusually inclement weather, and could only make a hasty inspection. We had expected to find two settlers at the ranch, but it was vacant, and our work had to be done without the aid of a guide. We made for the mangrove swamps to the south, and the tide fortunately being out, we worked through the damp thickets till we emerged into the tangle of scrub palmetto which covered the surface of the sandy upland of the Island. Catching a glimpse of a sand mound glistening with whitened crest, among the pines a quarter of a mile away to the eastward, we plunged in through the chapparal and made for that object. On our way we rose upon a slight ridge and then descending into a hollow level for some thirty feet, again surmounted a ridge and then realized that this was the Canal. It was thus we found it, much to our surprise. A thin growth of tall pines covered it and the surrounding sand level, an occasional palmetto rose here and there along the bottom, all else was a thicket of scrub palmetto. The position of this end of the canal was of some interest, as enabling us to estimate how far it was coeval with the sand or shell mounds at its western terminus. So far as it can be described without the aid of a diagram, the arrangement of these objects was as follows: On the western verge of the Island in a mangrove swamp, rose the various masses of shells constituting the Shell mound spreading over an area of eight or ten acres; due east of these ridges at a distance of some 300 feet, but upon the sand level of the Island, rose a sand mound 35 feet in height and 200 feet in base diameter, (one of the largest of these constructions which had come under my observation anywhere in Florida.) Looking eastward from its summit, we could discern about 460 yards distant, the sand mound we had first described. It was a twin or double-headed mound, as I afterward ascertained, 20 feet in perpendicular height, with a

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depression of 8 feet between the two summits, and the longest diameter of its base 300 feet. While these two mounds lay on a line due east and west, the canal passed between them angularly, coming from the south-east. The dimensions of the latter were at this point 30 feet in width from the bottom of the opposite banks, and seven to eight feet in height to the summit of the banks, which was also at an elevation of some three or four feet above the level of the adjacent sand of the Island surface.

Far as the eye could reach, we could trace this canal in a direct line through the sparse pine woods; its course being especially marked by the tall fronds of the cabbage palms, which the moisture of the depression tempted to grow within the banks, and were confined to that level. After passing between the two sand mounds in an angular direction, the western terminus of this interesting construction, faded away in the general level of the surface to the north of the larger mound, and this level, within a few rods, sank into a creek which continued straight through the mangroves into Charlotte Sound, emptying two hundred yards north of the ranch where I had landed. These were all the local characteristics of this Canal that I was able personally to inspect. I was assured by an old settler that it crosses the entire Island in a direct line on the course which I observed. At this point, the direct width of Pine Island is three and a half miles. The Canal however, crossing at the angle indicated, must exceed five miles in length. It was a source of great regret that indisposition on one hand and delays incident to an unusually rough and inclement winter on the other hand should have prevented my making a more thorough survey of this interesting and inexplicable work.

MSC-002 THE ANCIENT CITIES OF ARIZONA

Anonymous; American Antiquarian, 10:325-326, 1888.

The ancient canals of the American southwest number among the greatest of the pre-columbian engineering works.

Mr. Frank H. Cushing has been exploring in Southwestern Arizona and has made some important discoveries. Science says: "The scene of his explorations is the wide valley or plain at the confluence of the Salt and Gila rivers in Southwestern Arizona. To-day railroads cross this valley, and much of it has been reclaimed by irrigation from the desert condition into which it relapsed when the ancient inhabitants disappeared. Still a wide expanse of the plain, which is forty-five miles across, remains a desert covered with sage-brush, cactus and mesquites. It slopes from the Salt to the Gila river, and advantage was taken of this feature of topography by the ancient people, in constructing canals to irrigate the whole plain. In some places these old canals have been reopened by the modern farmers, and restored to their original use. On this wide plain are many groups of mounds, in excavating which Mr. Cushing has discovered many ancient cities, to some of which he has given the names of Los Muertos, Los Hornos, Los Guanacas, Los Pueblitas, Los Acequias, etc. Los Muertos, the city (sic) of the dead, has been traced for three or four miles, and forty or fifty huge structures or communal houses have been examined.

The houses are rather large, 300 or 400 feet long and 200 feet wide, possibly larger. They were generally built of adobe bricks, sun-dried, without straw or admixture of cement of any kind. In some instances, Mr. Cushing thinks, they were four or five stories high, but this can only be conjectured from the size of the mounds, the thickness of the walls, and the quantity of the debris. Between forty and fifty of the large, or communal, houses were found in Los Muertos. In the center was a structure larger than the others, which Mr. Cushing called a temple. In this building, which was enclosed by a strong adobe wall, and in no other, were bodies found deposited in an upper story. Here there were four or five adobe sarcophagi, two of which were placed nearer the center of the building than the others, were more conspicuous, and contained what appeared from the skeletons to be the remains of men of advanced age. Mr. Cushing said that extra decorations were found on these two sarcophagi. It is supposed that this was the home of the chief ruler of the tribe, the priest or some one of exceptional note. The object of the wall surrounding the structure was probably to make it a stronghold or citadel in time of war. The temple might also have served as a general storehouse for provisions.

Other structures of a peculiar character were discovered. They were circular, and in the center of each was a fire-place. One of each was found in each city. Mr. Cushing thought that this round structure was a temple of the sun, or something of the sort, as nothing was found in them but the fire-place and some pottery. The one most carefully excavated was about 50 feet in diameter. This ancient people built all of their houses on the main line of the irrigating canal. The large canals are about twenty-five feet wide at the top, the central ditch being four or five feet wide. Certain remains have been found indicating that they constructed of reeds, rafts or "balsas" on which they floated the stones with which to build their houses. In some places large ditches terminated in great reservoirs. In these, probably water was stored to be used in times of drought. The largest ditch was about twenty-five miles long. Mr. Cushing's party found on the rocks of neighboring mountains pictographs or rude etchings. All illustrated matters of a realistic nature, and did not record an individual or a nation. They represented men offering prayers for rain, herders or hunters offering sacrifices. These rock pictures are interesting, however, as bearing upon the question of the use of domestic animals by these people, and their probable acquaintance with the use of wool. In these petrographs appear representations of animals much like the llama of South America. They are represented in a position or attitude that the llama habitually assumes. They are so pictured as to lead to the conclusion that they were domestic animals. They are connected with a string or cord, a man having hold of the string and appearing to be driving them.

 MSC-003 ANCIENT CANALS IN NEVADA

Boothby, H. E.; American Antiquarian, 10:380-381, 1888.

The following letter was sent to the editor of the American Antiquarian by the assistant editor of the Fresno, California, Republican.

MSC-004 CANALS AND WATERWORKS

I am very much interested in your magazine. We published an article about seven weeks ago in the Republican which was an epitome of a pioneer's trip across the plains. It contained a very interesting account of an ancient canal, found (as near as I could tell from his description) in the extreme southwest corner of Nevada. His trip was made in 1849. He and his companions also found, near the canal (which, by the way, was lined with rocks) one or two mounds. The party remained several days and unearthed from the mounds some highly decorative pottery. The jugs were egg-shaped, with the smaller end cut off for an opening. Some of the vessels had earthen leaves and vines, looking like grape vines and leaves, twining around them. The surroundings seemed to indicate that the country had been uninhabited for ages.

In Death Valley, Inyo county, California, the same party of pioneers found a small tribe of Indians who lived in holes in the ground. The Indians were filthy in appearance and very ignorant.

There are a great many Indian mortars and pestles found in nearly every county in California.

MSC-004 [PREHISTORIC IRRIGATION CANALS IN ARIZONA]

Anonymous; Nature, 45:185, December 24, 1891.

The New York Engineering News says that prehistoric irrigation canals in Arizona are "really worthy of more notice than is usually given them. The Salt and Gila River valleys are intersected by a vast network of these canals, which antedate, at least, the arrival of Coronado in 1552, for he mentions these ruins and the traditions of the Indians regarding a once dense population in this region. Modern engineers cannot improve upon the lines of these canals, nor in the selection of points of diversion from the rivers. The first irrigation canal in this section, the one that has made Phoenix, with its present population of 20,000, simply followed the lines of one of these old canals. Their extent may be appreciated when it is said that in the Salt River valley alone the land covered by these canals once aggregated over 250,000 acres, and the canals themselves, with their laterals, must have exceeded 1000 miles in length. This country is filled with prehistoric ruins, with walls of stone or adobe, and almost every acre contains fragments of pottery, steel ornaments, stone implements, and other remains of a population which can only be estimated in its aggregate."

These canals are now attributed to the Hohokam Indians. See the Subject Index for other accomplishments of this remarkable culture.

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MSD-001 ACCOUNT OF A SINGULAR STONE AMONG THE ROCKS AT WEST HOADLEY, SUSSEX

Journal, Thomas; Archaeologia, 6:54-60, 1780.

Sir,

The curious particulars which you had heard of, and had communicated to me, respecting the great pencil Rock at West Hoadley, in Sussex, (called by the people Great upon Little), raised my curiosity, and determined me at a leisure day to make an excursion to view and examine it.

The following description confined to the simple fact of the object, with a portrait and plan [a] of it, is very much at your service: and although I have subjoined some sentiments of an opinion which I have, from repeated views of these sorts of things, formed in my mind; yet I send them not as giving mine but with design to elicit your opinion.

In the parish of West Hoadley, about three or four miles south of East-Grinstead, the ground in many places rises in high ridges with craggy cliffs. About half a mile west of West Hoadley church, there is a high narrow ridge covered with wood. The edge of this is a craggy cliff composed of enormous blocks of sand-stone. The soil hath been intirely washed from off them, and in many places from the interstices by which they are divided. One perceives these craggs, with bare broad white foreheads; and as it were, overlooking the wood which cloaths the valley at their feet. In going to the place I passed across this deep valley, and was led by a narrow foot-path almost trackless, up to the cliff, which seems as one advances to hang over one's head. The mind in this passage is prepared with all the suspended feelings of awe and reverence; and as one approaches this particular rock standing with its stupendous bulk poised, seemingly in a miraculous manner, on a point, one is struck with amazement. The recess in which it stands hath behind this rock, and the rocks which surround it, a withdrawn and recluse passage, which the eye cannot look into but with an idea of its coming from some more secrete and holy adyt. All these circumstances in an age of tutored superstition would give even to the firmest minds the impressions that lead to idolatry. The rock which stands thus poised upon the edge, almost upon the point of another which appears just above the surface of the earth, is a prodigious mass. It is a parallelepipedon, whose height is about twenty feet, and whose sides are as follows:

	feet.	inches.	
1st	14	3	
2d	15	3-1/2	
3d	19	9-1/2	
4th	21	3	63---7 total.

It is not as you may imagine exactly regular, and has therefore been differently estimated from 487 to 500 tons weight: from the measurements and passing observations which I made, accept the enclosed as a rough sketch of its plan, and of its position respecting the other rocks on which it stands. I also send you inclosed a view of it, which I composed from several views taken as I could sketch them out from different stations on the spot. It is upon the whole such a one as will give you a pretty exact idea of the rock, its position, and situation [b].

Although it had been represented to you as an ancient druid monument, I was not led towards it on that consideration. I am not decided to refer indiscriminately at all times these stupendous objects to the Druids and their system only. Whatever may be the impressions which these appearances at first make as effects of superior art and something above nature, they will often be found to be the mere effects of natural accidents.

These phaenomena however carrying in their features the marks of some operation, some activity other than the ordinary course of nature, and in the

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stupendous scale of their magnitude something beyond any experience of the powers of man, have naturally led minds prepared for such impressions to the idea which has been commonly expressed by the word magic. In less civilized or less enlightened ages they have led to actual idolatry. In ages wherein men, beginning to grow learned, affect, as the proverb expresseth it, to see further into a millstone than the vulgar eye doth, the same impressions have exactly in the same manner led to an opinion, that these objects and their circumstances must have been the holy places and the consecrated idols of some former religion. But unless I find some concomitant external circumstances which evidently mark the hand or the vestiges of man, I have always remained in doubt as to the internal evidence of their religious origin or consecration. I must own, at the same time, that the air of mystery and supernatural power which surrounds these objects naturally forms the mind to a ton of religious fanaticism, which it is not in the power of the human breast not to feel, and from these notions they have commonly and too indiscriminately been supposed to have been religious and sacred monuments, and in particular to have been those of the druid superstition. But I own that I differ from this opinion as to this object. In the first place the eastern parts of this island were not much frequented by the Druids: on the contrary, it was invaded and possessed by the Wicanders of the north-eastern people, Saxons, &c. in much earlier periods of time than our common vulgate histories take notice of. These people had their rock monuments, both civil, religious, and supulchral, of the most stupendous magnitude, as well as the Druids. If therefore these kind of objects in these parts are to be referred to any interposition of superstition, why not to that of these people? There are in these parts many remains which are evidently and decisively theirs; but there is another origin to which they may be referred, I mean a pur British superstition, in which the missions of the Druids had no interposition. Britons worshiped the spirit of fury or revenge under the name of Andrast, a sacrificed the human being to this idol. The great wild of this county was sacred to her, and was called in the British tongue Coit-Andraed, which the northern people translated, and named in their languages Andrast-wald and Andred-heida, corruptly written Anderida. If this great stone was ever any idol, why not the bloody rock Andrast? But without any reference to any of these superstitions, I am apt to consider many of these objects as mere natural phaenomena, whose state in which they are found may be easily explained from the common operations of nature acting on the circumstances amidst which they are found.

These great pensile, poised, rocking stones, or piled masses of rocks, are almost always found on the edges of craggy cliffs, or on the mountainous sides of rocky ground; where we see how the wear and tear of time operates in such places, how the beating of storms, and wash of rains, for ages, have cleared away the earth from amidst the blocks and strata of these rocks, and left them bare, and many of them isolees, almost exactly as we now find them. We need refer to no other cause for these effects in the first instance; yet I do allow, on the other hand, that the interposition of man may have carried these operations further on some of these objects, than what nature would have given. After the common operations of nature (having worn and washed away the earth) may have laid open some of these strange appearances, I can suppose that man may have carried this effect still further by totally clearing away all the remaining foil that surrounded these marvellous phaenomena: that either priests profiting of their supernatural appearance, and having destined them for consecration, did thus work them up to a kind of miracle; or that the common inhabitants of the district [b] without any such design, or any design at all, have from mere curiosity, following an extraordinary appearance which struck them, done the same thing, by clearing away every thing which surrounded them, and leaving them thus naked and isolees. Cattle also getting into the excavations of such craggs will naturally loosen the soil about them, and render it more liable to wear and wash away. There is by the road side, which leads to

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West Hoadley, a very great rock, of dimensions much larger than those of the subject of this letter, from under which, and from every side of which also, except one corner which remains still inserted, the earth hath been washed away; this also rests upon a point, and with its enormous projection forms a cave, under whose shade and shelter the cattle find a retreat from heat and weather.

I hope you will not conceive that I mean to account for the edifices and erections which the great cathedral-temples and conventual-dwellings of the Druids exhibit from these kind of accidents or aidings. I have, on the contrary, the most confirmed persuasion that the priests of these missions had in use a power of mechanism, not only beyond the conceptions of the ignorant people, amongst whom they dwelt, as above the human power, and therefore from the appellation of the society called Magick, but also above any thing (one instance excepted [c]) which modern practice knows. At the same time I do believe, that many of the lesser holy places, the chapels and tabernacles of private priests, many of the cromlecks, kistvang, logan stones, judgment seats, oracular and sepulchral stones, have been applied and consecrated to these several purposes from the suggestions which nature, who had in part given them their form, prompted. And I make no doubt if the Druids had resided in these parts, but that they would have adopted and consecrated this our Great upon Little, as one of their mysterious rocks, one of their symbols of the Numen, whom they taught the people to worship. Other priests also of the northern people might have done the same. The object itself would inspire, and the nature of the place where it is found would conspire to this imagination.

I could not, whilst I was upon the spot, hear of any other particulars than what I have beforementioned. After I was come away, I was told of a cave some where thereabouts, where a broom-maker had lived for many years. Perhaps it may become a days amusement to you, as this was to me, to go and search it out, and examine it.

[b] That this great and extraordinary stone has engaged the marked attention of the common inhabitants for many ages back may be seen by multitude of names, and initials of names, of all dates cut in every part of it.

[c] I refer here to the moving and transporting near forty miles the great granite rock, destined for the pedestal of the statue of the Zar Peter the Great. This rock, whose weight is 1200 tons, was found sunken in a swamp. The Count Carbars, of Ceffalonia, raised it out of this swamp, drew it upon rolling balls several miles by land. Then embarked it on a float, conducted down to Petersburg between two ships, and again disembarked it. The various difficulties he met with seemed unsurmountable; the various different operations which this stupendous work required, would really, had not this instance proved the contrary, have appeared to this day impracticable and impossible. The Count however, from a principled science in mechanics, which I do not believe any other man possesses, planned so simple a process of operation as was superior to all difficulties. If any thing could exceed the plan and conduct of this enlightened science. The quickness and application of those resources, by which he repaired and overcame all accidents which occurred in the execution, did so, as far as my reading goes. This work appears to me not only the greatest operation of mechanics which was ever effected in our world, but unique.

MSD-002 DOLMENS AND STANDING STONES

MSD-002 AN ACCOUNT OF THE DRUIDICAL REMAINS ON STANTON AND HARTLE MOOR IN THE PEAK, DERBYSHIRE

Rooke, Hayman; Archaeologia, 6:110-115, 1780.

No 4 [an illustration] is a north view of an assemblage of large rocks, called Bradley rocks. They stand about a quarter of a mile west of Rowter, on a similar kind of hill: the largest of these is a rooking stone, marked 1, thirty-two feet in circumference; it moves with great ease, and seems, from its extraordinary position, to have been placed there by human strength; it rests upon two stones clear of the ground, and, if one may judge from its situation, and from the passage between the two stones it rests upon I should suppose it to have been a stone Deity. It answers to the description given by doctor Borlase of rock idols in Cornwall, called Tolmens. He says, one thing is remarkable, "which is, that these Tolmens rest upon supporters, and do not touch the earth, agreeable to an established principle of the Druids, who thought every thing that was sacred would be profaned by touching the ground, and therefore, as I imagine, ordered it so as that these Deities should rest upon the pure rock, and not be defiled by touching the common earth." (p. 111)

Most megalithic structures are now regarded as being much older than the Druids.

MSD-003 MONOLITHS IN ASSAM

Anonymous; Nature, 126:71, July 12, 1930.

Mr. J. P. Mills, and Mr. J. H. Hutton in vol. 25, No. 1, of the Journal and Proceedings of the Asiatic Society of Bengal describe a series of five groups of remarkable monoliths in the Cachar Hills not previously recorded in print. The monoliths are pear-shaped, artificially dressed, and each contains a cavity in the bulbous end. They are now recumbent, though they appear at one time to have been erected on their narrow ends. They fall into two distinct types which may be regarded as male and female. The former constitute the whole of a large group at Kartong, and a smaller group between Kartong and Kobak. Most of the stones are incised with geometric designs and forms of men and animals, such as the pig and the mithun. While the monoliths may be interpreted as embodying the phallic principle, assisting the fertilising of Nature, the hollows seem to have been meant for some specific purpose not easy to discern. It may be that they were intended to hold water to promote rainfall, or they may have been intended to contain offerings on the analogy of holes recently scooped out in ancient monoliths at Kasomari. It is concluded that the North Cachar hollowed monoliths must be regarded as a specialised development of a phallic ancestral cult typical of Assam. It is clear that they were not erected by the Nagas and ole Kukis who are the present inhabitants of the area. Local tradition assigns them to the Mikirs. This may be the case, subsequent invasion having overwhelmed the Mikirs and left them in isolated communities too weak to provide the labour requisite to carry on the custom. It is more probable, however, that it is to be associated with the Khasi Synteng group of tribes and that it has disappeared owing to their migration into an unsuitable environment.

MSF-001 ANCIENT FORTIFICATIONS OF SCOTLAND

Anderson, James; Archaeologia, 5:241-266, 1777.

Here is a classic account of the famous "vitrified forts" of Scotland. At least most writers assume they are vitrified and were used as forts. In any case they are certainly strange edifices. In reprinting this article the obsolete "f" has been replaced with "s" and the capitalization of the first word in each paragraph eliminated.

Nothing seems to be so well calculated for throwing light on the origin of nations, as an attention to the radical construction of the language of the people, and to the nature of those monuments of remote antiquity that have escaped the ravages of time.

Much has been written about the origin of the Scottish nation. And although some attention has been paid to the nature of the language of the natives, the antiquities of the country have been in a great measure disregarded; though it should seem that the last would be of greater utility in this discussion than the first of these particulars. For, a language may have been spread through so many nations at a very remote period, and is subject to such perpetual variations, and it is so difficult to trace these variations before the discovery of letters, that there is no possibility of pointing out by any unequivocal peculiarities of language, the particular nation from which any particular tribe may have descended. But the mechanic arts discovered by any particular nation, especially before commerce was generally practised, were in a great measure confined to the original discoverers themselves, or their immediate descendants; and therefore they serve more effectually to distinguish the countries that were occupied by particular tribes of people. It is with this view that I suggest the following remarks on some of the remains of antiquity that are still discoverable in Scotland.

All the antiquities that I have yet heard of in this country may be referred to one or other of the following general classes, (not to mention Roman camps, or other works of later date) of each of which I shall speak a little, according to the order in which they occur.

- I. Mounds of earth thrown up into a fort of hemispherical form, usually distinguished by the name of mote or moat.
- II. Large heaps of stones piled upon one another, called cairns.
- III. Large detached stones fixed in the earth in an erect position.
- IV. Large stones fixed likewise in an erect position in a circular form.
- V. Circular buildings erected of stone without any cementing matter, usually distinguished by the adjunct epithet dun; and
- VI. Walls cemented by a vitrified matter, usually found on the top of high mountains.

The first two categories are of little interest and are omitted here.

III. The long stones set on end in the earth are, with still greater certainty, known to be monuments erected to perpetuate the memory of some signal event in war. These are probably of later date than the cairns; for there is hardly one of them whose traditional history is not preserved by the country people in the neighbourhood: nor is it difficult on many occasions to reconcile these traditional narratives with the records of history. On some of these stones is found a rude kind of sculpture; as on the long stone near Forreth in the shire of Murray, and on that at Aberlemno in the shire of Angus; but in general the stones are entirely rude and unfashioned, just as they have been found in the earth.

It is probable that this kind of monument has been first introduced into Britain by the Danes; as almost all the traditional stories relate to some transaction with

the Danes, or other memorable event since the period when that Northern people infested this country; and I have never heard of any of them in the internal parts of the Highlands, though they are numerous along the coasts every where. It is certain, however, that the Britons adopted this method of perpetuating the memory of remarkable events, as appears by Piercy's cross in Northumberland, which is a modern monument belonging to this class.

IV. The stones placed in a circular form, as being less known than the former, and confined to a narrower district, deserve to be more particularly described.

These, from their situation and form, have been evidently places destined for some particular kind of religious worship. They are for the most part placed upon an eminence, usually on that side of it which declines towards the South, and seem to have been all formed after one plan with little variation. I have examined, perhaps, some hundreds of them in different places, and find, that by restoring the parts that have been demolished they would all coincide very exactly with the plan annexed to this, which was drawn from one that is still very entire in this neighbourhood, at a place called Hill of Fiddess, which I believe you once saw.

This particular temple, 46 feet in diameter, consists of nine long stones marked C in the plan, placed on end in a circular form, at distances nearly equal, though not exactly so. The area E within this circle is smooth, and somewhat lower than the ground around it. By this means, and by a small bank carried quite round between the stones, which is still a little higher than the ground about it, the circular area has been very distinctly defined. Between two stones that are nearest the meridian line, on the South side of the area, is laid on its side, a long stone A, at each end of which are placed two other stones smaller than any of those that form the outer circle. These are a little within the circle, and at a somewhat great distance from one another; and still farther, within the circular line, are placed two other stones. These four stones are marked D D D D in the plan. Behind the large stone the earth is raised something more than a foot higher than the rest of the circular area; the form of which is distinctly marked in the plan at B. It is probable that on this stage the priest officiated at the religious ceremonies, the large stone supplying the place of an altar.

There is not the smallest mark of a tool on any of these stones; but they are sometimes found of surprisingly large dimensions, the horizontal one on the South side especially, which seems to have been always chosen of the largest size that could be found. They are seldom less than six or eight feet in length, usually between ten and twelve; and I met with one that was near sixteen feet in length, and not less than eight feet in diameter in any of its dimensions. It appears to us amazing how in these rude times stones of such a size could have been moved at all; and yet they are so regularly placed in the proper part of the circle, and so much detached from other stones, as leaves not a possibility of doubting that they have been placed there by design.

It does not seem, however, that they have been confined to any particular size or shape of any of the stones in these structures, for they are quite irregular in these respects; only they seem always to have preferred the largest stones they could find to such as were smaller. Neither does there seem to have been any particular number of stones preferred to any other; it seems to have been enough that the circle should be distinctly marked out. In the shire of Nairn, where flat thin stones much abound, I saw some structures of this kind where the stones almost touched one another all round. It appears also by the plan annexed, that exact regularity in the distance between the different stones were not much regarded.

I have never seen or heard of any temples of this kind in Scotland to the South of the Grampian mountains, nor to the North of Inverness. They abound in Aberdeenshire, and along the Grampian mountains themselves.

Stonehenge in Wiltshire, is without doubt a monument referable to this general class, although differing from the above in many particulars.

There are some vestiges of these four kinds of antiquities in South Britain; but it is doubtful if there are any of a similar nature with those of the other two classes that remain to be taken notice of. I shall, therefore, be a little more particular with regard to them.

V. The first of these in order are the circular buildings, consisting of walls composed of stones firmly bedded upon one another without any cement; some of which have been so firmly built as to be able to withstand the ravages of time for many centuries.

I have seen many of these more or less entire, and have heard of others that are still more perfect than any of those that I have seen. By the description I have got of these, the structure, when entire, seems very much to have resembled one of our modern glass-houses; the walls having been gradually contracted to a narrow compass at top, which was left open.

This account of the upper part of these buildings I give merely from hear-say, as the walls of the most entire one that I have seen did not, as I imagine, exceed twenty feet in height, and was at top very little narrower than at the base. This was at a place called Dun Agglesag in Rossshire, about ten miles West from Tain, on the South bank of the firth of Dornoch, which was, in summer 1775, in the following condition.

The walls appeared to be perfectly circular. The internal diameter, (as nearly as I can recollect, having lost my notes of this tour) was about fifty feet. The walls were about twelve feet in thickness, and the entry into it was at one place by a door about four feet wide: the height I could not exactly measure, as the passage as well as the inside of the building was choaked up in some measure with rubbish, so that we could not see the floor. The coins of the door consisted of large stones carefully chosen, so as exactly to fit the place where they were to be put; but neither here, nor in any other part of the building, could I discover the smallest mark of a hammer or any other tool. The aperture for the door was covered at top with a very large stone in the form of an equilateral triangle, each side being about six feet in length, which was exactly placed over the middle of the opening. This stone was about four feet in thickness. We must here be again surprized to think in what manner a stone of these dimensions could be raised to such a height by a rude people, seemingly ignorant of the powers of mechanism, and carefully placed above loose stones, so as to bind and connect them firmly together, instead of bringing down the wall, as would have inevitably happened without much care and skill in the workmen. Nor could I help admiring the judgement displayed in making choice of a stone of this form for the purpose here intended; as this is perhaps at the same time more beautiful to look on, and possesses more strength for the same bulk and weight than any other form that could have been made choice of.

The outside of the wall was quite smooth and compact, without any appearance of windows or other apertures of any kind. The inside too was pretty uniform, only here and there we could perceive square holes in the wall, of no great depth, somewhat like pigeon-holes, at irregular heights.

I have been informed that there is in many of these buildings a circular passage about four feet wide, formed in the centre of the wall that goes quite round the whole, on a level with the floor. I looked for it, but found no such thing in this place. At one place, however, we discovered a door entering from within, and leading to a kind of stair-cafe that was carried up in the centre of the wall, and formed a communication between the top and bottom of the building, ascending upwards round it in a spiral form. The steps of this stair, like all the other stones here employed, discovered no marks of a tool, but seemed to have been chosen with great care of a proper form for this purpose. At a convenient height over head, the stair-case was roofed with long flat stones going quite across the opening, and this roof was carried up in a direction parallel with the stair itself, so as to be in all places of an equal height. It was likewise observable, that the stair was formed into flights

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of steps; at the top of each of which there was a landing-place, with an horizontal floor about six feet in length; at the end of which another flight of steps began. One of these flights of steps was quite compleat, with a landing-place at each end of it, and two others were found in an imperfect state; the lowermost being in part filled up with rubbish, and the highest reached the top of the wall that is now remaining before it ended. Whether these flights were regularly continued to the top, and whether they contained an equal number of steps or not, it was impossible for me to discover; but these remains show that the structure has been erected by a people not altogether uncivilized.

About twenty years ago, a gentleman in that neighbourhood, who is laird of the spot of ground on which this beautiful remnant of ancient grandeur is placed, pulled down eight or ten feet from the top of these walls, for the sake of the stones, to build a habitation for its incurious owner. It may perhaps be a doubt with some whether the builders or the demolishers of these walls most justly deserve the name of a savage and uncivilized people?

By whatever people this has been erected, it must have been a work of great labour, as the collecting the materials alone, where no carriages could pass, must have been extremely difficult to accomplish. It must, therefore, have been in all probability a public national work, allotted for some very important purpose. But what use these buildings were appropriated to it is difficult now to say with certainty.

Most persons whom I have conversed with on this subject seem to think, that they have been intended as places of defence; which conjecture seems to gain some probability from the name; as it is said, by those who understand the Erse language, that dun signifies a place of strength, or a rock. But there are many reasons that satisfy me that this could not have been their original use. For, not to mention any other reason, these buildings are, all of them that I have seen, save that a Dun-robin alone, placed in a valley; and many of them are commanded by adjoi heights, from whence stones might have been thrown through the aperture at to, with ease. Neither is there in any of them that I have seen, the least appearance of a well within the walls; from which circumstance alone we may be satisfied that they must have been appropriated to some other use than that of defence.

It appears to me, that they have been places of religious worship, which is also confirmed by the name these places still bear among the vulgar. For although every place where one of these is found has the syllable dun added to the original name of the place; as Dun-robin, Dun-beath, &c. yet the particular building itself is always called the Druids house, as the Druids house of Dunbeath, &c.

Osstan mentions the horrid circle of Brumo as a place of worship among the ancient Scandinavians, unknown in his own country in those times. Possibly he may here allude to structures of this fort, which may have been introduced into this country along with the religious worship peculiar to the Scandinavians, during the period that the Western isles and Northern provinces of Scotland were under the dominion of Norway. This conjecture gains an additional degree of probability when we observe, that although thousands of ruins of this species of buildings are found in the shire of Caithness, and in the Western and Northern islands, yet now one of them has hitherto been heard of in Scotland to the Southerward of Inverness. That at Dun-agglesag is the Southermost on the East coast, and another at Glenelg, opposite to the Isle of Sky, the Southermost that has hitherto been observed on the West coast. But it is well known that the county of Caithness was so long under the dominion of Norway, that the inhabitants of that country still use a language, the greatest part of whose words are immediately derived from Norwegian roots, and many of the customs of Norway still prevail there as well as in the Northern isles, which were annexed to the crown of Scotland not many centuries ago.

If this conjecture is well founded, similar buildings to these will certainly still be discoverable in Norway or Denmark, and this is no improper subject of enquiry.

You will probably recollect the building called Arthur's Oven, which stood upon

the banks of the Carron near Stirling, and was demolished not long ago. A drawing of it is preserved in Sibbald's "Scotia Illustrata"; from which it appears that in its general form, and several other particulars, it much resembled the buildings of this class; and if it should be admitted as one of them, it would be an exception to the foregoing rule, and tend to invalidate the reasoning I have employed. But although in some particulars it did resemble these buildings, in other respects it was extremely different. Its size is the first observable particular in which it differed from them, as there is hardly one of them which has not been many times larger than it was. These buildings are always composed of rough stones, without any mark of a tool. It consisted entirely of hewn stones squared and shaped by tools, so as exactly to fit the place where they were to be inserted. The walls of Arthur's Oven were thin without any appearance of a stair within them. In short, it bore evident marks of Roman art and Roman architecture, and resembled Virgil's tomb near Naples more than it did the structures we now treat of; on which accounts it has always been, with seeming justice, supposed a small temple, erected by the Romans when they occupied that station, and very different from the ruder but more magnificent temples of these Northern nations.

The temple (for so I will venture to call it) at Dun-agglesag has no additional buildings of any kind adjoining to it, although I had occasion to observe, from many others, that it has been no uncommon thing to have several low buildings of the same kind, joining to the base of the larger one, and communicating with it from within, like cells. The most entire of this kind that I have seen is at Dun-robin, the seat of the Earl of Sutherland. The late Earl was at great pains to clear away the rubbish from this building, and secure it as much as possible from being farther demolished. Unfortunately it is composed of much worse materials than that I have described.

The only particular relating to the situation of this kind of building that occurred to me as observable, was, that they were all situated very near where water could be obtained in abundance. The side of a lake or river is therefore a common position; and where another situation is chosen, it is always observable, that water in considerable quantities from a rivulet, or otherwise, can be obtained near. It seems, however, to have been a matter of indifference, whether that water was salt or fresh, stagnant or running; from whence it would seem probable, that water, in considerable quantities, must have been necessary for performing some of the rites celebrated there.

In Caithness, as I have already hinted, the ruins of this kind of buildings are exceedingly numerous; but many of them are now such a perfect heap of rubbish, that they have much the same appearance with the cairns already mentioned, and might readily be confounded with them by a superficial observer. The names in this case will be of some use to prevent mistakes, as every building of this kind seems to have been distinguished by the syllable dun prefixed to the word; so that whenever this is found to be the case, there is reason to suspect at least that it is not a cairn.

Dr. Johnson, in his late tour to the Hebrides, was carried to see one of these buildings in the Isle of Sky, which he seems to have surveyed rather in a hasty manner. He conjectures, that these structures have been erected by the inhabitants as places of security for their cattle, in case of a sudden inroad from their neighbours. A thousand circumstances, had he bestowed much attention upon the subject, might have pointed out to him the improbability of this conjecture. We shall soon see that the inhabitants knew much better in what manner to secure themselves or cattle from danger than they would have been here.

I have annexed a plan and elevation of the building of Dun-agglesag, by the help of which you will be able to form an idea of other buildings of this kind. A represents the entry. B the entry to the stair-case. C, the stair-case seen from above. D, holes like pigeon-holes in the wall. This and the foregoing sketches

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are drawn from memory, and the elevation is too high in proportion to its other dimensions.

VI. The most remarkable of all the Scottish antiquities are the vitrified walls which I come now to mention.

It is not yet three years since I got the first hint of this species of building, from a gentleman who had examined them with attention; and who was, I believe, the first person who took notice of them in Scotland. This was Mr. John Williams, who was for several years employed by the honourable board of trustees for managing the forfeited estates in Scotland, as a mineral surveyor on these estates. Since that time I have seen and examined them myself, and have made the following observations upon them.

These walls consist of stones piled rudely upon one another, and firmly cemented together by a matter that has been vitrified by means of fire, which forms a kind of artificial rock, (if you will admit this phrase,) that resists the vicissitudes of the weather perhaps better than any other artificial cement that has ever yet been discovered.

All the walls of this kind that I have yet seen or heard of, have been evidently erected as places of defence. They, for the most part, surround a small area on the top of some steep conical hill of very difficult access. It often happens that there is easier access to the top of one of these hills at one place than at any other; and there they have always had the entry into the fort, which has always been defended by outworks more or less strong according to the degree of declivity at that place. If the form of the hill admitted of access only at one place, there are outworks only at one place; but if there are more places of easy access, the outworks are opposed to each of them, and they are proportioned in extent to the nature of the ground.

The first fortification of this kind that I saw was upon the top of a steep hill called Knock-serrel, two miles west from Dingwal in Rossshire. And as an idea of all the others, may be formed from this one, I shall here subjoin a particular description of it.

The hill is of a longish form, rising into a ridge at top, long in proportion to its breadth. It is of great height and extremely steep on both sides; so that when it is viewed at a distance from either end, it appears of a conical shape, very perfect and beautiful to look at; but, when viewed from one side, one of the ends is seen to be much steeper than the other.

The narrow declivity of the hill is of easy access, and forms a natural road by which you may ascend to the top on horseback; and at this end has been the entry into the fort A. This fort consists, as I guessed by my eye, of a long elliptical area of near an acre, which is entirely level, excepting towards each end, where it falls a little lower than in the middle. The fortification of vitrified wall, C C C C, is continued quite round this area; being adapted to the form of the hill, so as to stand on the brink of a precipice all round, unless it be at the place where you enter, and at the opposite end, B; both which places have been defended by outworks. Those at the entry had extended, as I guessed, about a hundred yards, and seem to have consisted of cross walls one behind another, eight or ten in number; the ruins of which are still plainly perceptible. Through each of these walls there must have been a gate, so that the besiegers would be under the necessity of forcing each of these gates successively before they could carry the fort; on the opposite end of the hill, as the ground is considerably steeper, the outworks seem not to have extended above twenty yards, and consist only of two or three cross walls. Not far from the further end was a well marked D, now filled up, but still discoverable.

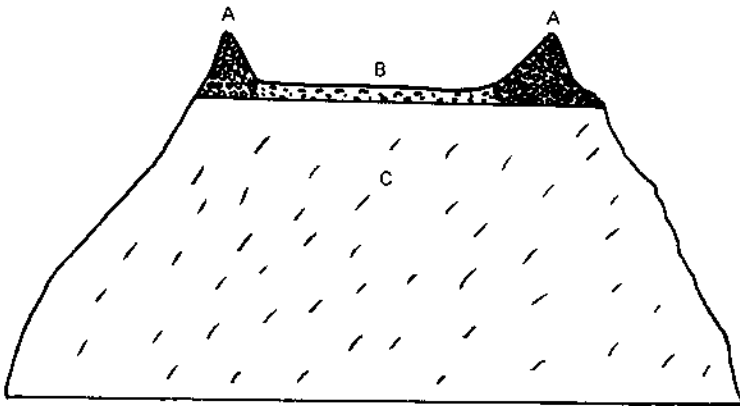
To assist you in forming an idea of this structure, I subjoin a plan of the hill with its fortification, as if it were compleat. This is drawn entirely from memory, and is not pretended to be exact in proportions; but it has the general form, and is

sufficiently exact for our purpose here.

The wall all round from the inside, appears to be only a mound of rubbish, consisting of loose stones now buried among some earth, and grass that has been gradually accumulated by the dunging of sheep, which resort to it as a place of shelter. The vitrified wall is only to be seen on the outside.

Nor are these walls readily distinguishable at a distance, because they are not raised in a perpendicular direction, but have been carried sloping inwards at top, nearly with the same degree in inclination as the sides of the hill; so that they seem, when viewed at a small distance, to be only a part of the hill itself.

It appears at first sight surprizing that a rude people should have been capable of discovering a cement of such a singular kind as this is. It is less surprizing that the knowledge of it should not have been carried into other countries, as distant nations in those periods had but little friendly intercourse with one another. But it is no difficult matter for one who is acquainted with the nature of the country where these structures abound to give a very probable account of the manner in which this art has been originally discovered, and of the causes that have occasioned the knowledge of it to be lost, even in the countries where it was once universally practised.



A Scottish "vitrified" fort. The outer ring of stones in this section are fused together as if by heat. (MSF-001)

Through all the Northern parts of Scotland, a particular kind of earthy iron ore of a very vitrescible nature much abounds. This ore might have been accidentally mixed with some stones at a place where a great fire was kindled; and being fused by the heat would cement the stones into one solid mass, and give the first hint of the uses to which it might be applied. A few experiments would satisfy them of the possibility of executing at large what had been accidentally discovered in miniature.

This knowledge being thus attained, nothing seems to be more simple and natural than its application to the formation of the walls of their fortified places.

Having made choice of a proper place for their fort, they would rear a wall around the area, building the outside of it as firm as they could of dry stones piled one above another, the interstices between them being filled full of this vitrescible iron ore; and the whole supported by a backing of loose stones piled carelessly behind it.

When the wall was thus far completed, with its facing all round reared to the height they wished for, nothing more was necessary to give it the entire finishing but to kindle a fire all round it sufficiently intense to melt the vitrescible ore, and thus to cement the whole into one coherent mass, as far as the influence of that heat extended. As the country then abounded with wood, this purpose would be readily effected by building a stack of wood round the whole outside of the wall, and then setting it on fire. It was probably with a view to enable them to build this stack of wood with the greater ease, and to suffer the fire to act more forcibly and equally upon the different parts of the wall as it gradually consumed, that they were induced to incline the walls so far from a perpendicular position. In an after period, when the woods had gradually been destroyed, and before it was well known how to manufacture peat for fuel, it would be such a difficult matter to procure fuel in abundance, that buildings of this kind would come to be disused, and the art in a short period, among a people ignorant of letters, be entirely forgotten.

You will perhaps imagine that the above account of the manner in which these walls have been formed, is only an ingenious conjecture, entirely destitute of proof. But that they have indeed been formed in this manner, can, I think, be demonstrated in as clear a manner as the nature of the subject will admit.

The ingenious Mr. Williams, already mentioned, by the permission of the board of trustees, caused a section to be made across the top of the Hill of Knockferrel, which was carried quite through the walls on each side, in the line marked F F, plate XXIII. Fig. 1 so that any person has now an opportunity of observing the nature of these walls, and may judge of the manner in which they have been constructed.

It appears by this section, here engraved in plate XXIII. fig. 2. that the wall all round is covered on the outside with a crust of about two feet in thickness, consisting of stones immersed among vitrified matter: some of the stones being half fused themselves where the heat has been greatest, and all of them having evidently suffered a considerable heat. This crust is of an equal thickness of about two feet from top to bottom, so as to lie back upon and be supported by the loose stones behind it.

Within that crust of vitrified matter is another stratum of some thickness running from top to bottom, exactly parallel to the former, which consists of loose stones that have been scorched by the fire, but discover no marks of fusion. The stones that are nearest the vitrified part of the wall being most scorched, and those behind becoming gradually less and less so, till at length they seem not to have been affected by the heat in the smallest degree. I have endeavoured to represent this in the drawing by the gradual decrease in the shading.

It deserves to be remarked, that these different crusts or strata, as I have named them, for want of a more appropriated term, do not consist of separate walls disjoined from one another, but are parts of one aggregate mass; as it frequently happens that one stone has one end of it immersed among the vitrified matter in the wall, and the other end of it only scorched by heat; and in the same manner it often happens, that one end of a stone is scorched by heat while the other end appears never to have suffered in the smallest degree from the action of the fire. This affords the clearest proof that the heat has been applied to them after they have been placed in the wall.

In carrying the section across the level area in the middle of the fortification,

there was found a stratum of black vegetable mold B, lying above the solid rock C C C. This mold has probably been formed in the course of ages by the dunging of sheep which resort often to this place for shelter.

Nothing seems to be more judicious or simple than this mode of fortification adopted by our forefathers. The stones for forming the walls were probably dug from the top of the rock that formed the ridge of the hill, and therefore served at once to level the area of the fort, and to erect the massy walls without any expence of carriage. The walls too, although rude in form, and inelegant in appearance, were extremely well adapted for the only mode of defence that their situation rendered necessary. For as they were always placed upon the brink of a precipice, no weapon could have been so destructive to an assailant as a stone rolled down the hill: but as the inside of the wall consisted in every part of it of an immense heap of loose stones, the defendants could never be at a loss for weapons wherever the attack was made.

I have been told, that on some of the hills which have been fortified in this manner, there is another circumvallation drawn round the hill nearer the base, which has been defended by a wall of dry stones only. But as I never saw any of these myself I cannot describe them particularly. It is probable these were intended as places of security for cattle, in case of any sudden inroad from an enemy of no great force. If so they will naturally be placed on the extremity of some swelling part of the hill so as to include an area of as little declivity as possible immediately behind them.

Many hills are fortified in this manner through all the northern parts of Scotland. I have heard of none of this kind that have as yet been discovered farther South than the shire of Angus; but it is possible that others of the same kind may be yet discovered that have not hitherto been taken notice of. I think Governor Pownall mentions some in memoir lately given in by him to the Antiquary Society. I have not the memoir here and therefore cannot consult it; but a little attention will soon discover if it is of the same kind with that which is here described.

I am much disposed to believe that this has been entirely a British invention, and think it probable that the art was never carried out of this country. That it was not known by the Danes at least seems extremely probable, from a curious fact that I shall now take notice of; and if it was not known by the Danes, it seems probable, that it would not be known by the other Northern nations on the continent. The fact I allude to is as follows:

It is well known that the Danes made frequent inroads into Scotland, for several centuries, with various degrees of success. During that period they seized upon a peninsulated rock in the Murray Firth, about four miles from Elgin, which is now called Brough head. As this was a place naturally strong, and formed besides a kind of harbour, by means of which supplies could be brought to it by sea, they thought it a very convenient station to be occupied as a place of arms, and accordingly fortified it for that purpose. Three large and deep parallel ditches were drawn across the neck of the Isthmus that joined it to the land; and within the innermost of these a large wall has been erected, which has been continued quite round the peninsula, as the ruins of it at this day clearly show.

The circumstance that made me here take notice of this Danish fortification is, that all the stones on the outside of the wall appear to have been scorched in the fire, insomuch that they appear almost as red as bricks on that side, although the stone is naturally of a very white kind, and some of them are almost burnt to a powder. Between these stones, on digging among the ruins of the wall is found a good deal of reddish dust, exactly resembling dry clay that has been burnt to ashes. But in no part of this fortification is there the smallest appearance of vitrified matter, and the stones in the inside are every where of their natural colour.

From these circumstances it appears to me extremely probable, that the Danes, from having seen in their incursions some of the vitrified fortifications, have ad-

mired the invention and wished to imitate them. We may suppose they might have been able to learn in general that they consisted of walls of stone intermixed with dry clay in powder, which was afterwards converted into a vitrified mass by surrounding the whole with a stack of wood or other combustibles, and then setting it on fire. But having been ignorant of the necessity of employing only that particular substance already described, which, from its general appearance, might be on some occasions mistaken for a kind of clay, they have probably taken some ordinary clay and employed that in its stead. But as ordinary clay is hardly at all vitrescible, they have not been able to succeed in their attempt, but instead of that, the stones, by the great heat applied to them, have been scorched in the manner they now appear, and the clay between them has been burnt to ashes. This so perfectly accounts for the peculiarity observable in the ruined walls of this fortification, and it is so difficult to assign any other reason for the singular appearance of them, that I could not avoid throwing out this probable conjecture to direct towards other researches.

Although it is only of late that the real nature of these vitrified walls has been known, it is long since the vitrified matter has been observed; but it was always supposed that these were the natural production of volcanos; from whence it was inferred that volcanos had been very common in Scotland at some very distant period. But if no better proof can be adduced in support of this last hypothesis it will hardly be admitted.

From the foregoing account it appears, that these works are purely artificial. At the same time it must be owned, that the natural appearance of the places where these vitrified masses are usually found, is well calculated to favour the opinion that they have been produced by volcanos.

The vitrified matter is usually first discovered by travellers around the bottom and on the sides of steep hills, frequently of a conical shape, terminating in a narrow apex, exactly resembling the hills that have been formed by the eruptions of a volcano. It is therefore very natural to think that these may have been produced in the same way.

Let us suppose that a traveller, strongly impressed with this idea, should resolve to examine the top of the mountain more nearly, and for this purpose ascends to the summit; would not his former conjecture be much confirmed when at the top he should find himself in a circular hollow, surrounded on all sides by matter rising gradually higher to the very edge of the precipice, which is there entirely environed with vitrified matter of the same kind with that he had found at the bottom? Could such a man be called unreasonably credulous if he should be induced by so many concurring circumstances to believe that this had been a real volcano? But would he not be reckoned sceptical in extreme if he should entertain the smallest doubt of the truth of this opinion if he should likewise see the very opening itself in the centre of the hollow, through which the boiling lava had been spewed out? Yet strong as all these appearances are, we know that they may, and actually do all concur on many occasions to favour the deceit. The formation of the hollow bason has been already explained; and the well, with which every one of these forts has been provided, and which is still discoverable in all of them, though for the most part now filled up with stones to prevent accident, might very readily be mistaken for the mouth of the volcano.

In these circumstances a casual visitor might be excused if he should believe in such strong appearances without enquiring minutely into the matter. But a philosophical enquirer who resolved coolly to investigate the matter, would soon find reason to doubt that he might be mistaken. The vitrified masses themselves are of a nature extremely different from real lava; so different indeed, that nothing but the difficulty of accounting for the way in which they could be otherwise produced would ever have occasioned them to be confounded with one another. In real lava, the heat has been so intense as to fuse almost all matters, and reduce them into

one heterogeneous mass; but in the matter, of which we now treat, the heat has been so slight as to vitrify scarce any of the stones, but barely to fuse the vitrescible matter that was interposed between them; which alone points out a very essential difference between the nature of the two. But if he should proceed farther in this investigation, he would also discover, on digging into the hill in any part, that no lava, or any other matters that show marks of having been in the fire, are to be found; but that they consist of rock or other strata of mineral matter similar to what is found in other parts of the country. Neither has there ever been found in Scotland any appearance of pumice stones, nor large beds of ashes like those which are always found in the neighbourhood of volcanos. There is not (for the most part) even any appearance of basaltes in the neighbourhood of these fortified hills; a substance which is now thought to be invariably generated by volcanos alone, although it does not seem that the proofs upon which this opinion is founded are so conclusive as to leave no room to doubt of the fact. Unfortunately too for Scotland, the parallel fails in another respect; for, instead of the extraordinary fertility of soil that for the most part is found near volcanos, we here find that sterility which is invariably produced by the vitrescible iron ore above alluded to wherever it abounds.

If this account of the artificial curiosities, found in the Highlands of Scotland, should afford you any entertainment, I may, perhaps, on some future occasion, make a few observations on the natural curiosities of these unknown regions, which are more numerous and more generally interesting to philosophic enquirers than the former. I know no way in which a philosopher, who wants to view nature undisguised, and to trace her gradual progress for successive ages, could do it with half so much satisfaction as in the Highlands of Scotland. Half a day's ride there would do more to give such an enquirer a proper idea of the changes produced on this globe, and the means by which they are effected than twenty years study in the closet could produce; as any one who shall attentively view these, after reading the writings of Buffon, will readily allow.

Some recent writers have suggested that the stones and the material between them might have been fused by some laser-like weapon! If this were the case, the walls would likely be fused on one side only. Vitrified structures and areas of ground have been reported from other continents, as subsequent volumes will demonstrate.

Note that the towers of Section V above might well be compared to the strange towers in Ireland, South America, the American Southwest, and elsewhere. In most cases these towers do not seem defensive in character. In fact, their true uses are unknown.

MSF-002 A FURTHER DESCRIPTION OF ANCIENT FORTIFICATIONS IN THE NORTH OF SCOTLAND

erson, James; Archaeologia, 6:87-99, 1780.

As the account I sent you some time ago of some remain of antiquities in the North of Scotland gave you satisfaction, I now send you a few additional remarks on the same subject, particularly with regard to the vitrified walls, the existence of which I have been told is still doubted by some sceptical philosophers in the metropolis. [The original spelling has been retained except for the obsolete "f."]

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I have now examined several other hills fortified after the same manner as that at Knockferrel, but I find they differ from each other in some particulars. At Knockferrel the vitrified crust surrounded the wall only on the outside whereas at Tap-o-noath in Aberdeenshire where a large fortification of this kind has been the vitrified crust is only discoverable on the innerside of the wall without any marks of vitrification on the outside, except at one place, where the whole of the conical wall is incrustated on both sides. I apprehend indeed that the whole of the wall on this hill has been originally incrustated on both sides, but as it is very steep and has probably been built very near the edge of the precipice, the foundation has gradually given way so as to allow the vitrified crust on the outside to slip down the hill, at the foot of which large masses of it are still to be found in abundance, and being thus demolished nothing now remains on that part of the wall but the loose stones that formed originally the heart of the wall tumbled also in part down the hill, whereas the vestiges of the inner crust whose foundations remain firm are still distinctly perceptible. The hill on that part where the wall remains entire is less steep than the other part of it; the green sod remaining entire to the very foot of the wall, which seems to confirm this conjecture.

On the top of the hill called Dun-o-deer in Aberdeenshire, there are also vestiges of a fortification of the same kind, but as I here observed some particulars that I did not discover in any of the other hills of the same cliffs that I examined, I took a drawing of the ground plan of it, with two perspective views which I inclose for your inspection.

This is a beautiful green hill situated in the middle of the extensive vale called the Garioets. This hill was celebrated by Boethius, as containing inexhaustible mines of gold in its bowels, from which there issued such a subtle effluvium, or exudation, or what you please to call it, as tinged the teeth of the sheep which pastured upon it in his days with a beautiful golden hue. But he lived in that age where alchemy flourished, so that it was no difficult matter for them to convert iron into gold.

On the top of this hill, besides the vitrified wall already alluded to, there are also the remains of another antient structure of stone and lime, which is by the vulgar supposed to have been the palace of one of the kings of Scotland. It discovers no remains of princely magnificence, and has been evidently a strong hold erected at that period when every princely baron was obliged to have such habitations for securing himself and his vassals from the sudden attacks of his barbarous neighbours. This castle has been originally a square, sixty feet on each side, the walls about twelve feet in thickness, with small windows, in the common style of building in those days. It is now in rubbish except a small part of the west wall which was lately repaired, so as to keep it from falling, at the expence of the neighbouring gentlemen who wished to preserve it on account of its picturesque appearance which is seen from afar. The site of this building is marked on the plan at H.; the part that is standing is shaded black.

There is no tradition of the time when either this structure or the vitrified walls were erected; but it is sufficiently apparent that the latter must have been of a date much prior to the former, and built by a nation in a very different state of civil polity; for at that latter period the lord of the domain having found, we may suppose, the old vitrified fortification inadequate to the purpose of defence, or inapplicable to the state of his private affairs, has purposely demolished them, and with their ruins erected his own habitation. This is evident from the fragment of the vitrified walls and scorched stones, which are everywhere discoverable in the ruins of the stone and lime building.

This circumstance deserves in my opinion to be particularly attended to, as it serves to throw some light upon the antient state of our civil polity, and its revolutions, where more distinct records are wanting. In the infancy of society, perhaps, in all nations no man assumed any other authority over others than what

was voluntarily yielded on account of his age, experience, or superior abilities, whether mental or corporeal. But man could hardly be placed in society before he would discover that without the assistance of his fellows he was a weak defenceless animal; so that, although each might live independent of another while at peace, when any danger threatened they would find the necessity of uniting together for mutual defence, and of submitting for the time to be directed by the wisdom of some man in whom they in general placed confidence. In this state of society it would exceed the power of any individual to render his own place of residence sufficiently strong to resist the attacks of any invading power, and therefore it would become the interest of the whole community to fortify, in the best fashion they could, some places of strength to which the whole community could retire for safety in times of danger. So long as they continued to migrate from one region to another in hordes this place of strength would be only a temporary fortification of the nature of a camp; and this seems to have been the stage to which the Germans had arrived in the time of Tacitus. But in a more barren country, where grain could only be raised with ease on those spots which had been already cultivated, and in a state of society somewhat more advanced in civilization, when some idea of private property began to take place, the man who at a great deal of trouble had cleared a small spot for himself, and erected an habitation that could stand for more than one season, would look out for a place of strength not far from himself, to which he could retire occasionally in case of danger, which he would fortify in a durable and substantial manner. In this stage of society have in all probability these vitrified fortifications been reared, which served not as a place of continued residence to any one, but merely as a place of temporary retreat when any national danger threatened which individuals were not able to repel.

But when, at an after-period, honours and fiefs became hereditary, when particular families waxed great in power, and each chieftain at the head of his clan became a sort of petty sovereign in his own district, and assumed to himself the charge of protecting his vassals, and avenging their quarrels, he found it necessary to have a fixed habitation proportioned to his own dignity, in which he could reside at all times himself in safety and to which some of his vassals might occasionally repair for shelter. The open fortifications, which could only be defended by a great number of men, perpetually upon their guard, were in that state of perpetual alarm by no means adapted to his wants, and therefore he had recourse to smaller fortifications of another kind, which by the strength of their walls and gates were not liable to be suddenly surprized, even when defended by a few only. This gave rise to those numerous strong holds, of the nature of the stone and lime tower now in question, which superseded the use of the old vitrified open forts, which were either neglected and suffered to fall to ruin of themselves or were pulled to pieces like that of Dun-o-deer, to afford materials for a dwelling better suited to the wants of the owner.

From this cause the ruins of the vitrified walls on the top of this hill assume a very different appearance from the others already mentioned: where the vitrified matter has been so ill compacted, as to admit of being broken into small pieces, they have been carried away, and the walls razed to the very foundation; but, where these vitrified masses were too firmly united to admit of being easily broken into small pieces, they have been suffered to remain in their place, where they still exhibit to the eye of the curious traveller venerable remains of ancient art now mistaken by the careless for the operations of nature, some of which assume a beautiful and picturesque appearance, as may be perceived by the faint representation of them annex, which has been perforated by a hole like a natural rock. These ruins are indeed the firmest masses of the kind that I have met with. Here, however, as was to be expected, we in vain look for the large backing of loose stones to be found in all the other buildings of this kind that I have seen: they have been carried away to the stone and lime tower, and nothing remains but masses of

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the vitrified rock, if I may venture that expression, stripped entirely naked, rising up in irregular masses round the hill: yet even here some stones are found with one end immersed firmly in the vitrified matter, while the other end projects considerably beyond it, and is only browned by the heat. This circumstance sufficiently marks that these walls must have been built after the same general plan with the others of this class.

The entry to both these castles has been from the west near the stone and lime tower, where the hill is of more equal ascent than at any other place, although the descent towards the east is, near the summit, much more gentle than towards the west, which has occasioned some additional works there, the traces of which are still sufficiently distinct, and are delineated on the plan for your inspection (see pl. IX.), where AAAA is the vitrified wall surrounding the whole hill. BB is the remains of another wall that has been drawn right across the hill, at that part where the descent to the eastward begins to be perceptible. No marks of vitrification are discoverable in this wall. CCC is the remains of a ditch, with a rampart stretching out beyond the vitrified wall still farther to the eastward. Beyond that, and considerably down the declivity of the hill, is the remains of another ditch of circumvallation DDDD seen in the perspective views of the hill at DD pl. X. fig. 2. and FFF in the same place fig. 1. Below this, in some parts of the hill, there are some indistinct marks of another ditch; but this is now in a great measure obliterated, except in that part of the hill marked G, Fig. 3.

Besides these lines of circumvallation, which have been evidently intended for defence, there are several excavations in the hill plainly artificial, the intention of which is not quite so obvious; although I think it probable that they also were meant for defence. Two of these are found between the circular rampart to the east, and the vitrified wall at EE, pl. IX. These hollows may be about five or six feet deep, with an easy and smooth descent to the bottom from all sides. The hill is at this place only of a gentle declivity, which would render the works more difficult to be defended than where it was more steep; which gives room to conjecture, that these cavities might either be intended to screen the defendants on ordinary occasions from the missile weapons of the enemy, by way of guard house, or to conceal a body of men by way of ambuscade. Upon examining the face of the hill along the east side where the great ditch of circumvallation runs along a more level surface than at any other part of the hill, and where it is of course much more liable to be forced, four more excavations of the same kind were discovered, which are marked FFFF, fig. 1. nor could I perceive any more of the same kind in any other part of the hill, save two on the west side near the entry marked GG, fig. 1. I leave you, Sir, and others to conjecture what may have been the intention of these hollows. For although I do not forget that fame has placed gold in the bowels of this mountain, which might have induced some persons to dig in search of these imaginary treasures, yet there seems to be little reason to suppose that these cavities have been formed by that means, as they are greatly too wide for their depth, and as the rubbish that has been taken out of them has been carried clear away, which it is natural to think would have been tumbled carelessly down the hill from the mouth of the hole, had they been opened only in search of treasure.

It has been said that these vitrified walls are no where to be found but where the rock on which they stand is of the plumb-pudding kind; but this I can assure you is a mistake. The hill of Tap-o-noath consists chiefly of small fragments of rotten granite, that of Dun-o-deer is a mass of slaty iron gravel.

You will probably recollect that in my last I hazarded a conjecture, that the circular towers called Duns were of Norwegian extract. Since that time I have made enquiry if they were common in the Orcaes, which must be the case if my conjecture be right. By a letter from Arthur Nicolson, Esq. jun. of Lerwick, I learn that buildings of that kind are extremely numerous through all these islands.

Some of these he says are surrounded with a kind of moat or ditch, from which circumstance, and in compliance with the prevailing opinion, he conjectures that they have been places of strength, or alarmposts for warning the country of danger. My reasons for rejecting both these opinions, with regard to those at least in the north of Scotland, are given in my former letter, to which I here refer. But that you may the better judge of the nature of these structures, I shall transcribe a part of Mr. Nicolson's letter giving a description of the most entire structure of that kind which is found in that country.

The letter and remainder of the article deal with these towers, one of which was described in MSF-001. Since these constructions seem to be of relatively recent origin, the quotation ends here.

MSF-003 OBSERVATIONS ON THE VITRIFIED WALLS IN SCOTLAND

Barrington, Daines; Archaeologia, 6:100-103, 1780.

Dear Sir,

I send herewith a drawing of what is supposed to have been a vitrified fort on the S. W. end of the island of Bute, and which still goes by the name of Dunagoyle. I am obliged for this elegant and accurate plan to Sir David Dalrymple, one of the lords of Session, who was so good as to transmit at the same time one of the vitrified stones, of which parts of the wall were composed.

These supposed forts, thus built, have lately much engaged the attention of the Scotch Antiquaries, particularly Mr. John Williams (a mineral engineer), who published a pamphlet on the subject in 1777; as also Mr. Freebairn, whose sentiments on the same head are to be found in the minutes of the Society, June 17, 1779. To these I may add a dissertation of Mr. Anderson's in the Vth vol. of our Archaeologia, p. 255. and a second by the same gentleman immediately preceding the present paper.

All these ingenious antiquaries agree in supposing, that these walls were only vitrified, because the natives of N. Britain, at that time, did not understand how to make what we at present call cement; that, in most of the few which remain, the vitrification only takes place on one side; that they are situated upon insulated hills of a very considerable height: and that they were used as places of defence.

With regard to the first of these particulars, I should conceive, that if one side of the wall only was heated, and to any height, the matter in fusion would all drop down to the bottom, and therefore could not operate as a cement to fill the interstices of the loose stones.

In relation to the second circumstance, I have myself been twice in the Highlands of Scotland, and have seen very few hills of any height which were clothed with wood; the trouble therefore of carrying it up to the top of such a mountain would be considerable; nor do I very well understand how the walls being vitrified on one side only, added much to the strength of the post against an enemy.

Mr. Williams, indeed, after having observed the third particular of their being intended as fortresses, was sensible that water was requisite, if the place was to be held for any time; he therefore informs us, that there are dried wells within these forts. In answer to which I would observe, that shelter from the weather is also necessary (during a siege) upon the top of a bleak Scotch hill, whilst whisky (or a succedaneum for it) would be often in greater request than the bare element of water.

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As I therefore cannot entirely subscribe to the opinions of the before mentioned antiquaries, though supported with much ingenuity, I shall without difficulty state my own hypothesis, be it never so erroneous; for, in many matters of antiquity who guesses best does best; nor is demonstration often to be produced on any subject.

As I have travelled the most mountainous circuit of Wales for more than twenty-one years, I have frequently seen stone-walls like those in the present drawing, and upon inclosures of a much smaller compass. There is a long tract of such in the western part of Merionethshire, very near to the sea.

When I first observed these small inclosures made with thick walls of loose stones, I could not comprehend how it could be worth while to make so formidable a fence to such a small compass of ground. Upon examining however the adjacent country, I found it almost entirely covered with such loose stones, and that therefore the smaller the piece of ground to be cleared the less expensive the removal. For the same reason, such dry walls are often of a great thickness, and sometimes the corners of the inclosure are filled with stones to a great width, this being the only possible means of procuring pasture.

Thus likewise, and for the same reasons, this practice is very common in the Highlands of Scotland; and Lord Bredalbane (at his most capital place of Taymouth) hath for many years employed a labourer solely in blasting [b] large pieces of stone dispersed over some of his fields, which then became manageable, and may be used in the stone enclosures of the same piece of ground.

But it will be urged, that the stones of the fences in question are vitrified; which observation, indeed, is unanswerable, if the expense of vitrification was incurred merely to make these supposed fortresses more strong. But may not this vitrification have been occasioned, either by volcanoes, or what are called bloomeries? The same effect may be produced likewise on dry walls of stone, lightning passing along them. The loose stones in either case would not be rejected, because they were glassy, and would be piled up in the fences of the inclosure; as the great point upon these occasions is to clear the ground, and remove the incumbering stones to the smallest distance.

One of the advocates for the designed and not fortuitous vitrification, says, that the pieces he had procured did not resemble what is called lava; but every volcano is not necessarily an Etna, or a Vesuvius; and, consequently, the matter disgorged from the crater, must perpetually vary, both in substance and form. Vitrified masses larger or smaller, will likewise be produced by the same means.

It may be contended indeed, that pasture thus procured, by clearing the ground, would be more convenient at the bottom or sides, than on the top of the hill. But to this I answer, that in rocky countries you must get what pittance you can of soil, and often it will happen, that the only detached and removable stones are on the summit.

When such inclosures have been made, they become very convenient for putting cattle into; and hence perhaps some of the wells which Mr. Williams hath mentioned.

I shall conclude these observations, by suggesting, that if vitrification answered the purpose of cement, it is very extraordinary, that the ancient inhabitants of Scotland did not apply it to the houses or huts in which they constantly lived, but reserved this expensive and troublesome process merely for a fortification, which might not perhaps be used in a century against an enemy.

MSF-004 OBSERVATIONS ON VITRIFIED FORTIFICATIONS IN GALLOWAY

Addell, Robert; Archaeologia, 10:147-150, 1790.

Little light is shed on the vitrified forts below, but there is another mention of a "rocking stone."

The ingenious Mr. Williams mineral engineer having discovered in the Highlands of Scotland some singular remains which he called vitrified forts, and having described in a Series of Letters those at the hill of Knocksarrel, at the hill of Craig Phadrick, at the hill of Dun-Evan, at Castle Finlay and at the Castle hill of Fin-avon, this publication very much engaged the attention of the curious in research. Along with it, was published a Description of Craig-Phadrick, by Mr. Wate, Engineer at Birmingham, and a Letter from Dr. Black, Professor of Chymistry, to Mr. Williams.

Many sensible enquirers were much puzzled, whether to consider these appearances as the work of man alone, or as volcanic remains, which a rude ferocious people had taken the advantage of to form a strong and permanent place of refuge from an equally barbarious foe. While many judicious antiquaries remained sceptical upon this curious subject, the learned Alexander Frazer Tytler, Esq. published in the second volume of the Edinburgh Philosophical Transactions, a most satisfactory and elaborate paper on some extraordinary structures upon the tops of hills in the Highlands, with remarks on the progress of the arts amongst the antient inhabitants of that country. And in this account, he accurately described Craig-Phadrick, which he seems to have surveyed in a very minute manner.

Having now no doubt of the existence of these curious remains, and that the probability was greatly in favor of their being the work of man, without the aid of volcanic craters, I began to make many enquiries, whether any such remains existed in Galloway: and I very soon obtained information of two; The Moat of the Mark in the Barony of Barclely, in the parish or Colvend; and Castle Gower in the adjacent parish of Baittle.

At my request two different gentlemen went and examined them, from whose reports I found them to be very similar to those described in the Highlands. I then requested a neighbouring clergyman to go to the one on Colvend and transmit me the best account of it he possibly could. In consequence of which he went, and sent me the following account, along with several specimens of the vitrified matter.

"With this you will receive some specimens of the vitrified fort. It is impossible, at present, for me to give you any particular account of it. It is full of rubbish, and surrounded with standing corn. It would take a man one day at least to clear it, and this cannot be done till after harvest. It resembles in form a child's cradle, and would be worth the trouble of clearing out when the crop is taken off the ground."

A gentleman in the neighbourhood has also sent me some specimens of the coloured vitrified sort, and informed me that the area was of an oblong form, and that in it was discovered a pile or heap of stones of the form and size of a goose egg each (one of which was sent me) and I apprehend they had been gathered upon the shore, which is contiguous, and piled up here for the purpose of slinging or throwing with a balista, at an approaching enemy. I very much wished that Capt. Grose should have seen these forts when he was in Scotland last summer; but the difficulty of approaching them in a wheel-carriage prevented it. I could wish much that a ground plan, section and perspective view were taken of each. Galloway would amply repay a judicious antiquary who was a draftsman, for the trouble of investigating the antiquities of this, almost as yet undescribed country. Capt. Grose, in his very elegant work now carrying on, has given views of many of its monastic ruins, as well as some of its baronial seats, and he has caused to be

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engraved that very singular curiosity in the Glen kenns, called the Laggan stone; which certainly was a druidical rock idol. This huge rock is situated in the wild spot almost to be seen; many miles from an house, and the road almost inaccessible. It rests on two points, and the light shines through it, and though a child may make it move, it would require gunpowder to raise it from its seat. I have heard of many more Druidical remains in Galloway, which only want a Borlase to explore them. Mr. Gordon, the steward depute of Galloway, wrote me concerning a fine cromlech, something like that in Kent mentioned by Dr. Borlase. The fine rides and picturesque scenery to be met with, along the margin of Loch Kenn (a fresh water lake, 18 Scots miles in length) would much gratify any person of taste visiting the Lakes in Cumberland and Westmoreland, and would afford full compensation for the additional trouble of continuing their journey so far.

MSF-005 MAORI FORTIFICATION

Anonymous; Nature, 126:451, September 20, 1930.

The Records of the Auckland Institute and Museum, vol. 1, No. 1, contains an account of the examination of the Piraunui Pa at Matawhana, Waikato, N. Z., by Messrs. J. W. Delph and Gilbert Archey, director of the Institute. The elaborate terraces of the Maori fortification are situated on natural strongholds formed by series of rock-capped headlands of the high rhyolite plateau of Central Waikato. The general layout of the fortifications is as follows: (1) A flat portion of the marae high up on a broad spur, below which is (2) a series of terraces on either side of the steeper ridge formed by the narrowing spur, leading down to (3) a still narrower and much steeper sided ridge cut across by a deep fosse and so forming a strongly protected approach to (4) the stronghold and citadel, a rhyolite-capped, vertical-walled spur rising with precipitous cliffs above the Waikato valley. The pa is very rich in storage pits of both the subterranean and semi-subterranean type. The former are built on flat ground wherever available, the latter at the base of some of the terrace walls. The subterranean pits are 6-9 ft. in diameter and about 5 ft. to the dome. In one which was cleared it was found that the floor was divided into bins, which would indicate its use for the storage of roots. In one, the original door-frames were still in place, tightly fitting to keep out the loose soil. Resting on the upper edge of one was a slab, the wood being well cut and originally about 2 in. in thickness. These pits penetrated into the hard rhyolite, and it was possible to see the method of working. Blocks of stone were worked behind or undercut so as to enable large slabs of rock to be broken off. The finish showed a skill which would not disgrace the efficient tools of a modern mason.

Like most ancient races, the Maori knew how to work hard rock. Their forts, too, are like those found around the world.

HENGES, ORGANIZED STRUCTURES MSH-001

MSH-001 AN ATTEMPT TO ASCERTAIN THE DATE OF THE ORIGINAL CONSTRUCTION OF STONEHENGE FROM ITS ORIENTATION

Lockyer, Norman, and Penrose, F. C.; *Nature*, 65:55-57, November 21, 1901.

This article of Lockyer represents a good snapshot of Stonehenge thinking around the turn of the century. See other papers in this volume to sample Lockyer's studies of ancient buildings and megalithic sites.

This investigation was undertaken in the spring of the present year, as a sequel to analogous work in Egypt and Greece, with a view to determine whether the orientation theory could throw any light upon the date of the foundation of Stonehenge, concerning which authorities vary in their estimate by some thousands of years. We beg to lay before the Royal Society the results derived from a careful study of its orientation for the purpose of arriving at the probable date of its foundation astronomically. This is not, indeed, the first attempt to obtain the date of Stonehenge by means of astronomical considerations. In Mr. Godfrey Higgins' work¹ the author refers to a method of attack connected with precession. This furnished him with the date 4000 B. C.

More recently, Dr. W. M. Flinders Petrie,² whose accurate plan is a valuable contribution to the study of Stonehenge, was led by his measures of the orientation to a date very greatly in the opposite direction, but, owing to an error in his application of the change of obliquity, clearly a mistaken one.

As the whole of the argument which follows rests upon the assumption of Stonehenge having been a solar temple, a short discussion of the grounds of this view may not be out of place; and, again, as the approximate date which we have arrived at is an early one, a few words may be added indicating the presence in Britain at that time of a race of men capable of designing and executing such work.

As to the first point, Diodorus Siculus (ii. 47) has preserved a statement of Hecataeus in which Stonehenge alone can by any probability be referred to.

"We think that no one will consider it foreign to our subject to say a word respecting the Hyperboreans.

"Amongst the writers who have occupied themselves with the mythology of the ancients, Hecataeus and some others tell us that opposite the land of the Celts there exists in the Ocean an island not smaller than Sicily, and which, situated under the constellation of The Bear, is inhabited by the Hyperboreans; so called because they live beyond the point from which the North wind blows. . . . If one may believe the same mythology, Latona was born in this island, and for that reason the inhabitants honour Apollo more than any other deity. A sacred enclosure is dedicated to him in the island, as well as a magnificent circular temple adorned with many rich offerings. . . . The Hyperboreans are in general very friendly to the Greeks."

The Hecataeus above referred to was probably Hecataeus of Abdera, in Thrace, fourth century B. C.; a friend of Alexander the Great. This Hecataeus is said to have written a history of the Hyperboreans: that it was Hecataeus of Miletus, an historian of the sixth century B. C., is less likely.

As to the second point, although we cannot go so far back in evidence of the power and civilisation of the Britons, there is an argument of some value to be drawn from the fine character of the coinage issued by British kings early in the second century B. C., and from the statement of Julius Caesar (*de bello Gallico*, vi., 13) that in the schools of the Druids the subjects taught included the movements of the stars, the size of the earth and the nature of things.

1 "The Celtic Druids." 4to. (London, 1827.)

2 "Stonehenge," &c. 1880.

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Studies of such a character seem quite consistent with, and to demand, a long antecedent period of civilisation.

The chief evidence lies in the fact that an "avenue," as it is called, formed by two ancient earthen banks, extends for a considerable distance from the structure, in the general direction of the sunrise at the summer solstice, precisely in the same way as in Egypt a long avenue of sphinxes indicates the principal outlook of a temple.

These earthen banks defining the avenue do not exist alone. As will be seen from the plan which accompanies this paper, there is a general common line of direction for the avenue and in the principal axis of the structure, and the general design of the building, together with the position and shape of the Naos, indicate a close connection of the whole temple structure with the direction of the avenue. There may have been other pylon and screen equivalents as in ancient temples, which have disappeared, the object being to confine the illumination to a small part of the Naos. There can be little doubt, also, that the temple was originally roofed in, and that the sun's first ray, suddenly admitted into the darkness, formed a fundamental part of the cultus.

While the actual observation of sunrise was doubtless made within the building itself, we seem justified in taking the orientation of the axis to be the same as that of the avenue, and since in the present state of the southwest trilithon the direction of the avenue can probably be determined with greater accuracy than that of the temple axis itself, the estimate of date in this paper is based upon the orientation of the avenue. Further evidence will be given, however, to show that the direction of the axis of the temple, so far as it can now be determined, is sufficiently accordant with the direction of the avenue.

The orientation of this avenue may be examined upon the same principles that have been found successful in the case of Greek and Egyptian temples---that is, the assumption that Stonehenge was a solar temple, and that the greatest function took place at sunrise on the longest day of the year. This not only had a religious motive; it had also the economic value of marking officially and distinctly that time of the year and the beginning of an annual period.

It is, indeed, probable that the structure may have had other capabilities, such as being connected with the equinoxes or the winter solstice; but it is with its uses at the summer solstice alone that this paper deals.

There is this difference in treatment between the observations required for Stonehenge and those which are available for Greek or Egyptian solar temples---viz. that in the case of the latter the effect of the precession of the equinoxes upon the stars, which as warning clock stars were almost invariably connected with those temples, offers the best measure of the dates of foundation; but here, owing to the brightness of twilight at the summer solstice, such a star could not have been employed, so that we can rely only on the secular changes of the obliquity as affecting the azimuth of the point of sunrise. This requires the measurements to be taken with very great precision, towards which care has not been wanting in regard to those which we submit to the Society.

The main architecture of Stonehenge consisted of an external circle of about 100 feet in diameter composed of thirty large upright stones, named sarsens, connected by continuous lintels, and an inner structure of ten still larger stones, arranged in the shape of a horseshoe, formed by five isolated trilithons. About one-half of these uprights have fallen and a still greater number of the lintels which they originally carried. There are also other lines of smaller upright stones respecting which the only point requiring notice in this paper is that none of them would have interrupted the line of the axis of the avenue. This circular temple was also surrounded by an earthen bank, also circular, of about 300 feet in diameter, interrupted towards the north-east by receiving into itself the banks forming the avenue before mentioned, which is about 50 feet across. Within this

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avenue and looking north-east from the centre of the temple, at about 250 feet distance and considerably to the right hand of the axis, stands an isolated stone, which from a mediaeval legend has been named the Friar's Heel.

The axis passes very nearly centrally through an intercolumnation (so to call it) between two uprights of the external circle and between the uprights of the westernmost trilithon as it originally stood. Of this trilithon the southernmost upright with the lintel stone fell in the year 1620, but the companion survived as the leaning stone which formed a conspicuous and picturesque object for many years, but happily now restored to its original more dignified and safer condition of verticality. The inclination of this stone, however, having taken place in the direction of the axis of the avenue, and as the distance between it and its original companion is known both by the analogy of the two perfect trilithons and by the measure of the mortice holes on the lintel they formerly supported, we obtain by bisection the measure (viz. 11 inches) from its edge of a point in the continuation of the central axis of the avenue and temple, and which has now to be determined very accurately. The banks which form the avenue have suffered much degradation. It appears from Sir Richard Colt Hoare's account that at the beginning of the last century they were distinguishable for a much greater distance than at present, but they are still discernible, especially on the northern side, for more than 1300 feet from the centre of the temple, and particularly the line of the bottom of the ditch from which the earth was taken to form the bank, and which runs parallel to it. Measurements taken from this line assisted materially those taken from the crown of the bank itself. With this help and by using the southern bank and ditch whenever it admitted of recognition, a fair estimate of the central line could be arrived at. To verify this, two pegs were placed at points 140 feet apart along the line near the commencement of the avenue, and four others at distances averaging 100 feet apart nearer the further recognisable extremity, and their directions were measured with the theodolite, independently by two observers, the reference point being Salisbury Spire, of which the exact bearing from the centre of the temple had been kindly supplied by Colonel Johnston, R. E., the Director-General of the Ordnance Survey. The same was also measured locally by observations of the sun and of Polaris, the mean of which differed by less than 20" from the Ordnance value. The resulting observations gave for the axis of the avenue nearest the commencement an azimuth of $49^{\circ} 38' 48''$, and for that of the more distant part $49^{\circ} 32' 54''$. The mean of these two lines drawn from the central interval of the great trilithon, already referred to, passes between two of the sarsens of the exterior circle, which have an opening of about 4 feet, within a few inches of their middle point, the deviation being northwards. This may be considered to prove the close coincidence of the original axis of the temple with the direction of the avenue.

This value of the azimuth, the mean of which is $49^{\circ} 35' 51''$, is confirmed by the information also supplied from the Ordnance Office that the bearing of the principal bench mark on the ancient fortified hill, about eight miles distant, a well-known British encampment named Silbury or Sidbury, from the centre of the temple is $49^{\circ} 34' 18''$, and that the same line continued through Stonehenge to the south-west strikes another ancient fortification, namely Grovely Castle, about six miles distant and at practically the same azimuth, viz. $49^{\circ} 35' 51''$. For the above reasons $49^{\circ} 34' 18''$ has been adopted for the azimuth of the avenue.

The present solstitial sunrise was also watched for on five successive mornings, viz. June 21 to 25, and was successfully observed on the latter occasion. As soon as the sun's limb was sufficiently above the horizon for its bisection to be well measured, it was found to be $8' 40''$ northwards of the peak of the Friar's Heel, which was used as the reference point, the altitude of the horizon being $35' 48''$. The azimuth of this peak from the point of observation had been previously ascertained to be $50^{\circ} 39' 5''$, giving for that of the sun when measured, $50^{\circ} 30' 25''$, and by calculation that of the sun with the limb $2'$ above the horizon should be

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$50^{\circ} 30' 54''$. This observation was therefore completely in accordance with the results which had been obtained otherwise.

The time which would elapse between geometrical sunrise, that is, with the upper limb tangential with the horizon, and that which is here supposed, would occupy about seventeen seconds, and the difference of azimuth would be $3' 15''$.

The remaining point is to find out what value should be given to the sun's declination when it appeared showing itself $2'$ above the horizon, the azimuth being $49^{\circ} 34' 18''$.

The data thus obtained for the derivation of the required epoch are these:-

(1) The elevation of the local horizon at the sunrise point seen by a man standing between the uprights of the great trilithon (a distance of about 8000 feet) is about $35' 30''$, and $2'$ additional for sun's upper limb makes $37' 30''$.

(2) - Refraction + parallax, $27' 20''$.

(3) Sun's semidiameter, allowance being made for greater eccentricity than at present, $15' 45''$.

(4) Sun's azimuth, $49^{\circ} 34' 18''$, and N. latitude, $51^{\circ} 10' 42''$.

From the above data the sun's declination works out $23^{\circ} 54' 30''$ N., and by Stockwell's tables of the obliquity, which are based upon modern determinations of the elements of the solar system,¹ the date becomes 1680 B.C.

It is to be understood that on account of the slight uncertainty as to the original line of observation and the very slow rate of change in the obliquity of the ecliptic, the date thus derived may possibly be in error by ± 200 years.

In this investigation the so-called Friar's Heel has been used only as a convenient point for reference and verification in measurement, and no theory has been formed as to its purpose. It is placed at some distance, as before-mentioned to the south of the axis of the avenue, so that at the date arrived at for the erect of the temple the sun must have completely risen before it was vertically over the summit of the stone. It may be remarked further that more than 500 years must yet elapse before such a coincidence can take place at the beginning of sunrise.

Lockyer's results are not far from modern estimates.

¹ "Smithsonian Contributions to Knowledge," vol. xviii, No. 232, Table ix. (Washington, 1873.)

MSH-002 THE DATE OF STONEHENGE

Whitmell, C. T.; Nature, 65:128-129, December 12, 1901.

The following letter is rather technical, but it is important in terms of the correction of other astronomically determined dates for Stonehenge.

The remarkable paper on Stonehenge, by Sir N. Lockyer and Mr. Penrose, in Nature of November 21 has greatly interested me. Just two years ago I was working at the subject, and wrote to Prof. Petrie to inquire what azimuth he had used for the axis of the temple in his estimate of the date, which he gives as 730 A. D. \pm 200 years, with a possible date of 400 A. D. As I received no reply I employed the angle $50^{\circ} 12' E.$ of N., given in Mr. Edgar Barclay's "Stonehenge," 1895. With this azimuth I obtained by means of a formula, kindly supplied by Dr. Downing, F.R.S., a date of 425 A. D. I find that, for the given azimuth, even

this date is too early, as I did not allow enough for refraction, &c. Applying the same formula to the figures given in Sr. N. Lockyer's paper, the date comes out about 1700 B.C., as stated, so that the formula was correct, and the chief error was in the erroneous azimuth of the axis, which differs by about 38' from the 49° 34' 18" so carefully determined in the published paper. Now as an increase of some 90" in sunrise azimuth at the solstice means a decrease of some 46" in declination and represents the lapse of about a century, the discrepancy is clearly explained. Allowing for refraction, &c., I make the present azimuth of the sun at sunrise at the solstice about 50° 26' 21" E. of N., the sun's declination being 23° 27' 8" N. Consequently since the date, 1700 B.C., the solstitial sunrise azimuth has shifted 52' 3" further E. and the declination has decreased 27' 22", representing a lapse of about 3600 years, when the appropriate formula is applied.

At the distance (250 feet) of the Friar's Heel, or Sun-stone, from the centre of the ruin, a change of azimuth of 52' would shift a point on the axis only 3 feet 9 inches, and as the avenue is 50 feet wide, some idea may be formed of the necessary delicacy of the measurements. The azimuthal shift of the sun himself is less than two diameters. It seems to me very improbable that any estimate of the date closer than that arrived at by Sir N. Lockyer and Mr. Penrose can be made on astronomical grounds. Recent excavations have given valuable information, but much more yet remains to be done in this direction. I may add that an exhaustive study of the "Blue-stones" (igneous rocks foreign to the locality) by the methods of modern petrology may lead to some definite knowledge of their origin and so throw fresh light on the whole problem.

P. S. --- For sunrise (in accordance with p. 57) I take the tip of the visible sun to be 2' above the local horizon.

MSH-003 THE SECRET OF STONEHENGE

Cooksey, Charles F.; Nineteenth Century, 67:356-367, February 1910.

In these days of computerized studies of Stonehenge and its supposed astronomical proclivities, it is refreshing to read this charming and highly personal study of the Stonehenge mystery. Practically nothing at all is deduced from Stonehenge's configuration!

The mystery surrounding this mighty monument of a forgotten civilisation has exercised the greatest fascination over the minds of writers, who have for ages used their utmost endeavors to unravel it. There is not a civilised country where people are unfamiliar with the outward appearance of this, perhaps one of the most wonderful megalithic monuments in the world. It has inspired the poet and philosopher, and has impressed upon the British race a sense of awe and veneration such as is accorded to no other work of our remote ancestors. In the silent solitude of Salisbury Plain Stonehenge stands Sphinx-like, defying alike the ravages of time and the attempts of man to read its riddle.

Who, then, with the bones of rash speculators whitening the path of ages, dares to intrude upon this grim and undiscovered pole of British history? With a spirit of the utmost humbleness, doffing the shoes of pride or presumption at the threshold of this inquiry, I beg to submit, not a vainglorious claim to having succeeded where so many better equipped in every way have failed, but a simple record of the circumstances which led up to, and the results of the personal investigations

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which followed, a consideration of the historical accounts and an inspection of the places concerned.

It was the outcome of a long period of observation in the South of England that I arrived at the conclusion of the existence of a very early civilisation, of which our English historians knew, or at least said, nothing. That such a civilisation existed is evident to any person who is in the least familiar with our principal museums, where may be seen arms, armour, ornaments, utensils and implements, chaste in design and elegant in form, and in an endless variety of metal or other materials not assignable to any clearly defined historical period or people. All these things prove a comparatively high state of culture, which was not indigenous, but almost certainly introduced by some early immigrants from the scattered civilisation of the East. We read vaguely of an incursion of the Belgic Gauls to Southern Britain, and that they were the people whose descendants offered so stubborn a resistance to Julius Caesar and his successors. This is all mixed up with allusions to the Britons as being little better than savages. It is stated that they lived in woods, that their bodies were tattooed with woad, and that they were entirely subject to the Druids, under whose influence the unenlightened defenders of their country bravely but ineffectually strove to protect their land and liberty. My personal observation, however, convinced me that prior to the Roman invasion there was a literature, a civilisation with settled laws, a knowledge of art, a large and well-directed army, commanded by men of very superior intellect and resource, of which we in this day have little knowledge, and who for at least five hundred years maintained a not entirely unsuccessful resistance to Rome herself. I found, for instance, that the Roman city of Galleba, Calleva, or Silchester was placed on the ruins of an earlier Celtic one, the remains of the houses of which were constructed with a knowledge of the art of building little inferior to that of their Roman successors. There was at that place, as I demonstrated in 1892, at a meeting of the Surrey Archaeological Association, a primitive Christian church, which could hardly have been much later than the first century of the Christian era.

These indications, and many others far too numerous to be dealt with on this occasion, led me to investigate the region of Romance for a possible solution. I found an evidently Gallic civilisation struggling between Christianity and paganism. I read of Joseph of Arimathea and his brethren, and of one earlier missionary, perhaps St. Paul himself, associated with Caractacus on his return from pseudo-captivity in Rome about the year 60 of the Christian era. The Welsh, or rather the British records, as they should be more correctly called, contain definite statements on the subject of St. Paul's mission to Britain, but that point, interesting and capable of strong corroboration as it is, need not detain me from my present purpose. These, so far as they were available, I read, and still could find no sufficient evidence to demonstrate the chronological position of this missing civilisation. It was not until I closely studied Geoffrey of Monmouth, Malory, and others that I detected some remarkable parallels between the lives of Caractacus (otherwise Arviragus) and King Arthur, and began to see daylight through the historical gloom of this period. These views I have already expressed in my little brochure, Who was King Arthur? to which I beg to refer any of my readers who would care to acquaint themselves with my line of reasoning in this direction. I am not one of those who look for reasons or excuses that go to destroy the value and influence of ancient records---rules which, however applicable to or justifiable in the present age, cannot fairly be applied to those early chroniclers and writers without casting upon them responsibility for the sins of omission and commission of their various and successive translators and transcribers. Hence it was that reverently approached the story of Stonehenge as recorded by Geoffrey of Monmouth and Walter de Mapes. Curiously enough, I found that they agreed upon the main points---the removal of the stones from the Mountain of Killara in Ireland to Stonehenge, and their having been taken to Ireland from some place which, in the case

of Geoffrey, has come down to us as Africa, and in that of Walter as Spain.

As I pondered these statements, evidently derived from the same common early source, I became satisfied that an error must have crept into the narrative, and that probably a similarity of names had led both writers astray. I could not believe that this wonderfully conceived and equally wonderfully executed work could have been erected in Ireland under any conditions which had prevailed in that island up to that period. It was also difficult to believe that it would have been possible to convey the stones such a long distance by sea and land. Under these circumstances, I began to cast about for an ancient name which would be likely to occur in those primitive records, and which had sufficiently strong resemblance to the word Ireland to mislead the early English historical writers.

It was at this juncture that I frequently found in Malory's *Morte d'Arthur* allusions to the Kingdom of Ure. I also found that the Eurovicians or Eburicians were a Belgo-Gallic tribe who inhabited the country on the south side of the river Seine, and had the ancient city of Evreux as their capital. These people were among the earliest to make a settlement in Southern Britain, as Geoffrey of Monmouth supposes, nearly twelve hundred years before the Christian era. A close study of place-names on the shores of Britain opposite the estuary of the Seine disclosed the fact that many in the Isle of Wight were based upon the word Eur, or variants thereof, thus: The town of Yarmouth was described as Ermuc in 1287, Eremuc in 1294, and Eruemouth in 1398; Yaverland was written Ewerland in 1307, and Everlond in 1346. The ancient way from Carisbrooke to the water's edge near Cowes, which originally ran to Romsey and Winchester, is still known as Rue Street; while Carisbrooke, I suggest, was *Caer Ebroac*, or *Caer Euroc*, possibly so named by the new settlers after their old capital, Evreux or Ebroc, as was the course adopted by these people in several other instances. Then, again, there is St. Eurien's Chapel near Brading, and an ancient local surname of Urry. There seemed to be sufficient evidence of similarity to justify a further quest for a site which would answer to the description of the Mountain of Killaraus, or the Hill of Arus--- a task neither long nor difficult. The most prominent and central elevation, which practically dominates the entire island, is that of Arreton Down, about two and a half miles from the Borough of Newport. Here, then, we have the Hill of Arre in the land of Ure---names which closely approximate to the Hill of Arus and that of the country from which the stones were said to have been removed.

It is curious to observe that at the western extremity of Arreton Down are two places named East and West Standen, forming a chapelry two miles from Newport. If the name Standen is derived from Stan dun, it further strengthens the case for identification. A similar coincidence occurs in connection with the present site of Stonehenge, where there exist, in close proximity, two villages known respectively as Orcheston St. George and Orcheston St. Mary. These are of great antiquity, and may have obtained their names from that of the early or pagan Stonehenge, the Christian affixes being subsequently adopted. The chroniclers refer to the monument as 'The Giant's Dance,' and it is well known that the early Britons included in their worship a Hercules under the names of Ercwliff, Orchwiff, or Urchwiff. It is suggested that Stonehenge was known as the Orch stones, and that the two villages adjacent were named from them. We thus also get a clue to the source of the name 'Orkney,' in connection with the operations of Claudius and Vespasian in Southern Britain, as having been applied to the Isle of Wight. The Kingdom of Ure in Britain and its Gallic original both appear to have derived their names from that of the Gallic Hercules. Again, following this line of reasoning, we may be able to discover in the Nodes or the Needles the actual 'Pillars of Hercules.' This term has been generally considered to refer to Gibraltar, but a moment's consideration will show that in no sense is there any feature on either side of the Straits which can, by the wildest flight of imagination, be considered to have any resemblance or relation to pillars. Gibraltar was out of the usual line of traffic to

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Britain from the south or east, and there does not appear to be any direct evidence that the Romans at that early period had either the desire or the ships which would lead or enable them to face the perils of the western ocean.

We read in Book I., ch. vi., sect. 16, of the Chronicle of Richard of Cirencester that

"In this arm [of Southern Britain] was the region of the Cimbri, whose country was divided from that of the Hedui by the river Uxella. It is not ascertained whether the Cimbri gave to Wales its modern name, or whether their origin is more remote. Their chief cities were Termolus and Artavia. From hence, according to the ancients, are seen the pillars of Hercules and the Island of Hercules not far distant. From the Uxella a chain of mountains, called Ocrinum, extends to the promontory of that name."

Thus it may be seen that the name of Hercules and the variants of its British form are closely associated with the natural features of the southern shore of the 'Island of Britain,' being that portion only of the country south of the rivers Severn and Thames. It may also be found in its Roman form upon a slab of Purbeck marble discovered at Silchester, dedicated by one Tammonius to the Hercules of the Segontians, a British tribe which occupied the country adjacent to the Attrebates.

We are not absolutely without some indication of an historical reference to 'The Giant's Dance' when it was standing on Arretton Down, for one of the earliest of the Triads refers to Moel Ewyr, Bryn Gwyddon, and Beiscawen as the 'three chief sessions or meeting-places of the Bards of Britain,' while another, considered to be of later date, though mentioning the two last-named places, has, instead of Moel Ewyr, the name of Caer Caradoc (Old Sarum) as 'the three sessions of perfect art in Britain.'

Seizing the first opportunity of visiting Arretton Down, in the company of a friend of a somewhat sceptical turn of mind, we arrived on the summit, and sto for some minutes entranced by the magnificent prospect of land and sea which spread itself out as a banquet to our eyes in every direction. The spot at least was an ideal one for the erection of a temple, but something much more was needed to establish the theory of this being the actual site of which we were in quest. The first indication of the possibility of the spot being the correct one was the finding of a large and well-marked circular barrow and of a number of earthen banks and ditches along the brow of the hill. These, though interesting and almost inseparable from such a site as we were seeking, did not help us much, and my friend did not fail to remind me of his prognostications. Proceeding to the easternmost and highest point, now locally known as Mesley Down, I noticed a large circular ring having, as these religious rings usually have, a bank outside the ditch. The area seemed to be about the size of the one enclosing the stones at Stonehenge, but there was no trace whatever of any stones which could be considered connected in any historical way with the ring. A walk round the area disclosed the fact that the work was in good state of preservation, one small portion only, undermined by rabbit burrows, having slipped a little down the hillside to the north.

The next point to notice was that a road had been made at some remote period from the western side of the ring, over which the close down turf had grown. A small portion of this turf having been removed, the road itself was found paved with closely packed flints, into which two deep and well-defined ruts were cut, the flints being driven downward by some heavy weights.

Following this road by an easy declivity, we reached the point where the modern highway joins its line for the most part of the way to Newport. The old way had been most carefully graded and directed, so as to secure as far as possible the same easy descent, and ran direct to the tidal water close by the Newport railway station.

The day had yielded every satisfaction, the local evidence coinciding in every way with my anticipations.

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We are told by the historians before referred to that the stones were placed in ships and so taken to their present position. Taking this statement literally, I suggest that they were taken down the Medan or Medina River into the Solent, and so past what is now Hurst Castle to Christchurch Bay, thence by Hengistbury Head into the Salisbury Avon, and so commenced their journey into the mainland of Britain. There are evidences that the river has been canalised in many places, at least as far as Salisbury, and that it was dammed to form lakes or meres in other places, some of which are indicated by such names as Lake, near Salisbury, and by the little gravel beach terraces which still exist round their margins. The art of meering was carried to a great state of perfection by the Belgic Gauls, and the early British laws contain special enactments relating to this subject. Two small but excellently preserved examples of meers in Southern Hampshire are Fisher's Pond, near Twyford, and Sowley Pond, near Beaulieu.

Assuming this to have been the method by which the stones were transported, and that the objective was the present site of Stonehenge, it would be natural that they would try to get as near to that place as possible by water. This point would be near the village of Bulford, at a place known as Durrington Walls, where there exist the remains of a very extensive Celtic town, one side of which extends to the river, which has been obviously meered, at a point locally known as Watergate. Here, strange to say, may be seen in the bed of the river a stone evidently intended to form part of one of the trilithons. From this point also a graded road can be traced directly into the ring of Stonehenge.

This simple relation deals only with the second removal of the stones; that relating to the primary one is rather more complicated, and will, consequently, take longer in the telling.

It is a well-known fact that the separation of the Isle of Wight is, geologically speaking, of recent date, and there is evidence that up to about 400 B.C. it formed a portion of the mainland of Britain. It is certainly well established that it was an island at the time of the invasion of Julius Caesar, B.C. 55. A glance at the map will show the points of the irruption of the sea over the area which is now known as the Solent, but which the Venerable Bede speaks of as the Solvente.

The sea apparently broke in from the westward, as the effect of the prevalent south-west winds, which gradually washed away the chalk edge of the Hampshire basin. By the action of some great geological convulsion this chalk has been tilted till its strata have assumed a vertical instead of the natural horizontal position.

The process of attrition by the sea, which must have occupied a long course of ages, resulted in the formation of a line of herculean pillars, the survivors of which are represented by the Needles at the Isle of Wight and the Old Harry (or perhaps Old Ure) rocks at Swanage. These, in their turn, yielded to the ravages of the sea, which soon made havoc with the Tertiary formation in the interior of the basin, and so the catastrophe occurred. As the translation of the ancient British poem expresses it:

Accursed be the sea guard,
Who, after carousal,
Let loose the destroying fountain of the raging deep!
A cry from the sea arises above the ramparts;
Even to heaven does it ascend.

and so sixteen towns of fair Lantonesia, Lindonesia, or Lyonesse were swallowed up, and to-day the keels of huge ships pass over the homes of warriors, 'Thorny Knolls,' and pleasant pastures.

If, then, the Isle of Wight formed a portion of the mainland till so comparatively late a period, it is easy to understand why the mighty men of old placed their chief temple there rather than upon a small island. It also strengthens the view that the

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stones were not brought to the spot by the same route as it is suggested they were taken away, but possibly from an ancient channel of the sea from Sandown Bay to Brading harbour, which would permit their being brought by water near to Horroford village, from which an ancient road runs direct to Arretton Down.

It is now necessary to consider the question of the source from which the stones may have been brought to the Isle of Wight.

The conflicting statements of the two historians before referred to, of Africa and Spain as being respectively the original site of the monument, are very difficult to attribute to any common origin, but if Africa is put out of the question it may be possible to get a little enlightenment from the word Spain used by Walter de Mapes. The nearest point of land on the Continent is at the mouth of the river Seine, the Celtic name for which was Sequana, Sequan, or Senan, from the banks of which the Eurovices emigrated, and where to-day the name lingers in that of the Department of the Eure and the river of that name. Examining the map of France in that locality, with a view to finding some place-name which might give a clue to the discovery of the required spot, that of a town a few miles inland on the north bank of the Seine, and near its estuary, cannot fail to arrest attention. Bolbec---Baalbac! What visions of Phoenicians and their worship of the great sun-god immediately rush to the mind! Can it indeed be possible that here may be found the source of the great sun temple of Stonehenge? There is another Bolbec in Europe, not far from Hamburg, which was occupied by the same people in their migrations after the destruction of Troy, but that is out of the range of our subject at the present moment.

A visit to Bolbec, and close inquiry from many who were in a position to know dispelled the idea of finding anything there to assist me in my quest. All agreed however, that the only place thereabout where any such evidences could be found would be at Lillebonne, a few miles to the south of Bolbec, upon the little river which gives its name to the last-named place. Lillebonne is a small but thriving manufacturing town to-day, having a history of the highest antiquity. It was the capital of the Galetes, or Gauls, who invaded and peopled Southern Britain. It was occupied by the Romans, who, recognising its importance, fortified and adorned it with magnificent buildings, of which the remains of the great amphitheatre are the finest examples of Roman work in Northern France.

Here, after all, might be found the site desired; but again no one seemed to know anything about its actual history before the period when William the Conqueror held his Council there and decided upon the invasion of Britain in 1066.

Cast back upon myself, I was in no way disheartened. I had found a place closely associated with the people with whom I was concerned. I had found their capital city on the banks of the Bolbec, the name of which had first directed me to the spot, and I determined to proceed with my quest in this, to me, unknown place without looking for any guidance or help from anyone.

Having furnished myself with sheets of the official maps, I had noticed prominently indicated an insulated hill, the summit of which was described as Le Platon. Accompanied by my wife, I set out to put my instinctive faculty to the test, and, following the course of the Bolbec, soon reached the little village of Le Mesnil, from which an ancient road winds by an easy gradient up the steep ascent to Le Platon. The modern, well-kept road diverges from the line of the ancient one, but generally the line and level are identical. The sides of the hill are thickly wooded; in some places carefully shut in by high wire fences, in others open to the highway. Nearing the summit, and emerging from the trees, a stone lying by the roadside attracted our attention. An examination disclosed the fact that the stone was a granitic sandstone roughly measuring 4 ft. 6 in. in length and 3 ft. 3 in. at its greatest width, but, being buried in the bank, its thickness could not be ascertained.

Close by this stone was observed in the wood what appeared to be the remains of a tumulus, the greater portion of which seemed to have been quite recently car-

ried away. A few yards further on the old road turned to the right on to the plateau, the modern highway continuing in a straight line. Here the ancient road was barred by a gate leading into private grounds, and we feared we might have reached an impasse; but an amiable lady-caretaker gave us permission to proceed, and told us that Madame Le Maitre, the owner, was absent.

We entered the beautifully kept grounds, passed the close-shuttered, elegant, wood-built, chalet-like house, and reached the lawn, when to our great satisfaction we found, running up to the brink of the precipitous declivity on the southern side, a ring of earthwork practically identical with that of Stonehenge and Arreton or Mesley Down. The circle had been partly levelled in some places, and in others it was rather difficult to trace, but there could be no doubt as to its original size and completeness.

To confirm this I subsequently saw a tracing of a large-scale map which plainly indicated a complete circle.

The view from Arreton was eclipsed by the one upon which we now gazed. At our feet was a low-lying, marshy plain, extending for three miles to the wide, glittering Seine. This plain was intersected by a straight road from the foot of the hill on which we stood to the ferry at Port Jerome, opposite Quilleboeuf.

Away to the right from Quilleboeuf the river suddenly widens into the estuary, and the ancient town of Tancarville, on the north bank, is visible beneath the great quarries of calcareous stone which pierce the hills behind it.

Away to the south, beyond the river, extends the vast, fertile, alluvial plain known as Le Marais, bounded in the azure distance by a swelling ridge---a portion of the far-spreading Forest of Brotonne.

Retracing our steps to the entrance-gate, I borrowed a hammer and secured a specimen of the stone by the roadside, and obtained information as to the existence of a quarry close by. This was indicated by a dilapidated wooden shoot, which had evidently been used for the delivery of broken stone from the quarry above to carts standing beneath it on the road. A short, sharp climb brought us to a low, flat-topped entrance into the side of the hill, which has been partially blocked up by the deposits of debris from the interior.

The entrance had been at some remote period closed by a wall of stone, and repaired later by bricks. A breach in this wall about four feet high and six feet wide afforded access to the interior.

Having scrambled over the obstructions, we found ourselves in a spacious chamber with a perfectly flat roof of large flints, embedded in a calcareous matrix, supported by natural square piers.

Proceeding carefully by the aid of the light of wax matches, it was found that the quarry consisted of a series of large chambers opening one from the other. These we explored till the light from the opening was shut out, when it was deemed prudent to retrace our steps. Certain indications made me very loth to leave, but I restrained my impatience till the next day.

On the following morning we rode to the spot, having fortunately found a driver who, in his youth, had been into the caves. He took with him his son to hold the horse while we made our examination. This time we were provided with candles, and were able to make a little more leisurely inspection. This revealed the astonishing fact that the chambers we had noticed opened one from the other and formed a circle in the bowels of the earth. There was also an entrance from the opposite side of the hill, but this was closed except for a small opening at the top, permitting a tiny glimmer of light to enter the passage.

The flat roofs of the chambers were covered with short stalactites of small inverted crater-like form, and the piers were covered by a deposit of lime. The chambers had been extended at the periphery of the original circle by late quarryings, but the inner portions exhibited so much care in the formation of the roof walls, niches, and piers (the latter having carefully shaped lamp-holes) that the

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conviction flashed upon me we were in a place of sepulture or catacomb. The angles of the wall with the roof were squared with mathematical precision, the original tool marks in the stone being very evident.

The piers were formed of tufa-like Caux stone intermixed with flints, layers of flint nodules, bands of more or less dense calcareous stone, and, in one case, of a light blue siliceous rock 2 ft. 4 in. in thickness. Having secured specimens of the rocks and completed the tour of this mysterious work, we arrived at the opening at which we entered and regained the outer air and daylight.

Entering our carriage, we descended the hill to Le Mesnil, and followed the ancient road from Le Platon directly to Port Jerome. We reached the last-named place, which had but one solitary house---a poor-looking and dilapidated cafe. The quay and slipway, however, bear traces of great antiquity, the blocks forming the latter being partly composed of stone of apparently the same character as the one by the roadside near the top of Le Platon.

This stone has been pronounced by Professor W. Gowland, of the Royal College of Science, South Kensington, to 'have many points of similarity to the sarsens of Stonehenge.' But he expresses no opinion upon the fragment of blue stone or other specimens submitted to him.

On the northern slope of Le Platon a large Romano-Gallic cemetery has been discovered, which indicates that this spot was regarded with religious reverence long after the Druidic form of worship had ceased.

Various accounts of Stonehenge assert that the stones are of at least three different kinds, and in one case the great altar stone is spoken of as being 'Grey cos, a very fine-grained calcereous sandstone'---a description which seems to correspond somewhat with two specimens taken from the piers in the quarry. Whether the blue flinty rock is identical with the material of the inner circle, or horseshoe, described 'as a fine-grained grunstein' or 'bluestone,' I cannot determine.

It is quite within the bounds of probability that there are other galleries similar to the one described in the hill of Le Platon. I have endeavoured to restrain myself as much as possible from any theories or conjectures beyond such as were requisite to show the attitude of my mind when I commenced this inquiry. It is only a small portion of a much greater task which has occupied me for the past thirty years, and which, I believe, will solve and elucidate the mysteriously involved and obscure historical period, of which there is, nevertheless, such abundant evidence.

Owing to the confusion of chronology and topography, many people have been led to dispute the authority of the venerable and valuable records almost miraculously preserved to us.

The existence of these catacombs, if catacombs they are, lead me to speculate as to whether similar chambers exist in the hill at Arreton or beneath the stones of Stonehenge.

In the case of Arreton, there certainly is an ancient excavated cave, which has been disclosed on the face of a chalk pit.

Have we here traces of the hand of that genius who is thus described in Celtic song as one

Who knew the range of all arts,
Had built the King his havens, ships, and halls,
Was also Bard, and knew the starry heavens:
The people called him wizard. . .

or of the hero of heroes referred to thus by Leyden:

That bids the charmed sleep of ages fly,
Rolls the long sound through Eildon's caverns vast,
While each dark warrior rouses at the blast,
His horn, his falchion, grasps with mighty hand,
And peals proud Arthur's march from Fairyland?

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MSH-004 STONEHENGE

Lockyer, Norman; Nature, 66:25-27, May 8, 1902.

Lockyer, the editor of Nature and author of many articles on the orientation of ancient structures, reviewed the two Stonehenge books cited below for his readers. Full of interesting details not found in the usual works on Stonehenge, the reviews are reproduced in full.

The Wiltshire Archaeological and Natural History Magazine. Stonehenge and its Barrows. By William Long, M. A., F. S. A. Pp. 244; many illustrations. (1876.) Price 7s. 6d.

The Wiltshire Archaeological and Natural History Magazine. Stonehenge Bibliography Number. By W. Jerome Harrison. Pp. 170 (1902.) Price 5s. 6d.

The Wiltshire Archaeological and Natural History Society is to be warmly congratulated on its persistent and admirable efforts to do all in its power to enable the whole nation to learn about the venerable monuments of antiquity which it has practically taken under its scientific charge.

Chief among these, of course, is Stonehenge, and it is fortunate for students that while interest in this structure, unique in so many particulars, is being revived, such a rich mine of information as that supplied by the Wiltshire Society should be available.

It is within the knowledge of all interested in archaeology that not long ago Sir Edmund Antrobus, the owner of Stonehenge, at the request of this famous local society, the Society for the Protection of Ancient Buildings and the Society of Antiquaries, enclosed the monument in order to preserve it from further wanton destruction, and with the skilled assistance of Messrs. Carruthers and Detmar Blow set upright the most important menhir, which threatened to fall or else break off at one of the cracks.

Ever since that time he has been the butt of agitations on the local parish councils, got up apparently by persons who care, not for the preservation of ancient monuments, but rather that there shall be no right of property in anything interesting enough to be worth chipping.

The "unclimbable wire fence" recommended by the societies in question, the Bishop of Bristol being the president of the Wiltshire Society at the time, is by them regarded as a suggestion that the property is not national, the fact being that the nation has not bought the property and that it has been private property for centuries.

It is curious to think that the very destruction of the monument is now urged as an argument against enclosure. The Times in a recent article tells us some of the arguments used before a Committee of the County Council.

"There are old ways, long and systematically used, which lead directly to the stone circles, and the barbed wire stretches right across these ways. One fact alone is sufficient to prove their antiquity. The outermost circle of Stonehenge consists of an earth vallum worn down by time and weather, but still rising some feet above the natural surface of the ground. The ways in question cut through this vallum, which rises abruptly some three feet or so on either side of them."

Everybody except the devastators knows that this vallum is the equivalent of the temenos walls which surround the Egyptian temples, and is part and parcel of the temple.

It is very sad to read, both in Mr. Long's volume and the bibliography, of the devastation which has been allowed to go on for so many years and of the various forms it has taken. It appears that this temenos wall or vallum was the first to suffer by indiscriminate driving over it, so that its original importance has now become so obliterated that many do not notice it as part of the structure; and that

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it bears the same relation to the interior stone circle as the nave of St. Paul's does to the Lady Chapel.

It appears also, from the Times account of the meeting, that a recent paper by Mr. Penrose and myself on the orientation of Stonehenge may have added strength to one of the arguments so improperly employed and apparently endorsed by Mr. Shaw Lefevre and others:-

"One fact of singular interest was elicited. There seems to have been a special gathering every year, numbering thousands of persons, at Stonehenge to witness the rising of the sun on the 21st of June. As Stonehenge, according to the best opinions, was originally constructed with reference to rites performed at this very moment, there is nothing extravagant in the supposition that there has been something in the nature of a public assembly on Salisbury Plain at midsummer ever since the circles of Stonehenge were first completed."

Meanwhile we trust the Wiltshire Society will continue its labours, which date back at least to 1866, for the preservation of the monument, and that the members of the various Councils concerned will read the literature the Society has printed and become less phillistine in their attitude. If Stonehenge had been built in Italy or France or Germany, it would have been in charge of the State long ago. Let the County Council send a small committee to Carnac to see how the equivalent monuments are looked after there.

It is very sad that in this twentieth century there should be Englishmen phillistine enough to wish to preserve a so-called "right of way" which cuts through the vallum twice and passes close by the most important and imposing stone circle in the world. It is still sadder that since Sir Edmund Antrobus, the present owner, has accepted the advice of the Societies I have named to enclose the monument, with a view to guard it from destruction and desecration, he has been assailed on all sides, as we have seen. The world of science has already one matter of the highest importance to thank him for, namely, the setting upright of the so-called leaning stone, which was tottering to its fall. Let us hope that before long the minor gaps in the vallum may also be filled up. When they are, the present upholders of the "right of way" through the major ones will be the first to insist that the road shall be deviated outside one of the most imposing monuments of the world. In the meantime, it is comforting to know that, thanks to what Sir Edmund Antrobus has done, no more stones will be stolen, or broken by sledge-hammers; that fires; that unskilled excavations such as were apparently the prime cause of the disastrous fall of one of the majestic trilithons in 1797; that litter, broken bottles and the like with which too many British sightseers mark their progress, besides much indecent desecration, are things of the past.

Let me now refer more particularly to the publications of the Wiltshire Society bearing on Stonehenge.

Dealing with Mr. Long's memoir first, it may be stated that it includes important extracts from notices of Stonehenge from the time of Henry of Huntingdon to Hoare (1812), and that all extant information was given touching on the questions by whom the stones were erected, whence they came and what was the object of the structure. The barrows on Salisbury Plain are next carefully described, and the information to be obtained from them discussed in a most masterly way. It is a very great pity that a book so full of facts of great interest along so many lines has no general index.

Many who have followed the recent work on the monuments will be glad to have beside them for ready reference so many extracts from the publications of those who have attempted to solve its mysteries in the past. Thus we learn (p. 44) that in 1771 Dr. John Smith, in a work entitled "Choir Gawr, the Grand Orrery of the Ancient Druids, called Stonehenge, Astronomically Explained, and proved to be a Temple for Observing the Motions of the Heavenly Bodies," wrote as follows:-

"From many and repeated visits I conceived it to be an astronomical temple; and from what I could recollect to have read of it, no author had as yet investigated its uses. Without an instrument or any assistance whatever, but White's 'Ephem-eris,' I began my survey. I suspected the stone called The Friar's Heel to be the index that would disclose the uses of this structure; nor was I deceived. This stone stands in a right line with the centre of the temple, pointing to the north-east. I first drew a circle round the vallum of the ditch and divided it into 360 equal parts; and then a right line through the body of the temple to the Friar's Heel; at the inter-section of these lines I reckoned the sun's greatest amplitude at the summer solstice, in this latitude, to be about 60 degrees, and fixed the eastern points accordingly. Pursuing this plan, I soon discovered the uses of all the detached stones, as well as those that formed the body of the temple."

With regard to this "Choir Gawr," translated Chorea Gigantum, Leland's opinion is quoted (p. 51) that we should read Choir vawr, the equivalent of which is Chorea nobilis or magna.

That the slaughter stone was once upright is rendered probable by a reference to Mr. Cunnington's digging in 1803 (p. 56). Mr. Long adds:-

"Mr. William Cunnington, F. G. S., informs the writer that if this stone stood erect, it must have entirely concealed the 'gnomon' from persons standing in front of the 'altar.' 'It would have been impossible,' he says, 'to see the sun rise over the "gnomon" from the exact centre of the building. It is nevertheless a fact that the gnomon does occupy this critical position, as to the sunrise at the solstice.'"

But as we now know that from the axis of the sarsen stones the sun did not rise over the "gnomon," that is the Friar's Heel, this reasoning is not conclusive.

Again, there is the question of the roof. In our paper communicated to the Royal Society, Mr. Penrose and myself gave reasons why the Naos, that is the space included in the horseshoe of trilithons, was covered. This suggestion, however, I now find is not new, the view having been held by no less an authority than Dr. Thurnham (p. 67), who apparently was led to it by the representations of the Scandinavian temples as covered and enclosed structures.

On pp. 71 et seq. I find a very interesting extract from a paper by Mr. Cunnington on the "Geology of Stonehenge." He points out the origin of the sarsens according to Prestwich:-

"Among the Lower Tertiaries (the Eocene of Sir Charles Lyell), are certain sands and mottled clays, named by Mr. Prestwich the Woolwich and Reading beds, from their being largely developed at these places, and from these he proves the sarsens to have been derived; although they are seldom found in situ, owing to the destruction of the stratum to which they belonged. They are large masses of sand concreted together by a silicious cement, and when the looser portions of the stratum were washed away, the blocks of sandy rocks were left scattered over the surface of the ground.

"At Standen, near Hungerford, large masses of sarsen are found, consisting almost entirely of flints, formed into conglomerate with the sand. Flints are also common in some of the large stones forming the ancient temple of Avebury.

"The abundance of these remains, especially in some of the valleys of North Wilts, is very remarkable. Few persons who have not seen them can form an adequate idea of the extraordinary scene presented to the eye of the spectator, who standing on the brow of one of the hills near Clatford, sees stretching for miles before him countless numbers of these enormous stones, occupying the middle of the valley, and winding like a mighty stream towards the south."

Mr. Cunnington displayed great acumen in dealing with the smaller stones not sarsens.

"The most important consideration connected with the smaller stones, and one which in its archaeological bearing has been too much overlooked, is the fact of their having been brought from a great distance. I expressed an opinion on this

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subject in a lecture delivered at Devizes more than eighteen years ago, and I have been increasingly impressed with it since. I believe that these stones would not have been brought from such a distance to a spot where an abundance of building stones equally suitable in every respect already existed, unless some special or religious value had been attached to them. This goes far to prove that Stonehenge was originally a temple, and neither a monument raised to the memory of the dead, nor an astronomical calendar or almanac.

"It has been suggested that they were Danams, or the offerings of successive votaries. Would there in such case have been such uniformity of design or would they have been all alike of foreign materials? I would make one remark about the small impost of a trilithon of syenite, now lying prostrate within the circle. One writer has followed another in taking it for granted that there must have been a second, corresponding with it on the opposite side. Of this there is neither proof nor record, not a trace of one having been seen by any person who has written on the subject. This small impost, not being of sarsen, but syenite, must have belonged to the original old circle; it may even have suggested to the builders of the present Stonehenge the idea of the large imposts and trilithons, with their tenons and mortises."

There are several references throughout Mr. Long's memoir to the tradition of the slaughter of Britons by the Saxons at Stonehenge, known as "The Treachery of the Long Knives"; according to some accounts, 460 British chieftains were killed while attending a banquet and conference. But one important item is omitted. I have gathered from Guest's "Mabinogion," vol. ii, p. 433 and Davies' "Mythology of the British Druids," p. 335 that the banquet took place on May eve "Meinvethydd." There is ample astronomical evidence that arrangements were made for observing the sun on May day both before and after the erection of the sarsens, and I think by this the truth of the tradition is strengthened.

Of the more recently published volume dealing with the bibliography of Stonehenge it may be said that on reference to Stonehenge by any ancient author, in any letter to the Times for the last twenty years dealing with any question touching the monuments, seems to be omitted from the bibliography. Thus, to give an instance, I find my old friend Sir Arthur Helps' work on "Spain's Conquest of America" referred to because in vol. iii, he treated of sun worship in Peru. The bibliography is not only to be commended for its thoroughness, but for its admirable method; it is a model of what such a work should be, and has evidently been a labour of love: Mr. Harrison acknowledges his obligations to the Birmingham Free Reference Library and the Bodleian, as well as to the Society's Library at Devizes.

MSH-005 STONEHENGE -- A NEOLITHIC "OBSERVATORY"

Newham, C. A.; *Nature*, 211:456-458, July 30, 1966.

Some critics of Hawkins' computer theory of Stonehenge deny such sophisticated usage altogether, but Newham suggests an alternative type of observatory.

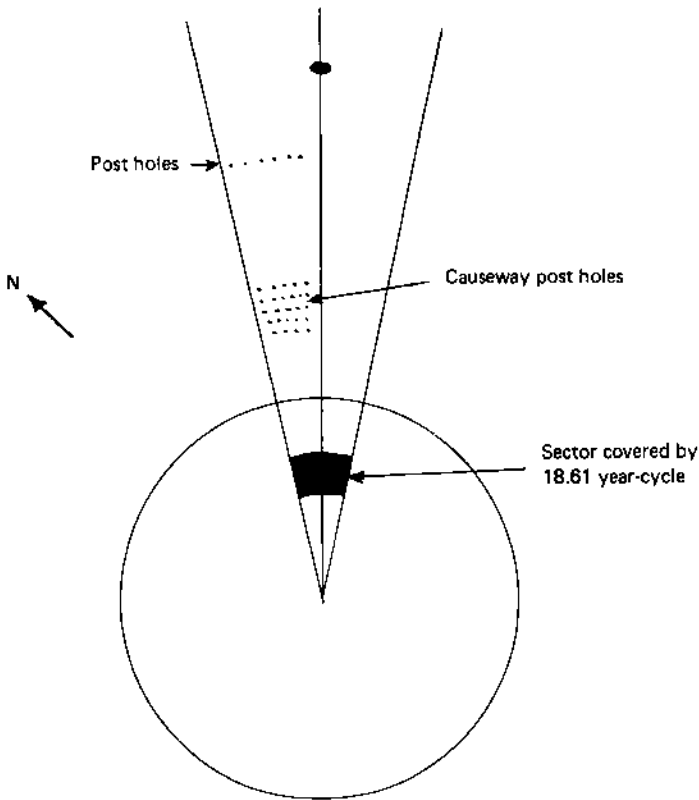
Prof. G. S. Hawkins has shown how Stonehenge could be regarded as a "computer" to predict the time when eclipses of the Sun and Moon were due, though not always visible at Stonehenge. He ingeniously relates the fifty-six Aubrey holes with a 56-year eclipse cycle. The principle is valid, but there is no evi-

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dence to support the idea that Stonehenge was intended to be a "computer" other than that the majority of main features embodied in the 'monument' unquestionably have some astronomical connexion. There are, however, a number of "post holes"; however, no satisfactory explanation has so far been put forward to explain their purpose.

An analysis of the position and number of post holes prompts a suggestion as to their purpose, and may well provide the clue to the method by which the builders of Stonehenge acquired elementary knowledge of Moon cycles, possibly including the approximate 56-year eclipse cycle.

Stonehenge post holes. Of the many post holes found in and around Stonehenge, there is one group of about forty holes situated in the "causeway" near the north-east entrance (Fig. 1). The holes seem to radiate from the centre of the Aubrey



Arrangement of postholes at Stonehenge. (MSH-005) [Note the convergence similar to that of the Menec alignments in MSH-008]

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circle, and lie within a 10-degree arc north of the heelstone or solstice line. They are roughly arranged into six ranks crossing the line of the causeway.

A fairly reliable record of the behavior of the Moon could be obtained by planting a temporary marker (wooden stake) to align on the point where the winter full-moon appeared above the horizon each year. The indications are such that this was done over a large number of years covering several 18.61 year cycles. Such a period would be sufficient to ascertain a 19-year phase or metonic cycle and possibly the approximate 56-year eclipse cycle as suggested by Hawkins (that is, 3×18.61 equals 55.83). It should be appreciated, however, that they would have considerable difficulty in defining this eclipse cycle by their crude methods.

Starting from the premise that the post holes were used for the purpose suggested, the azimuth bearing of each post hole was first ascertained in rank order, numbered 1 to 6 counting in a north-easterly direction.

The number of holes attributed to each rank and their azimuth bearings taken from the centre of the Aubrey circle are given in Table 1.

Preliminary calculations reveal that the causeway post holes lie within the arc or sector of the most northerly limits of winter full-moon rise as seen from the centre of the Aubrey circle (C. A. C.); also, the number of holes in any one rank did not exceed the number of risings that could appear north of the heelstone or solstice line in any one cycle.

If individual bearings of moonrise in a sequence of cycles were found to agree with the "hole alignments", any doubt as to their significance would be eliminated; furthermore, dating of the post holes would be feasible. Unfortunately, the necessary data concerning the Moon are not available; to obtain such information would severely tax the ability of the most expert celestial mechanician.

Table 1

Rank No.	1	2	3	4	5	6
	-	-	(40.4)	(40.7)	-	(40.3)
	41.9	41.9	-	-	41.8	-
Azimuth bearings	43.1	43.0	43.0	42.9	42.9	42.7
degrees	-	44.1	44.0	43.8	44.0	-
E. of N.	-	45.3	45.3	45.5	45.6	-
	-	45.6	45.6	-	-	-
	46.3	46.4	46.5	46.3	46.4	46.4
	-	-	*47.4	-	-	46.7
	-	47.8	47.5	47.2	47.6	47.5
	-	49.3	49.4	49.0	48.9	49.1
	-	49.8	-	-	49.8	-
	-	-	50.4	50.2	50.8	50.3

The figures in parentheses refer to holes beyond the line of full orb but are reached by the line of first gleam of moonrise.

* This hole is situated between ranks No. 2 and No. 3 and cannot be allocated to either rank.

However, computed moonrise bearings covering the period of 2000-1000 B.C. were first used in an attempt to determine whether any similarity existed between general grouping of the post holes and a sequence of moonrising. The data used were kindly supplied by Prof. G. S. Hawkins. His calculations are based on first-order term and refer to the full-moon nearest the winter solstice and also require that the instant of moonrise should coincide with the time when the Moon reaches its appropriate maximum declination. This particular feature seldom applies.

The pattern of risings that would apply to the early Stonehenge period is more truly represented in groups 'B' and 'C'. Even so, their arrangements could be subject to slight variations as many individual moons have possible alternative rising positions. This applies in those cases when the Moon reaches "full" during the daytime for example, on December 12, 1875, the Moon was full at 0745 h (shortly before setting). In similar circumstances would they regard the critical Moon as being that which rose on the afternoon of December 12, or that of the following day? If midnight was their datum, the former Moon would apply. On the other hand, it would be the latter if the critical time was on its rising. A similar condition arises in respect of those Moons which are full 14 or 15 days before the solstice and would be followed by the next Moon 14 or 15 days after the solstice.

There is no question that people of early civilizations had to contend with the same difficulty which was partly abated by choosing the critical Moon as the one which was full after a specified time, such as the day of the winter solstice or equinox. In the second millennium B. C. the Delians regarded the critical Moon as the first one that was full after the winter solstice, and the possibility that such was the case with the Stonehenge people cannot be overlooked. However, the remarkably close relationship of the moonrise sequences and hole patterns must surely be more than a coincidence. If this suggested method of observation had been carried out by the Stonehenge people, they would have had little difficulty in recognizing the 19-year phase or metonic cycle.

It seems fair to assume that these and other post holes served a purpose in obtaining preliminary information of the behaviour of the Sun and Moon. Once satisfactory alignments had been established, markers of a more permanent kind would be installed. If the foregoing assumptions were correct, then the long period of time that elapsed between the inception of the bank, etc., and the building of the first major stone structures would be accounted for.

The position and spacing of the four large post holes near the heelstone indicate a relationship with the causeway holes, especially so in conjunction with stone 'D' and the heelstone. The size of the holes indicates that the posts were much larger than the causeway posts and, presumably, more permanent. If stone 'B' were also included, then the seven markers which could be observed would act as a crude 'vernier'. When correlated with the setting Sun seen in the reverse direction, it would provide a means of defining the time when an eclipse of the Moon was probable.

Whether or not Stonehenge people discovered the 56-year cycle is a matter for conjecture, but their ability to predict pending eclipses after a crude fashion was certainly possible.

It can be shown that a person assisted by nothing more than the crudest equipment in the form of a peg and line and a few stakes could acquire the necessary information. The observer, however, would have to have the necessary tenacity of purpose to undertake systematic observations over a long period of time and a simple method of recording numbers by means of tokens, for example, notches on a stick or pebbles in a bag.

Doubtless, several generations of observers were involved, and if we are to believe that the writings of Diodorus referred to Stonehenge, then the position of supervisor of the "Spherical Temple" was held by a member of the same family from one generation to another.

The strong lunar influence with which Stonehenge must now be associated necessitates revision of hitherto accepted explanations of some salient features. Until new evidence is found pointing to the contrary, it is more logical to conclude:

(a) That the small stone (No. 11) in the sarsen circle was intentional, and that the circle represented the 29.5 days of the lunar month.

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(b) The double circle or spiral of the 'Y' and 'Z' holes represented the 59 days of two lunar months. The strong possibility that there were fifty-nine blue stones inside the sarsen circle would provide a more suitable means of representing the same thing.

(c) The 19-year phase or metonic cycle was represented by the nineteen blue stones inside the trilithon "horse shoe".

All things considered, including other similar post holes, there seems little doubt that Stonehenge, in its early stages, was a kind of "observatory". It provided a suitable site wherein systematic observations of 'Soluna' (Sun and Moon) phenomena were carried out by these neolithic peoples.

The "grid" of posts is reminiscent of the megalithic alignments at Carnac and elsewhere.

MSH-006 THE STANDING STONES OF CALLANISH

Millar, W. J.; Nature, 20:127-129, June 5, 1879.

This is a rather charming description of one of the most important groups of "standing stones" in Europe. Like Stonehenge, Callanish seems very likely to have been raised for astronomical purposes.

The object of the present paper is to describe the standing stones of Callanish, Island of Lewis, accompanied by notes of such measurements as the author was able to take during a somewhat hurried visit to these very interesting memorials of the early inhabitants of our islands.

Leaving the town of Stornoway, we soon find ourselves amongst great tracts of moorland, with sheets of water large and small on all sides. The deep black peat is being cut and piled up into stacks, when, after being dried, it will serve for the winter's fuel. The peats in the Lewis are broad and thin, and not so brick-shaped as those on the mainland further south. All around wears a sombre aspect. Miles and miles of bog and moorland, without tree or bush to break the long undulatory lines which rise and fall like the waves of the sea.

At length, as we reach the top of a slight rise, we see before us the object of our visit, the stones appearing so thickly clustered together on the rising ground on which they stand, as to suggest the likeness to a cemetery. Leaving the vehicle a little beyond the sixteenth milestone from Stornoway, we ascend by a roughly causewayed roadway which leads from the main road to the top of the low hill upon which the stones were placed. On a closer inspection it is found that the general outline is cruciform, and at or near the intersection of the cross limbs is placed the largest stone, whilst around is a circle of tall stones. The stones are rough, and appear only to have received such dressing as would bring them to a suitable shape for erection; they are composed of the rock of the island the Laurentian gneiss, which, in geological record, is the oldest known. In colour it is greyish, with occasional flesh-coloured patches. The stones are monoliths, and are all upright.

The upper parts of the stones are covered with a greyish green lichen, the lower parts being comparatively bare. This is accounted for by the fact that a number of years ago the proprietor of the island caused the peaty ground around to be removed, which showed that the height was much greater than had at first

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appeared; the parts thus recently disclosed have not the heavy coating of lichen which the upper parts have; the line separating the two parts is very marked. From this the great age of the stones may be inferred, as there has been an accumulation of peaty soil of about five feet deep.

From a careful inspection of the stones the author found the number to be forty-eight. (The driver's remark on being asked the number was that they could not be counted over by different people and made the same.) The highest stone is about 16 feet, and the stones forming the circle are next to the central one in height, varying from about 8 feet to 11 feet. The others vary from about 7 feet to about 4 feet.

The longer limb of the cross is composed of two rows of stones placed about 27 feet apart, there being ten stones on the west side and nine on the east side. This is a very distinct feature in the arrangement, as there is thus an avenue leading to the circle. The circle consists of thirteen stones, and the western and eastern cross arms have each a single line of four stones, whilst the southern limb is composed of six stones; the whole with the central stone and one outside and close to the circle makes forty-eight. The general arrangement



The standing stones of Callanish. (MSH-006)

will be more readily understood from the accompanying plan, which is drawn approximately to scale. From careful observations with a pocket compass, the general bearing of the northern limb was found to be 30° to east of magnetic north; it was also found that, when a line was projected from the flat side of the endmost southern stone, it cut exactly the end stone of the western side of the northern limb; the latter stone measures about 11 feet in height. If the compass variation be estimated at 25° west (the latitude is about $58^{\circ} 12'$ north), it appears that the main axis of the group lies about 5° to east of true of polar north. Several of the stones besides the one already mentioned appear to have a directive tendency, notably the one next the circle in the eastern side of the northern limb; this stone, both from its pointed shape and flat form, leads the eye to the centre of the circle. The whole series, indeed, are arranged with

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their narrow faces pointing in the line of setting; this is easily noticed, as the stones are generally flat, thin, and slab-like. The circle stones have their broadest faces turned to the centre of the circle. The great stone is situated at or near the centre of the circle; it measures about 16 feet in height, with a breadth at bottom of 5 feet, at middle of 4 feet, and upper part 3 feet 6 inches; its thickness is 1 foot; its flat side faces the east. This stone must weigh about six tons.

The general dimensions of the group are as follows:-

Extreme length, 128 yards; length of northern limb, 85 yards; diameter of circle, 14 yards (this measurement is in a north and south line; from east to west the measurements gave 13 yards, so that the figure is slightly elliptical); length of southern limb, 29 yards; extreme breadth, 44 yards; length of western arm, 13 yards; length of eastern arm, 18 yards. The whole figure roughly resembles the Iona cross in outline. In or near the centre of the circle there is a hollow, roughly rectangular on plan, measuring about 7 feet long, the breadth at centre being 6 feet, and at ends 5 feet, narrowing, however, at the eastern end, so as to form a kind of channel leading outwards. The sides of this hollow are built of small stones, and four large stones are placed so as to break up the whole into two chambers. The direction of length of this hollow is east and west; the tall central stone already described being situated near to and facing its western end. It is said that a stone cover was found upon this hollow when first discovered. The hill upon which the stones are placed slopes downwards to the north; the ground on which the cross arms are placed is about level. Another circle of tall stones still stands about a mile to eastward, from which it appears that the peat has been recently removed.

From an examination of the stone circles of Arran, the late Dr. Bryce found that stone cists in some cases existed at the centres of the circles, and that the longer lengths of these cists, as also the longer axis of one elliptically-shaped series of stones, were all lying about north and south, or inclining rather to east of north.

In the Smithsonian Report for 1876 there is a description of mounds and lines of stones in Guatemala, the long sides and directions of which were about 5° to west of magnetic north; they vary from 2 feet to 6 feet in height. This would leave, after allowing for the easterly variation of the compass there, a probable direction of 5° or 10° to east of true or polar north. A certain similarity, therefore, appears to exist in the setting out of these groups, with a tendency to a direction east of north.

The country people called the place Callanish, not Callernish, as sometimes given, the meaning of the former name having been defined as "place of assembly for worship," whilst the latter is given as "bleak headland." The title Fir Bhreige, or false men, is sometimes given to the group, from the apparent motion of the stones as the spectator changes his position when viewing them from a distance.

The erection of such circles as that of Callanish has been popularly attributed to the Druids, and according to this theory the Callanish circle would have been a religious meeting-place. Again, it has been supposed that they were tombs of warriors, and may have been erected by the early Norse rovers. Others look upon such groups of stones as places for judicial meetings, which might have been accompanied by religious ceremonies. From some recent scientific investigations at Stonehenge it appears likely that the stones there were erected for astronomical purposes.

The general impression which one gets from standing amongst the Callanish stones is that the long avenue was intended as an approach from the not far distant shore for a large body of people, who would thus converge towards the central circle.

MSH-007 BRITTANY DOLMENS AND LINES

Oliver, S. P.; *Nature*, 6:7-12, May 2, 1872.

Although Oliver's paper is primarily a critique of Fergusson's book (see below), his comments about "rude sculptures" and the cup marks arranged like the stars in the Great Bear are intriguing.

Mr. James Fergusson, in his interesting volume on "Rude Stone Monuments in all Countries," which will doubtless become a text-book on that section of archaeology which pertains to Megalithic structures, has made one or two unintentional misstatements, discrepancies, or errata, which perhaps he will allow me to correct through your columns, in hopes that they may be in time for the second edition, which is probably called for, if not accomplished. I will state them as briefly as possible.

I. Carnac (p. 349): "No stone in the neighbourhood of Carnac is hewn or even fashioned beyond splitting, and no sculptures of any class have been traced" (italics are mine). Will Mr. Fergusson forgive me if I point out that the tumulus of Kercado, situate in the grounds of the Chateau of the same name, and marked in the map of the neighbourhood of Carnac given in his volume Fig. 135 as "Kercadio Tums. 2" has well marked sculpture on at least three of its stones, one of the figures, viz. that on the under-surface of the capstone, being evidently of the same type as the Hatchet (?) in the roof of Dol-au-Marchand or Table de Cesar, see Fig. 149 (where by-the-bye I never could make out the so-called plume), and is identical with one in Be-er-groah (Locmariaker). This tumulus, or dolmen-mound, as I prefer to call it, is much nearer to the lines of Kermario and Kerlescant than Mont S. Michel is to the lines of Menec. I should add that M. Rene Galles figures two of the sculptured stones, but not the hatchet.

But this is not the sole example of sculptured stones in the neighbourhood of the Carnac amorpholiths. In the curiously arranged dolmens called the "Grottes de Kerozille," are distinct traces of former sculpture (in which, if I mistake not, some traces of some coloured pigment have been discovered by W. Lukis), of which M. Galles gives but imperfect representations. Doubtless all the stones were covered with similar ornamentation, which has disappeared from the weathering of the stone surface. The "Grottes de Kerozille" are situate to the north of Menec, about two miles distance, marked Dols. 11 and 12 in MM. Blair and Ronald's map as given by Fergusson. There are in reality three dolmens, the centre one at right angles to the other two, and almost connecting them with traces of a fourth; all have been covered under one mound. In "Les Grottes de Plouharnel," where the gold ornaments were found, are traces of rude sculpture. I need hardly add that none of these archaic markings are in relief, as is the case with the celts shown in Sr. Henry Dryden's drawing from Gavr' Innis, Fig. 152. Flowing labyrinthical lines seem characteristic of the Kerozille dolmen-mound, whilst straighter lines forming network are peculiar to Kercado. On the summit of the neighbouring dolmen of Runusto are some cup-markings which bear a very fair resemblance to the constellation of the Great Bear together with the Pole Star. The dolmen entrances in the long barrow close to and north of the Kerlescant alignments, one of which is figured (vide Fig. 139), were doubtless fashioned artificially, at least I think Mr. W. Lukis, who has described them, will bear me out in this assertion. It is indeed a monstrous pity that the Societe Polymathique du Morbihan should have permitted such an interesting structure to be destroyed.

I should not have taken the trouble of bringing the foregoing notes to the notice of the public in your pages had it not been for the great stress laid by Mr. Fergus-

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sson on the fact of the marked distinction made by him between the Locmariaker monuments and those in the neighbourhood of Carnac, the latter of which he asserts cannot be dissociated from the Carnac alignments.

In a communication addressed to the Anthropological Institute, I endeavoured lately to prove that the hewn and sculptured stones of Locmariaker were of a different type from the rough and shapeless blocks of Carnac, which latter I ventured to distinguish by the name of "Amorpholiths," and for that very reason disassociated the dolmen-mounds, such as Kerlescant, Kercado, and Mont S. Michel, from the lines and avenues, excepting the unchambered barrow at the western extremity of the Kerlescant lines which appear to lead up to it.

The critique continues in the same vein, concluding with detailed tables describing some dolmen mounds of Brittany.

MSH-008 AMONG THE PREHISTORIC MONUMENTS OF BRITTANY

Packard, Alpheus S.; American Naturalist, 25:870-890, October 1891

Not far from the Land's End of France, and adjoining the picturesque coast of Finisterre, a favorite resort not only of French, but also of English and American artists, lie the barren and almost treeless plains of Morbihan, one of the eighty-six departments into which the French Republic is now divided. Morbihan is Celtic for "The Little Sea," and the district is famous not for its scenery, for the landscape is very tame, but for its impressive and mysterious so-called Celtic or Druidical ruins. These remains are mounds, tombs, and monoliths erected by a race whose remote descendants still occupy the soil, their farms and dwellings and hamlets bordering upon, and in part inclosing, the tombs and lines of stone pillars which keep silent watch over the region. The most imposing and best known of these series of pillars or "menhirs" are the great "alignments" of Carnac, which have for centuries excited the curiosity and interest of travelers and antiquarians.

Such monuments, if they ever existed in so great perfection in other parts of France, have been removed by farmers in clearing their lands, or in building their own dwellings, as with us glacial boulders have been removed and used for building stone walls. On the remote coast of Morbihan, however, where the land is comparatively sterile and treeless, and the population is sparse, not only have the monuments been tolerably well preserved, but the Bretons themselves, perhaps speaking a language derived from their pre-Celtic ancestors of the later stone and early bronze age, have preserved in a degree the probable features, the folklore, and some of the customs of the times when these monuments were erected.

Hence a journey to Morbihan, with its weird, somber landscape, its cider-drinking, superstitious, Celt-speaking peasants, clad in their sober black garments, environed by the many mounds, tombs and standing stones, rising as silent witnesses of the mysterious past, and becoming an integral part of the everyday life of its inhabitants, --- a journey among such scenes has a strange fascination.

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What follows is a tourist's view of Brittany's megalithic sites. Although the accounts are charming, the descriptions of the towns and local cuisine are omitted below.

One should visit the excellent museum here before passing on to Carnac. The Musée Archeologique is situated in the third story of a very old, rambling, timbered building, with creaking oak stairs and ghostly corridors. The rooms are small, but the cases contain very rich collections taken from the dolmens and tumuli we were afterward to visit. Here were placed together in the case the relics excavated in 1862 from Mont St. Michel, at Carnac, the largest burial mound in France. It comprises superb series of polished axes in jadeite, chloromelanite, fibrolite, and diorite, with a beautiful necklace of green turquoise. There was also a fine series from the tumulus of Mane-er-H'rock at Lockmariaquer, comprising besides six jadeite axes ninety-two of fibrolite, which is a dark variety of serpentine. The pottery of the mound was represented, and among them were seen the rude, unfinished earthenware, precursors of our bowls, tumblers, and cups and saucers. Some of the "green turquoise" heads were cylindrical, perforated, and exactly resembled in shape and color a jade bead we had obtained at Cholula, from a Mexican Indian. The jadeite implements were illustrated by unworked specimens of jade from Thibet, and of jade nephite from Siberia, as well as saussurite from the valley of the Saas.

Reluctantly leaving this quaint and attractive town, we took the evening train for Plouharnel Carnac, reaching the Hotel du Commerce, kept by the two daughters of M. Felix Gaillard, to whom we took a card of introduction from Professor Topinard, and from whom we received every kind of attention and aid, the learned archeologist freely giving us the benefit of his many years' exploration of neolithic menhirs and dolmens, as well as Gaulish burial-places. Part of the hotel is devoted to a very rich local museum, crowded with stone implements, ornaments, and articles in bronze and gold, pottery, including funeral lamps and holes for the wick, and three graves removed with their contents from Quiberon, the whole illustrated by stone implements from North America and New Caledonia, with objects from the Swiss palafitts, or pile dwellings, which M. Gaillard told us are of the same age as the dolmens of France.

And now, before we actually visit these strange memorials of past neolithic occupation, let us explain the meaning of the Celtic names applied to them. The megalithic monuments are rude monoliths of the granite of the Breton coast, called menhirs, from two Breton or Celtic words, men, a stone, and hir, long; they are also called peulvans. The menhirs are arranged in groups of from nine to thirteen rows, each row being called an alignment.

The tomb-like structures called dolmens are so named from men, a stone, and dol, table. They consist of a few large, broad, flat stones set up on edge so as to inclose a more or less oblong space; the larger ones are about six feet high, and covered over by a single great slab (called table) or several flat stones. The smaller ones are said to resemble tables and altars. Many of those in the Morbihan are approached by covered galleries, which are generally straight, but at times curved; the main structure or chamber is sometimes wider than long. They, in nearly each case, face the east, and were places of sepulture or tombs, being the precursors of the old-fashioned tombs of our cemeteries, and were covered by mounds of earth called tumuli. A tumulus sometimes enclosed a cairn or galgal, or heap of squarish stones, six or eight inches or a foot in diameter, thrown or laid over the dolmen to protect it from wild beasts. A cromlech in France is a circle or semicircle of menhirs or upright stones. The stones composing a cromlech are usually smaller than the majority of the menhirs, and the stones touch each other, while in an alignment of menhirs the individual stones are from two to several feet apart. The word cromlech is from kroumn, curved, and lec'h, meaning sacred, or, according to some writers, smaller stones.

There are in the single department of Norbihan 306 dolmens, and throughout France 3,410. They are rarer in the north and east than in central, southern, and western France. Beginning with the most eastern point at which dolmens occur,

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archeologists have observed them in western India, where they have been used to the present. They are found in Palestine, near the Dead Sea, in the land of the Moabites. Going west, we find them on the other side of the Caucasus Mountains in Circassia and the Crimea. Passing farther to the westward, they occur in Central Europe, northeast of Dresden, from Mecklenburg through Denmark into southern Sweden, but none occur in Norway. Returning to Germany, many have been discovered in Hanover and the Low Country, as well as in Belgium, in Luxembourg, and Switzerland. They also occur on the Channel Islands, in Cornwall, in the Isle of Man and of Anglesea, some in western and a few in the eastern counties of England, while many occur in Scotland and in Ireland. Turning to the Mediterranean region, there are the ruins of dolmens in Corsica, in northern Spain, in Andalusia, in Portugal, while in northern Africa they are abundant from Morocco to Tripoli, especially in Algeria. Mortillet rejects the theory once held that the dolmens were constructed by a migratory people, maintaining that they were the work of a sedentary population, and not of one and the same race, as skeletons of very different races have been found in them. At the same time many facts tend to show that the dolmen-builders in the first place came from the east. Mortillet also states that dolmens were burial chambers used as places of sepulture by families or by tribes. The menhirs were also quarried and erected by the designers and builders of the dolmens, who roughly hewed and chipped the monoliths into their present shapes with small axes of polished flint, jade, and the harder varieties of serpentine.

Before we inquire into the traits and customs of the Neolithic tribes, let us glance at the monuments they left behind them.

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At the village of Lockmariaquer, which was the site of Dariusgum, or of some other Roman settlement, we walk out to the end of the solid granite jetty, whose earliest foundations are attributed to the Celts, the Romans afterwards improving upon them. We engage two fishermen to take us in their boats to Gaverne or Gavr'Inis, anglice Coat Island, on which is perhaps the most interesting tumulus in the Morbihan, and probably in Europe. With a fair westerly wind and a bright sky we lie on, taking the opportunity to eat our lunch of cold meat, bread, and cider, with a course of excellent, though tiny, raw oysters, which are usually offered at the hotels throughout the coast towns of Brittany. Clambering ashore over the slippery rocks we walk up a lane bordered with fig trees, and ascent the eastern side of the mound, which is a galgal, or cairn, twenty-six feet high, and covered with soil overgrown with the broom and prickly gorse.

The view from the summit of the mound, over the Gulf of Morbihan and its shores, is one of much interest, from the fact that some of the distant eminences are artificial mounds, and that on some of the islands there are dolmens. We can look across a narrow passage swept by swift tidal currents to the little ragged island of Er-Lanec, with the remnants of one cromlech, half of the circle on the shore and the other half below high-water mark, while beyond, at low water, can be seen the prostrate stones which once formed a second cromlech. The land has fallen, and the sea has partly torn down this and all the other islands since the times when the dolmen builders inhabited this region.

Descending, we enter the gallery of the dolmen by a path walled in with the square porphyritic granite blocks taken from the sides of the galgal, and, passing through the low, narrow gallery about twenty-five feet long (Cartailhac says thirteen meters) we enter the chamber, which runs east and west. About forty huge slabs form the pavement, the walls, and the ceiling. One of the slabs in the ceiling is of quartz; and we judged the largest slab to be about eighteen feet square. But the distinguishing feature of this dolmen is the mysterious sculpturing on the slabs. All the granite wall-slabs are thus sculptured, the marks being cut in. And what

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was the nature of the tools? The quartz slabs alone had been untouched. Cartailhac argues, with good reason, we think, that the implements could not have been of iron, as only the softer granite was grooved and engraved, and that the engravings were made with stone tools. It is also noticeable that in other dolmens we visited, symbolic stone axes, mounted on handles, are engraved on the slabs of the ceiling, while on a single upright slab in the dolmen we are now describing there are eighteen such axes figured, with others in the same gallery.

The marks themselves roughly resemble the tattoo marks of Pacific Islanders. As Cartailhac remarks in his "La France Préhistorique" (1889), they are diverse linear combinations, being straight, curved, waved lines, either isolated or parallel or ramified like fern leaves, or arranged in segments of concentric circles, either limited or not, and trimming certain compartments of spirals with short turns, recalling exactly the figures made by the wrinkles of the skin on the palms of the hands and the finger-tips.

The last-described marks are certainly the most typical and abundant, and perhaps were suggested to the proto-Celtic engraver by studying the lines on his hands. The artist was not hurried in his work, and, as Cartailhac says, the sculptures must have been made before the stones were put in place.

But the tide is going out, and we must unwillingly leave this fascinating ruin and return to Lockmariaquer, to visit other dolmens. One of the most notable, situated south of the town near the base of an elliptical mound, thirty-nine feet high, is the dolmen *Mane-ar-H'roeck* (the mountain of the fairy). The opening to the gallery, as in all the other dolmens, faces to the east; and to enter it we pass by two enormous but prostrate menhirs, one thirty-one and the other twenty-five feet long. The walls of the dolmen are built in horizontal layers, and one of the stones raised on the right side of the entrance is ornamented with very beautiful and curious sculptures, some like escutcheons, besides ten figures of symbolic axes with handles. Thence walking across a potato field, occasionally stopping to pick up fragments of Roman tiles, we approach the "king of the menhirs," called *Mane-ar-Groac'h*. His monolithic majesty is second in size and height to none in Europe, or any other country; the next largest one in Brittany being thirty-seven feet high. It lay however, prostrate, and broken into four pieces. When entire it was sixty-seven feet six inches long, seven feet six inches thick in one diameter, and thirteen feet six inches in the broadest portion. This colossal menhir, as usual when one or two stand alone, served as a monument, and was evidently in direct relation to the tumulus and the inclosed dolmen, for we noticed one standing sentinel over a dolmen; and they are sometimes erected on the summit of a tumulus, as at *Ile de Sein*; in such case they may have been put up to indicate burials. The dolmen near the base of the *Mane-ar-Groac'h* is a famous one, and, like many of the others, has been purchased and restored by the government. It is the *Dol-ar-Marc'hadourien*, or Table of the Merchants. On the under or inner side of the great table or covering slab, which is twenty feet long by thirteen feet wide, was engraved a large stone symbolic hatchet with its handle. That these images are in reality rude representations of hatchets seems plausible. Stone axes, apparently made expressly for ceremonial use, are found in nearly all dolmens, having been placed there by the side of the dead; and they are in nearly all cases beautifully finished, with sharp, unbroken edges, and often of jade, which is only now to be found in Asia and Polynesia, being one of the rarest minerals in Europe. Some authors suppose that the axe was regarded by the people as the symbol of separation, an emblem of the end of life. However this may be, whether from its utility alone in every-day life, or its use as a weapon of war, it must have been a highly prized and venerated instrument, to be so often engraved on tombs, and so invariably buried with the dead.

This region is especially rich in dolmens, as they are scattered all about

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Lockmariaquer; the dolmen of Mane Lud being situated on one of the principal streets, next to a house, the tumulus once inclosing it rising behind.

A little way out from the town is the dolmen of Kervress, remarkable for th cup-shaped pits in the under side of the covering slab, and which, of course, m have been made before the stone was put in place. These cup-shaped hollows are scattered irregularly over the surface, varying somewhat in size, the largest being about an inch and a half in diameter. They are a great puzzle to archeologists, who can make nothing of them. Occurring in Germany, Switzerland, among the Alps and the Pyrenees, and in Portugal, both in dolmens and on menhirs, they had some meaning to the men of the stone and of the bronze age, after which they ceased to be formed. It is only to be said, with Cartailhac, that at the present day Hindu women at the approach of maternity may be seen carrying water from the Ganges, with which they sprinkle these symbolic cups in their temples with prayers to the divinity indwelling.

Such superstitions still prevail, unless they are of new and independent growth, in France, and in the Pyrenees, in Sweden, as well as in Switzerland, where they are either regarded as the work of elves, or visited by young girls and widows in the hope of getting husbands. The great mound of St. Michel looms up as on our return we approach the little village of Carnac. It is the largest tumulus in France, overlooking the rather flat surrounding country and the Atlantic, with Belle Isle in the distance and to the right the peninsula of Quiberon. The tumulus is now 65 feet above the surrounding fields, though originally it must have been considerably higher, its summit having been leveled by the Romans, who built a temple upon it, while the remains of a Gallo-Roman villa are still visible near its base. In place of the Roman temple stands a humble and not at all interesting chapel, dedicated to St. Michael. We ascend the tumulus by the fifty-two steps made of the small granite blocks taken from the galgal which protected the dolmen, the great elliptical mound of earth covering both dolmen and cairn, being 400 by 200 feet in its greater and lesser diameters. Toward the north and northwest are plainly to be seen the famous alignments of Kerlescan, Kermario, and Menec, which we were to visit on the morrow, when M. Gaillard was again our guide, philosopher, and friend. Without his intimate knowledge of these striking monuments we should not have half seen or understood them, and the kindly man, full of enthusiasm and enlightened interest, told us all he knew of the alignments and their probable object. His conclusions seem to us to be in advance of what has been published by the leading French archeologists, who have only made comparatively brief visits to the region. Fortunately the government has for a number of years taken possession of the alignments and most of the dolmens, restoring them by setting the buried or fallen stones into their original places, so that we saw them under more favorable auspices than earlier travelers.

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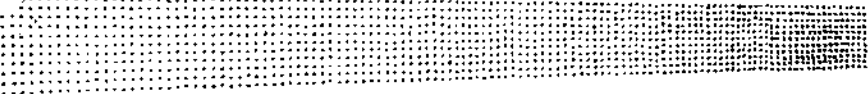
There are at Kerlescan thirteen rows or alignments, comprising 262 menhirs, and extending westward about 1,000 feet. At the western end is a cromlech now restored, which, instead of being semi-circular, is somewhat square, inclosing a space about three hundred feet in diameter. We then visited the interesting elliptical mound inclosing the dolmen of Kerlescan, lying just north of the middle of the group of menhirs, which is exceptional and indeed unique in Brittany from having been surrounded by an elliptical cromlech or circle of menhirs, some of which were six or seven feet high, and placed a few feet apart, not touching each other as in those of the alignment. Then retracing our steps, picking our way back through masses of the prickly, forbidding gorse, which bore an occasional yellow pea-like flower, we examined the cromlech, and, taking to our cart, drove on to the next series of alignments, the larger one of Kermario.

The avenues of Kermario consist of 855 menhirs planted in ten rows, extending

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over the undulating heath for nearly a mile, or, to be exact, 4,137 feet. The standing stones are impressive for their size and height, some of them being twelve feet high. Moreover, an added interest are the traces of Roman occupation on the south side near the western end, ---in fact, traces of the civilization of Rome of the period of the Gallic wars are scattered over Morbihan; and the peasants call the alignments Caesar's Camp. Indeed their explanation of these lines is that their patron Saint Corneille was pursued by the Roman army, which was, as a punishment, turned to stone, the taller pillars representing the officers.

After crossing another interval we reach the eastern end of the alignment of Menec, whose cromlech, at its western end, incloses some of the farmhouses of the hamlet of Menec, which is not far from Carnac. The menhirs lie to the north of the road between Carnac and Plouharnel. The group is a little shorter than that of Kermario, being 3,376 feet long, and consists of eleven instead of ten lines, and the stones are not quite so high and imposing as those of the middle group. The stones or pillars vary much in shape; some are much rounded; many were, however, planted with the smaller end down; and whether it is a mere coincidence or not the highest stone is about eleven feet high, the number of rows is eleven, the alignments themselves are about eleven yards apart, while the spaces between the stones composing each line are often ten or eleven feet apart. In this, as in the other groups of alignments, the rows are not mathematically straight, but more or less wavy, and the stones vary much in distance apart, all the way from perhaps three



The alignments of megaliths at Menec. Total length 3,376 feet, rows about 33 feet apart. (Adapted from MSH-008)

or four to ten or eleven feet. In general the stones decrease in height toward the end, where they are not much over four or five feet high. The groups follow the natural inequalities of the plain, whose surface is rolling, the country slightly descending from Menec to Kerlescan.

The semi-circle of stone or cromlech at the western end of the Menec group was inclosed by standing stones from about five to six and even eight feet high, which touched each other. At present many are prostrate, and there are two or three small stone farmhouses within the circle. Fortunately the government purchased the entire group in 1888, and will raise and plant the fallen stones; and as the inhabitants of the houses die or remove, the buildings will be taken down. The restoration of the Kermario group is nearly accomplished, and is almost entirely inclosed by a low stone wall.

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It was hard to leave this weird, fascinating, and impressive landscape, in which the natural features were tame enough, the strange interest being due entirely to the work of the heads and hands of a forgotten and extinct people, who have passed away leaving not a tradition behind them, ---only these imposing monuments of stone.

"No priestly stern procession now
Streams through their row of pillars old;
No victims bleed, no Druids bow, ---
Sheep make the daisied isles their fold."

.....

The carriage road to St. Pierre, which is a little village situated on the new railway running to Quiberon, passes over a dreary, monotonous waste of sand, and as it runs along the middle of the neck of land reveals few extended views of the ocean. On our way we pass on the western shore, not far from the site of a Gaulish burial-place, from which M. Gaillard had recently exhumed seven skeletons, with bronze bracelets and Gaulish coins and pottery. After visiting the dolmens and tumuli of Port Blanc, on the west shore near St. Pierre, gathering pieces of pottery, bones, and flint chips, and seeing how the ocean has encroached on the slowly subsiding coast, so as to undermine the cliff and the tumulus, which must have been situated much farther inland in pre-Celtic times, we walked over the grassy, sandy wastes back to our cart, and drove past the village of Saint Pierre and its old windmill to the menhirs and cromlech on the shore. How long the rows of standing stones were originally, it is difficult to say, because the coast has sunk-en and the waves have undermined and overturned the stones at the eastern end. Walking down across the field, where the men, and women, too, were digging potatoes, we stood on the edge of the falaise, or sandy cliff, and the tide being partly out, we could trace some of the lines into the sea. A few of the stones were lying prostrate on the beach, while others beyond were overgrown with sea-weed, and still beyond lay some under the waves. There are in all five lines, which extend in a southeasterly direction for 635 feet seaward. At a distance of about ninety yards from the head stones of the rows, the highest menhirs being about eleven feet, is situated the ruined cromlech which, according to Lukis, was two hundred feet in diameter. We did not attempt to measure it. The group has not yet been restored, and only about a dozen of the stones are still upright.

M. Gaillard had brought his compass with him, and now demonstrated a curious fact to us. He had already called our attention, while visiting the alignments of Kermario and of Menec, to the occurrence between certain of the rows of a single menhir, standing by itself, and which has been overlooked, he said, by all other archeologists. In the alignments of Kerdescan this mysterious odd stone is situated, we think, between the seventh or eighth space between the rows. It is about eleven feet high, and from nine to ten feet thick at its greatest diameter, which is not far from the top, the stone being smaller at its base. In the alignments of Menec the single menhir is in the third space from the northern side; namely, between the third and fourth rows of planted stones. In each group of alignments, at least in four of them, this odd menhir occurs, though varying in situation, depending apparently on the position of the rows, none of which are exactly in an east and west course, as their builders had no compass. They are all situated not many paces---perhaps fifty, more or less---from the cromlech.

Now our friend and guide took the greatest interest and satisfaction in placing his compass on one of the middle stones of the cromlech at St. Pierre, and demonstrating to us that the line of 50° (it varies from 45° to 50° in different groups of alignments) intersects the single menhir. M. Gaillard has been here, as well as at the other alignments, at sunrise on the morning of the longest day in the year, the 21st of June, has placed his compass on this menhir, and at the moment the sun appeared above the horizon the odd or single unaligned menhir was seen to be

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in line with the median stone of the cromlech and with the sun. It is therefore inferred, and very naturally, that the designers and builders planted these stones in accordance with a fixed plan, and that the inclosure must have been the scene of some ceremony at the time of the summer solstice. And this confirms the idea insisted on by archeologists, among them MM. Cartailhac and Gaillard, that the groups of standing pillars were planted after a common design and nearly at the same epoch, and that the people who erected them were possibly worshipers of the sun, having brought with them from the far east, their original home, the cult so characteristic of eastern races.

.....

The largest of the dolmens in Brittany is that of Crucuno, called La Roche aux Fees, or the Stone of the Fairies. A farmer had built his house next to it, and the dolmen, by no means of fairy-like proportions, was used as a cow-house until its purchase and restoration by the government. It is twenty-four feet long by twelve wide, and one can stand upright in it. From this impressive dolmen a path, which a boy will point out for a slight cupreous gratification, leads across the fields to the very remarkable dolmen of Mane-Groh, which is galleried, and besides the principal chamber, has four lateral inclosures.

We shall now dismiss the dolmens, which are so numerous and interesting. They are regarded as the tombs or burial-places, possibly in some cases ossuaries, of tribal chiefs and their families. They were opened at intervals, perhaps for the interment of the successors of the warriors for whom they were first built. Many of them have a circular hole in the stone door a little over a foot in diameter, too small for the passage of a body, and probably used for the deposit of food for the service of the departed in his wanderings in the other world. It is not improbable that our pre-Celtic, neolithic ancestors brought with them from their eastern homes the observance of burial rites, and very primitive religious ideas, involving some notion of a future life, besides the worship of their ancestors and of the sun.

On the whole the Erdeven group of alignments is more impressive than the others, on account of the greater length of the rows, the larger, higher stones, and their greater number, 1,120 having been counted by M. Gaillard. They extend over the rolling plains a distance of more than two kilometers, or over a mile, ---viz., 6,886 feet. One of the standing stones near the western end is nineteen-and-a-half feet in height, and two others a little over twenty feet high; one of the prostrate stones is called "the sacrificial stone," but the furrows in the surface seem due rather to weathering than to artificial means.

Could one stand at or near the head, and overlook the entire group of alignments, the impression made would be of course more striking than at present, since many of the stones have fallen, and the lines are much broken, while they make a turn to the southeast near their middle. But as they stand, the longer the observer lingers among them the more impressive they become; and not to see the alignments of Carnac and of Erdeven is to miss one of the wonders of the world. They rank in importance and interest with the ruins of Central America and of Mexico, and the so-called Pelasgic walls and burial-mounds of Greece, while they are by far the most imposing relics of prehistoric times.

Rows of standing stones are not, however, confined to the Morbihan; the menhir-erecting and dolmen-building race, judging by the monuments it has left behind, existed in other parts of France and of the Old World. According to the latest and most trustworthy authority, M. Cartailhac, whose work entitled "La France Prehistorique" appeared in 1889, there are in Morbihan eight of these groups of alignments, including the cromlechs connected with them, and nine, far less important, in Finisterre, five in the department of Ille-et-Vilaine, and six or seven others, of small size and slight importance, in the rest of France, most of them only forming one or two short rows of standing stones. Mortillet says there are in France fifty-

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six alignments, in fifteen departments. Analogous to the alignments in France the Sarsden Stones in Berkshire, England, which are composed of 800 menhirs

Solitary standing stones or monoliths of a later age occur in the Pyrenees, Corsica, and in Northern Africa, and at present the natives of Madagascar and Khasias of Northwestern India raise stone columns around their tombs; but these are analogous to the solitary menhirs planted near the dolmens, or those composing the cromlechs, surrounding dolmens, or tumuli. Whether of original prehistoric growth or a later development, the solitary menhirs are in Thibet and in other lands venerated as symbols of the reproductive powers of nature. Finally, we have the solitary obelisks of Egypt, and the monumental stones of mediæval times, which have survived to our day in the granite shafts and marble columns memorializing great national events, or sacred to the memory of the departed.

The alignments were not made spasmodically, at irregular intervals, one stone after another being set up during a long period, as in a modern cemetery, but they were evidently built at one period after a fixed design or pattern, to which all conform. Those of Morbihan and of Finisterre were undoubtedly planted at the same time by the same people,---a race animated by other ideas than those of living merely an animal existence. It is not probable that they were memorials of some conquest or other event of great importance. It seems natural to conclude that these vast and imposing relics, whether we consider the size of the stones themselves, their enormous number, their repetition over a not very extensive region, and their similarity of plan and contemporaneity with the dolmens, were the outcome or tangible expression of the religious nature of the pre-Celtic mind. The people had, long before starting on their westward migration, emerged from savagery, and after centuries of physical and intellectual effort, having peopled Europe, now strong in numbers, and dominated by lofty conceptions and wonderful zeal and industry, had met together, and working, as if impelled by a common inspiration and impulse, under the direction of their priests, raised these unique monuments. The population must have been dense; it was not now migratory, but an agricultural as well as pastoral people. The materials for the dolmens and menhirs were not far off. No traces of quarries have survived, because the Atlantic, in conjunction with the plutonic forces at work in the earth's crust, has lowered the coast, and washed away all traces of these mighty workers in stone. As we noticed in the materials of some of the dolmens and menhirs, the rock is a porphyritic granite, with oblong crystals of feldspar and scales of black mica, readily rusting on exposure to the air. On the cliffs at the ferry, on the way to Lockmariaquer, we noticed the rock in place. It readily and naturally breaks by the action of frost into square or oblong blocks, fitting either for monoliths, or for the small, squarish blocks with which the galgals were formed.

More industrious and inventive than savages, they made use of their oxen, and whole families or tribes cooperating, the busy multitudes, swarming like bees, with the use of stone axes and chisels, and the aid of fire, quarried the big slabs for the dolmens, and the monoliths for the alignments. They probably moved them on rollers a few hundred yards, or even one or several miles, inland, and then, with a skill developed by long experience, and probably after many a bitter failure, set the stones in place. Some of the menhirs stood on the surface, without any foundation; in other cases foundations for them were carefully laid. So long have they stood that all marks of quarrying have been effaced by the agency of the atmosphere. As Wilson states, a menhir in the headline of the Erdeven alignment, which had been overturned and used as a fireplace, though with tool-marks on it, and buried during Roman occupation, must have remained prostrate from fifteen hundred to nineteen hundred years; "yet it had previously stood on end long enough a time for the top to become so weathered as to be plainly distinguishable from the bottom."

What, then, was the use of these remarkable monuments? No burials took place among them. The chiefs and their families were deposited at death in the

dolmens. The question is still an open one, the best archeologists differing as to whether they were monuments to the dead, or whether they were temples. The common design pervading all the larger alignments, showing that they were erected at the same epoch, forbids one accepting the view that they were simply commemorative of different persons, that they were a kind of archive, each stone recalling a fact, a person, or a date. The remarkable care observed in burying the dead proves that these people were strongly religious. The care taken to put in the proper place the odd stone, and its relation in the summer solstice to the rising sun, indicate that the alignments were erected for the worship, on stated occasions, of the sun. M. Gaillard told us that he believed the menhirs were erected by this early race as monuments to their ancestors. The English archeologist, James Miln, who lived for many years at Carnac, and who founded and built the interesting local museum which bears his name, tells us in his "Fouilles Faites a Carnac" that after taking into account the association in this region of menhirs, of alignments, of cromlechs, and of dolmens, he concludes that "these monuments are the debris and the remains of an immense necropolis," and perhaps this is the more natural and logical view to hold. At the same time, while this involves the worship of their ancestors, the sun may also have shared in their adorations.

Judging by the contents of the dolmens, some bronze bracelets and other articles having been found in them, these megalithic monuments were erected during a period of transition from the stone age to the age of bronze; and they are supposed to be contemporaneous with the pile dwellings of the stone age of Switzerland. Who were these stone axemen, these neolithic stone masons, who could with their polished celts quarry, and could transport monoliths weighing more than some of the obelisks of Egypt, the great menhir of Lockmariaquer being nearly 68 feet long, and weighing 240 tons? Were they genuine Celts? Prof. Gabriel de Mortillet says no. "All these primitive monuments formerly bore the collective name of Celtic or Druidical monuments. It was supposed that they were peculiar to the Celts, and raised by their priests, the Druids. It is a great error. These monuments are found in abundance in regions which have never been occupied by the Celts, as Denmark, Spain, Portugal, Morocco, Algeria, etc. They are even very probably in greater part anterior to the great Celtic invasions; and if they attracted the attention of the Druids, it was only when they were already partly in ruins and lying on the surface of the soil" ("La Prehistorique Antiquite de l'Homme," 1885).

Cartailhac, in his excellent work on Prehistoric France (1889), also says that we must abandon the views of the older archeologists, who believed that these were Druidical monuments, and should be attributed to the Gallic or Celtic race, or to any single race of emigrants from the east. Within twenty years, owing to the rapid course of discovery in France, so many dolmens having been opened, in which were found the skeletons of different races, the tendency among the most experienced French students is, with Mortillet, to deny any special ethnic value to these monuments. For example, De Quatrefages discovered the bones of two races in the same dolmen, and Hamy has demonstrated that the population of France was almost as much mixed during neolithic times as to-day. Cartailhac concludes that the problem of the megalithic monuments is exactly that of the advanced civilization of Europe, which even in prehistoric times became almost universal, and which is called neolithic. "Did it," he asks, "reach our country with new races or populations? Was it spread by contact of one people with another? We have no response to make to these questions. The truth is probably scattered throughout all systems, and that which is true for one country will be inexact in another."

All archeologists, however, agree that these monuments were erected by the neolithic race or group of races, who used polished stone axes, and that this complex of races originated in the east, perhaps between the Caspian and Black Seas, migrated into Europe, bringing with them the cereals, flax, and the domestic

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animals and burial practices, and that they had religious ideas. As compared with the paleolithic races of the Old World, or those who were simply hunters and fishermen, and were of a purer, more savage, and primitive race, the neolithic peoples were a most composite type. To narrow down the problem, the French archeologists acknowledge that the megalithic monuments of France were of the same age as the pile-dwellings at Robenhausen, near Zurich, which are of the polished stone age. It is well known that the lake-dwellers of Switzerland, as the centuries went on, received from the east and south bronze implements, and a knowledge of the art of making bronze tools. It is also known that the dolmens of Northwestern France were still used as places of burial as late as the beginning of the bronze age. Hence it seems natural to infer that the people who built these monuments were the ancestors of the Celt-speaking Welsh, Irish, and Bretons. The Robenhausen civilization was not probably much older than that of Egypt; and it seems reasonable to suppose that the menhirs and dolmens of France were of recent age, compared with the troglodytes of Spy and Neanderthal, the cave-dwellers of Cro-Magnon, of Dordogne, and of Kent's Hole or the men of the Mentone rock-shelters.

At all events---and this is the great charm of such inquiries---the problem is as yet unsolved. We may wander up and down these alignments, so weird and awe-inspiring, and speculate as to what manner of men were their builders. Few places in the world are enveloped in such an atmosphere of myth and doubt. The very people now inhabiting these stone-studded plains, perhaps their remote descendants, speak a semi-fossil language, go about among these monuments of the dead in a funereal garb of black, still cherish a few pagan, almost prehistoric, superstitions. They can readily talk with Celtic, Irish, and Welsh, but French is a foreign language to them; and, in short, they are a link between the present and the age of stone. Many English travelers visit this strangely interesting region. Why is it that so few Americans care to wander to the Morbihan?

MSH-009 THE FARMER'S YEARS. II. CARNAC AND ITS ENVIRONS

Lockyer, Norman; Nature, 66:104-107, May 29, 1902.

It has long been known that the stones which compose the prehistoric remains in Brittany are generally similar in size and shape to those at Stonehenge, but in one respect there is a vast difference. Instead of a few, arranged in circles, as at Stonehenge, we have an enormous multitude of the so-called menhirs arranged in many parallel lines for great distances.

The literature which has been devoted to them is very considerable, but the authors of it, for the most part, have taken little or no pains to master the few elementary principles which are necessary to regard the monuments from the point of view of orientation.

It is consoling to know that this cannot be said of the last published contribution to our knowledge of this region, which we owe to Monsieur F. Gaillard, a member of the Paris Anthropological Society and of the Polymathic Society of Morbihan at Plouharnel.¹

¹ "L'Astronomie Préhistorique." Published in "Les Sciences Populaires, revue mensuelle internationale," and issued separately by the administration des "Sciences populaires," 15 Rue Lebrun, Paris.

M. Gaillard is a firm believer in the orientation theory and accepts the view that a very considerable number of the alignments are solstitial. But although he gives the correct azimuths for the solstitial points and also figures showing the values of the obliquity of the ecliptic as far as 2200 B. C., his observations are not sufficiently precise to enable a final conclusion to be drawn, and his method of fixing the alignments and the selection of the index menhir is difficult to gather from his memoir and the small plans which accompany it, which deal with compass bearings only.

All the same, those interested in such researches owe a debt of gratitude to M. Gaillard for his laborious efforts to increase our knowledge, and will sympathise with him at the manner in which his conclusions were treated by the Paris anthropologists. One of them, apparently thinking that the place of sun rising is affected by the precession of the equinoxes, used this convincing argument:---"Si, a Porigine les alignments etaient orientes, comme le pense M. Gaillard, ils ne le pourraient plus etre aujourd'hui; au contraire, s'ils le sont actuellement, on peut affirmer qu'ils ne l'etaient pas alors!"

M. Gaillard is not only convinced of the solstitial orientation of the avenues, but finds the same result in the case of the dolmens.

I cannot find any reference in the text to any orientations dealing with the farmers' years, that is with amplitudes of about 24° N. and S. of the E. and W. points; but in diagrams on pp. 78 and 127 I find both avenue and dolmen alignments, which within the limits of accuracy apparently employed may perhaps with justice be referred to them; but observations of greater accuracy must be made, and details of the heights of the horizon at the various points given, before anything certain can be said about them.

I append a reproduction of one of M. Gaillard's plans, which will give an idea of his use of the index menhir. It shows the cromlech and alignments at Le Menec. The line A---Soleil runs across the stone alignments and is fixed from A by the menhir B, but there does not seem any good reason for selecting B except that it appears to fall in the line of the solstitial azimuth according to M. Gaillard. But if we take this azimuth as N. 54° E., then we find the alignments to have an azimuth roughly of N. 66° E., which gives us the amplitude of 24° N. marking the place of sunrise at the beginning of the May and August years, and the alignments may have dealt principally with those times of the year.

I esteem it a most fortunate thing that while I have been casting about as to the best way of getting more accurate data, Lieutenant Devoir, of the French Navy, and therefore fully equipped with all the astronomical knowledge necessary, who resides at Brest and has been studying the prehistoric monuments in his neighbourhood for many years, has been good enough to write me a long letter giving me the results of his work in that region, in which the problems seem to be simpler than further south; for while in the vicinity of Carnac the menhirs were erected in groups numbering five or six thousand, near Brest they are much more restricted in number.

Lieut. Devoir, by his many well-planned and completely accurate observations, has put the solstitial orientation beyond question, and, further, has made a most important observation which establishes that the May and August sunrises were also provided for by a system of alignments. He permits me to make the following extracts from his letter:-

"It is about twelve years ago that I remarked in the west part of the Department of Morbihan (near Lorient) the parallelism of the lines marked out by monuments of all sorts, and frequently oriented to the N. E., or rather between N. 50° E. and N. 55° E. I had ascertained, moreover, the existence of lines perpendicular to the first named, the right angle being very well measured.

"The plans, which refer to the cantons of Ploudalmezeau and of St. Renan (district of Brest) and of Crozon (district of Chateaulin), have been made on a

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plane-table; the orientations are exact to one or two degrees.

In the cantons of Ploudalmezeau and St. Renan, the monuments are generally simple; seven menhirs possible of enormous dimensions, remarkable by the polish of their surface and the regularity of their section. The roughnesses hardly ever reach a centimetre; the sections are more often ovals, sometimes rectangles with the angles rounded or terminated by semicircles. In the canton of Crozon the monuments are, on the contrary, complex; we find a cromlech with an avenue leading to it of a length of 800 metres, another of 300 metres. Unfortunately, the rocks employed (sandstone and schist from Plungastel and Crozon) have resisted less well than the granite from the north part of the Department. The monuments are for the most part in a very bad condition; the whole must, nevertheless, formerly have been comparable with that of Carnac-Leomariaquer.

"For these two regions, granitic and shistose, the results of the observations are identical.

"The monuments lie along lines oriented S. 54° W. - N. 54° E. 54° = azimuth at the solstices for L - 48° = 28° 30' and i = 23° 30') and N. 54° W. - S. 54° E. Some of them determine lines perpendicular to the meridian.

"One menhir (A), 6m. 90 in height and 9m. 20 in circumference, erected in the small island of Melor (canton of Ploudalmezeau, latitude 48° 29' 05") a few metres from a tumulus surrounded by the ruins of a cromlech (B and C), has the section such that the faces 1 and 2, parallel and remarkably plane, are oriented N. 54° E.

"At 1300 metres in the same azimuth there is a line of three large menhirs (D, E, F) of which one (E) is overthrown. The direction of the line passes exactly by the menhir A. Prolonged towards the N. E. it meets at 3k, 700m, an overthrown block of 2m. 50 in height, which is without doubt a menhir: towards the S. W. it passes a little to the south some lines of the island Molene...

"There exists in the neighborhood other groups, forming also lines of the same orientation and that of the winter solstice. It is advisable to remark that orientations well determined for the solstices are much less so for the equinoxes, which is natural, the rising amplitude varying very rapidly at this time of year.

"The same general dispositions are to be found in the complex monuments of the peninsula of Crozon. I take for example the alignments of Lagatjar. Two parallel lines of menhirs, GG' IIII', are oriented to S. 54° E. and cut perpendicularly by a third line, II'. There existed less than fifty years ago a menhir at K, 6 metres high, which is to-day broken and overturned. This megalith, known in the country by the name of 'pierre du Conseil' (a bronze ax was found underneath it) gives with a dolmen situated near Camaret the direction of the sunrise on June 21.

"I have just spoken of the lines perpendicular to the solstitial one; there exists more especially in the complex monuments another particularity which merits attention. Between two monuments, M and N, on a solstitial line, sometimes other menhirs are noticed, the line joining them being inclined 12° to the solstitial line, always toward the east."

I must call particular attention to this important observation of Lieut. Devoir, for it gives us the amplitude 24° N., the direction of sunrise at the beginning of the May and August years. It shows moreover, that, as at Le Menec according to M. Gaillard, the solstitial and May-August directions were both provided for at the monuments in the neighborhood of Brest so carefully studied by Lieut. Devoir.

I think I have already stated that there is evidence at Stonehenge that the sun at the beginning of the May and August years was observed, so that in this we have another point common to the British and Breton monuments.

Lieut. Devoir points out the wonderful regularity of form and the fine polish of many of the menhirs. The one at Kerolas (11 metres high) heads the list in point

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of size; others in the island of Melon (7 metres), at Kergadion (8 metres and 10 metres), Kerenneur, Kervaon and Kermabion follow suit. He considered them to have been erected at the time of the highest civilisation of the Megalithic peoples. It will be of interest to inquire whether they are generally associated with solstice alignments. He states that these regularly formed menhirs do not exist at Carnac, or in the region of Pont l'Abbe, so rich in other remains. It may be, then, that in these localities the May-August worship predominated, and that the index menhirs of M. Gaillard which do not form part of the alignments were erected subsequently.

The remainder of the article deals with religious festivals. The article above is the second of two. The first part appeared in Nature 65:248-250, January 16, 1902, and contains nothing of interest from the standpoint of these sourcebooks.

MSH-010 ON SOME POINTS IN ANCIENT EGYPTIAN ASTRONOMY

Lockyer, J. Norman; Nature, 45:296-299, January 28, 1892.

Lockyer, editor of Nature for many years, did considerable pioneering work on ancient astronomy. Many of his papers appeared, like the present one, in Nature. Lockyer's papers are usually too long to quote fully, and only a few excerpts are presented below.

I have recently been prosecuting some inquiries on the orientation of Egyptian temples which have led me to the conclusion that in all probability the temples, and the gods and goddesses in the Egyptian Pantheon to which they were dedicated, were in some way connected with the sun and certain stars. The method adopted in the research has been as follows:-

(1) To tabulate the orientations of some of the chief temples described by the French Commission, Lepsius, and others.

(2) To extend and check some of these observations with special reference to my new point of view, in Egypt.

(3) To determine the declinations to which the various amplitudes correspond. In this direction I have made use of the Berlin Catalogue of star places from 1800 A.D. to 2000 B.C., some places for Sirius and Canopus which have been obligingly placed at my disposal by Mr. Hind, and approximate values given by the use of a precessional globe constructed for me by Mr. Newton. This globe differs considerably from that previously contrived by M. Biot, about which I was ignorant when I began the work, and enables right ascensions and declinations, but especially the latter, to be determined with a fair amount of accuracy for twenty-four equidistant points occupied by the pole of the earth round the pole of the ecliptic (assumed to be fixed) in the precessional revolution.

(4) Having the declinations of the stars thus determined for certain epochs, I have next plotted them on curves, showing the amplitude for any year up to 5000 B.C. at Thebes for a true horizon and when the horizon is raised 1° or 2° by hills or mist.

(5) In cases where the date of the foundation of a temple dedicated to a particular divinity has been thoroughly known, there was no difficulty in finding the star the declination of which at the time would give the amplitude, and, in the case of series of temples dedicated to the same divinity, an additional

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check was afforded if the changes of amplitude from the latest to the newest temple agreed with the changes of the declinations of the same star.

This method also enabled me to suggest that certain temples, the date of foundation of which was not known, if they formed part of the same series, would thus have the date of original foundation determined.

(6) These results led me to the conclusion that certain stars had been used for temple purposes, to the exclusion of others.

(7) The next point, therefore, was to determine why these stars had been selected, and not others; and the precessional globe was used to study these stars, in relation to their heliacal rising and setting at different times of the year, but especially at the summer solstice.

(8) The *raison d'etre* of the use of these stars at once became evident in a very remarkable fashion, and indicated that observations of them might certainly have been made to herald sunrise.

In some cases the star rose heliacally with the sun, or thereabouts; in others, it set heliacally---that is, when the sun was 10° below the eastern horizon.

In a paper presented to the Society of Antiquaries in May last, and elsewhere, I have given reasons to show that the temple of Amen-Ra at Karnak was built in such a manner that at sunset at the summer solstice---that is, on the longest day in the year---the sunlight entered the temple and penetrated along the axis (more than a quarter of a mile in length) to the sanctuary. I also pointed out that a temple oriented in this manner truly to a solstice was a scientific instrument of very high precision, as by it the length of the year could be determined with the greatest possible accuracy provided only that the observations were continued through a sufficient period of time.

All the temples in Egypt, however, are not oriented in such a way that the sunlight can enter them at this or any other time of the year. They are not therefore solar temples, and they have not this use. The critical amplitude for a temple built at Thebes so that sunlight can enter it at sunrise or sunset is about 26° north and south of east and west, so that any temples facing more northly or southly are precluded from having the sunlight enter them at any time in the year.

Thus at Karnak, to take an instance, there are two well-marked series of temples which cannot, for the reason given, be solar, since one series faces a few degrees from the north, and the other a few degrees from the south. There are similar temples scattered all along the Nile Valley. The first question, then, to ask of the inscriptions is if there are records that these temples were directed to stars, as the solar temples were to the sun?

Lockyer relates in considerable detail the descriptions of several temples, the ceremonies probably performed in them, and their stellar alignments. He concludes this installment with this interesting statement.

I may here remark that, so far as I know, Edfu is the only temple in Egypt on the meridian. If, therefore, it were used, as on my theory all other temples were, it could only have picked up the light from each of the southerly stars, as by the precessional movements they were brought into visibility very near the southern horizon.

In this respect, then, it is truly a temple of Horus, in relation to the southern stars---the southern eyes of Horus. But it was not a sun-temple in the sense that Karnak was one; and if ceremonies were performed for which light was required, perhaps the apparatus referred to by Dupuis (vol. i. p. 450) was utilized. He mentions that in a temple at Heliopolis, whether a solar temple or not is not stated, the temple was flooded all day long with sunlight by means of a mirror. I do not know the authorities on which Dupuis founds his statement,

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but I have no doubt that it is amply justified, for the reason that doubtless all the inscriptions in the deepest tombs were made by means of reflected sunlight, for in all freshly-opened tombs there are no traces whatever of any kind of combustion having taken place even in the innermost recesses. So strikingly evident is this that my friend M. Bouriant, while we were discussing this matter at Thebes, laughingly suggested the possibility that the electric light was known to the ancient Egyptians.

With a system of fixed mirrors inside the galleries, whatever their length, and a movable mirror outside to follow the course of an Egyptian sun and reflect its beams inside, it would be possible to keep up a constant illumination in any part of the galleries, however remote.

Many other writers have remarked how the interiors of the pyramids are free from the soot of torches and other primitive forms of lighting. In connection with the remark about the Egyptians possibly being familiar with electric lighting, several Egyptian frescoes show "equipment" closely resembling modern electrical apparatus! See, for example, the issues of Pursuit.

SH-011 A PRELIMINARY STATEMENT OF AN INVESTIGATION OF THE DATES OF SOME GREEK TEMPLES AS DERIVED FROM THEIR ORIENTATION

renrose, F. C.; Nature, 45:395-397, February 25, 1892.

Mr. Lockyer has made out I think quite satisfactorily that the Egyptian temples were so oriented that the rising or setting of some conspicuous star on or near the axis of the temple, and visible from the adytum, would give warning of sunrise; and he applied to me for particulars of Greek temples for the purpose of seeing if there was any analogy, and the comparison appeared to promise a favourable result. Mr. Lockyer had found, before he had proceeded far in these studies, that he had been anticipated to a considerable extent by Herr Nissen, of Bonn, who has published several articles on the subject in the Rheinisches Museum of Philologie, and has brought within his scope both the Egyptian and the Greek temples. There is room, however, in the inquiry for a distinct work on the Greek temples, and especially with the help of more exact measurements of the orientation angles than Herr Nissen has made use of; as he appears to have contented himself with magnetic bearings---which are liable to considerable local variations, which are sufficient in an inquiry like the present to vitiate many of the conclusions that may be founded on such measurements---and there is a want of recognition of the influence of an elevated horizon. I had taken, in several instances, astronomic observations with a view to the more exact orientation of different temples, but something more is wanted even in the case of most of these---namely, the apparent altitudes of the mountains in the directions of the axes of the temples.

.....
The great value of the inquiry lies in this: that it offers a means of determining, within tolerably close limits, the date of the foundation of a temple---not, perhaps, in most cases (although in some I believe it does) of the very structure which we now see, but of an earlier foundation on the same site. The key to the chronology lies in the movement of the stars with reference to the

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local horizon, owing to what is called the precession of the equinoxes. The object the ancients had in using the stars was to employ their rising and setting as a clock to give warning of the sunrise, so that on the special feast days the priests should have timely notice for preparing the sacrifice or ceremonial, whatever it may have been:

"Spectans orientia solis
Lumina rite cavis undam de flumine palmis
Sustulit," &c.

The inquiry, even in its present state, is sufficient to establish a very high probability that the principle is a true one. There is nothing vague about it. It has to be kept within very severe limits, and it holds good nevertheless.

No stars can be accepted except from among the brightest, unless conspicuous star groups may have been used instead. Again, of single stars, only such can have been used for orientation in Greek temples which during a period not incompatible with reasonable archaeology rose or set very near the line of the sun's course at some period of the year; and a further restriction is this, that the rising or setting must be just so far in advance of sunrise as to enable the star to be seen from the adytum of the temple, and, at the same time, not preceding it by any longer interval than is necessary.

If, in addition to this, we find, as is frequently the case in the Egyptian temples, and is not without parallel in Greece, that as the star to whose point of rising or setting the axis of a temple was first aimed worked away from its then position by precession, either the doorway of the temple was altered, or a new temple founded alongside, so as to retain the desired observation; and in every case of such new temple being so built it is found to have followed the same cult as the original; if, in addition to this, in different provinces temples are found of which the cult is known, and which are so planned as to be able to use the same star---with such decided differences of orientation, however, as were prescribed by latitude and the local circumstances of the surrounding heights---we obtain a further strong corroboration, and one that will in many cases be sufficient to determine the cult, where this has not been otherwise pointed out.

One further step requires to be taken to occupy the ground with perfect confidence---viz. to inquire what analogy is there between the days of the month when the sun would rise ushered in, as it may be said, by the temple's peculiar star, and the days of the festivals as derived from historical sources. In this comparison we must not expect a coincidence on every point.

The date of the temple foundation in many cases is pre-Homeric, whilst the basis of the historical account of the date of the feast is probably post-Persic. There may have been an interval of nearly 1000 years between the two, so that there is room for changes. Again, owing to their double system of reckoning months and years, considerable variation in the dates given by Mommsen, whose authority I mainly follow, is quite possible; and besides this, in some of the cases given below, the orientation day, if I may so call it, may be in fault one or possibly two days for want of the exact particulars of the site to which I have made allusion.

Firstly, speaking of Attic feasts, the great temple at Eleusis is an example very much to the point. The star which seems to have determined the orientation is Sirius, shining as it rose at midnight along the axis of the temple on September 14. The Eleusinian mysteries are stated to have commenced on the 16th of that month. In this case the sun was not looked for; the weird light of the star reflected from some combination of jewels was more likely to have been suited to the mysteries. It is perhaps less likely that this ceremony would have been changed than in most of the other cases.

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The axis of the older Erechtheum had the central star of the fine constellation Aquarius setting heliacally on August 9.

Warning of the sunrise at Sunium was given by the setting of the Pleiades on October 20.

The star α Arietis rose heliacally to the older Olympieum at Athens, April 2, more than 1000 years B. C.

The temple of Diana Brauronia on the Acropolis of Athens agreed with the rising of Aquarius (the central star Aquarii in particular) on February 21 at the presumed date of its foundation.

The lesser Panathenaia, dated August 13-14.

The feast to Minerva and Vulcan is dated October 30.

The feast Olympia is recorded for April 19 in later times.

The Little Mysteries were celebrated February 21. N. B. A temple of Diana was in close connection with the great temple at Eleusis.

Other Greek temples are examined in the manner just described. The results tend to confirm the author's thesis. Penrose found that the temples of Minerva, the Hecatompedon, and Sunium were oriented toward the Pleiades---that group of stars with special significance to the ancients.

Penrose and most other investigators of ancient oriented structures assume automatically that the purpose was to predict celestial events for religious purposes. This is a condescending attitude, although perhaps true for later cultures. There is always the possibility that very ancient astronomical observations were made to predict periodic natural phenomena, such volcanic and seismic outbursts, destructive meteor bombardments, or even climatic cycles.

MSH-012 THE ORIENTATION OF ANCIENT MONUMENTS

Greasted, Fred. F.; Nature, 45:464, March 17, 1892.

The deeply interesting results obtained by Mr. Norman Lockyer with regard to the orientation of Egyptian temples, and by Mr. F. C. Penrose with regard to the Greek, tempt me to call attention to an extract from the Century Magazine, May 1883, from an article by Frank Cushing, describing a visit to the Zunis, a typical tribe of the Pueblo Indians of New Mexico, in 1879:-

"Each morning just at dawn, the Sun priest, followed by the master priest of the Bow, went along the eastern trail to the ruined city of Ma-tsa-ki by the river side, where, awaited at a distance by his companion, he slowly approached a square open tower, and seated himself just inside upon a rude ancient stone chair, and before a pillar sculptured with the face of the sun---the sacred hand---the morning star and the new moon. There he awaited, with prayer and sacred song, the rising of the sun. Not many such pilgrimages are made ere the 'suns look at each other,' and the shadows of the solar monolith, the monument of Thunder Mountain, and the pillar of the Gardens of Zuni lie along the same trail; then the priest blesses, thanks, and exhorts his father, while the warrior guardian responds as he cuts the last notch in his pine-wood calendar, and both hasten back to call from the house-tops the glad tidings of the return of spring. Nor may the Sun priest err in his watch of Time's flight; for many are the houses in Zuni with scores on their walls or ancient plates embedded therein, while opposite a

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convenient window or small port-hole lets in the light of the rising sun, which shines but two mornings of the 365 on the same place. Wonderfully reliable and ingenious are these rude systems of orientation, by which the religion, the labo and even the pastimes of the Zunis are regulated."

In like manner, we read in Prescott that at Quito the festival of the Sun-god was held when "he sat upon the pillar," i. e. a pillar cast no shadow.

Might not this Zuni ceremonial be a description of one enacted at some primitive astronomical temple such as Stonehenge and do we not gain the best insight into the minds of those who in the Archaic period first oriented---the Babylonian and Assyrian ziggurats, the pyramids and temples of Egyptian temples of Greece, and our own Stonehenge---by seeing how people in a similar stage of intellectual and scientific development are acting to-day?

MSH-013 ON THE EARLY TEMPLE AND PYRAMID BUILDERS

Lockyer, J. Norman; Nature, 48:55-58, May 18, 1893; 49:371-372, August 17, 1893.

I have in previous articles discussed the orientation of many temples in various parts of Egypt. It will have been seen that it has been possible to divide them into solar and stellar temples, and that in the case of the former both solstices and equinoxes have been in question.

I have also referred to the very considerable literature which already exists as to the pyramids, and shown how the most carefully constructed among them are invariably oriented truly to the four cardinal points, and further that it is possible that some parts of their structures might have served some astronomical purpose, since astronomical methods must certainly have been employed in their construction.

It has also been suggested that the fundamental difference between solstitial and equinoctial worships indicated by the solstitial temples and the pyramids required nothing less than a difference of race to explain it. I propose now to inquire if there be any considerations which can be utilised to continue the discussion of the question thus raised on purely astronomical grounds. It is obvious that if sufficient tradition exists to permit us to associate the various structures which have been studied astronomically with definite periods of Egyptian history, a study of the larger outlines of that history will enable us to determine whether or not the critical changes in dynasties and rulers were or were not associated with critical changes in astronomical ideas as revealed by changes in temple-worship. If there be no connection the changes may have been due to a change of idea only, and the suggestion of a distinction of race falls to the ground.

In a region of inquiry where the facts are so few and difficult to recognise among a mass of myths and traditions, to say nothing of contradictory assertion by different authors; the more closely we adhere to a rigidly scientific method of inquiry the better. I propose to show, therefore, that there is one working hypothesis which seems to include a great many of the facts, and I hope to give the hypothesis and the facts in such a way that if there be anything inaccurately or incompletely stated it will be easy at once to change the front of the inquiry and proceed along the new line indicated.

.....

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The working hypothesis is as follows:-

1. The first civilisation as yet glimpsed in Egypt, represented by On or Heliopolis, was a civilisation with a solstitial solar worship associated with the rise of the Nile. A northern star was also worshipped.

2. Memphis (possibly also Sais, Bubastis, Tanis, and other cities with east and west walls) and the pyramids were built by an invading race from a land where the worship was equinoctial. A star rising in the east was worshipped at the equinox.

3. The blank in Egyptian history between the sixth and eleventh dynasties was associated with conflicts between these races, which were ended by the victory of the representatives of the old worship of On. After them pyramid building ceased and solstitial worship was resuscitated; Memphis takes second place, and Thebes, a southern On, so far as solstitial solar worship is concerned, comes upon the scene as the seat of the twelfth dynasty.

4. The subsequent historical events were largely due to conflicts with intruding races. The intruders established themselves in cities with east and west walls, and were on each occasion driven out by solstitial solar worshippers who founded dynasties (eighteenth and twenty-fifth) at Thebes.

Lockyer next reviews the history of ancient Egypt.

It will be seen then that a general survey of Egyptian history does suggest conflict between two races, and this of course goes to strengthen the view that the temple building phenomena suggest two different worships, depending upon race distinctions.

We have next to ask if there is any anthropological evidence at our disposal. It so happens that Virchow has directed his attention to this very point.

Premising that a strong race distinction is recognised between peoples having brachycephalic or short, and dolichocephalic or long, skulls, and that the African races belong to the latter group, I may give the following extract from his paper:-

"The craniological type in the Ancient Empire was different from that in the middle and new. The skulls from the Ancient Empire are brachycephalic, those from the new and of the present day are either dolichocephalic or mesaticephalic; the difference is therefore at least as great as that between the dolichocephalic skulls of the Frankish graves and the predominantly brachycephalic skulls of the present population of South Germany. I do not deny that we have hitherto had at our disposal only a very limited number of skulls from the Ancient Empire, which have been certainly determined; that therefore the question whether the brachycephalic skull-type deduced from these was the general or at least the predominant one cannot yet be answered with certainty, but I may appeal to the fact that the sculptors of the Ancient Empire made the brachycephalic type the basis of their works of art too."

It will be seen, then, that the anthropological as well as the historical evidence runs on all fours with the results to be obtained from such a study of the old astronomy as the temples afford us.

MSH-014 ORIENTATION OF TEMPLES BY THE PLEIADES

Haliburton, R. G.; Nature, 48:566-567, October 12, 1893.

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The question taken up by Haliburton concerns the great attention paid the Pleiades by ancient peoples the world over. Why did this single constellation have so much significance?

Eighteen months ago, while at the Mena House, Cairo, I came across a back number of Nature, which contained an article on "The Origin of the Year," in which reference is made to the orientation of some Egyptian temples, and I suggested that inquiries should be made as to whether they were not in some cases oriented by the Pleiades. I had not then seen the numbers that referred to stellar orientation.

A pamphlet of 105 pp. was privately printed by myself thirty years ago (!) for my own use in the prosecution of "A Comparison of the Calendars and Festivals of Nations," with special reference to the Pleiades.

Since that pamphlet, and a second, of about 20 pp. on cycles regulated by the Pleiades, were printed, I have collected a great deal of further data confirming the conclusions arrived at in 1863. Muller says, in his Religion, &c., of the Dorians, l. 337, that the famous eighth-year cycle, which was in general use in Greece, was luni-sidereal, and regulated by the Pleiades, and that the great feasts of Apollo at Delphi, Crete, and Thebes, were arranged by it. He also states (p. 338) that there are vestiges of a sacred calendar in general use in Greece in early ages based on this cycle, but that it fell into disuse, and, in consequence, the Attic festivals and months were thrown into confusion. He had previously stated that the Olympiads were based on the eight-year cycle. Apollo, generally assumed to have been essentially a solar deity, though he evidently was originally a type of Karlikeya, was a god of the Pleiades, and hence the seventh day was sacred to him at Athens. As those stars were the daughters of Atlas, the forty days during which they deserted the nightly sky were spent by Apollo in dancing and singing among the Hyperboreans of Marias. When the rising of the Pleiades at early morning took place, he returned. In 1882, at the American Association, I showed that he is still remembered south of the Atlas as "Apollo, a good god, who comes and plays upon the harp." But in the lapse of centuries the Pleiades seemed to go astray, and were forgotten, and, strange to say, Athenaeus was forced to treat the history of the Pleiades as a bit of obsolete folk-lore. In discussing the subject of the two groups of Pleiades on the handles of the divining cup of Nestor, he says that it is a mistake to suppose that Homer by Pleiades meant "doves" (a mistake which Mr. Gladstone has also made in his Homeric Studies), and he explains that the cup had two clusters of seven stars represented on it. Many persons, he says, are puzzled at the prominence thus given to those stars, but in early times they were regarded as very important, and left their impress on early mythology, and he also shows that they once regulated the time of sowing, and the season for navigation. He goes at great length into the question in his Deipnosophists; and I invite the attention of those who wish to know something as to the early history and influence of the Pleiades to the work in question.

As Plutarch says that the great feast of Isis was always held at the time "when the Pleiades are most conspicuous," and I found that the month of Athyr, in which it was held, was described as "the shining season of the Pleiades," I sent, in 1865, a copy of my pamphlet to Prof. C. P. Smyth, before he went to Egypt, and invited his attention to the probability that those stars were in some way indicated by the Great Pyramid.

The recent discovery by Mr. Penrose that the Hecatompedon site of the Par non, and other archaic Greek temples were oriented by the Pleiades, lends a new interest to this subject.

This diversity of orientation has had a far wider range than has been supposed, for nearly forty years ago it was noticed in the Mississippi mounds by Squier and

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Davis; and was long ago detected in several early churches of the south of England, a very remarkable fact, which I think was referred to at the Anthropological Institute. As it greatly surprised and interested me, I made a careful note of it when it was published, which I regret that I cannot now hunt up, as I am preparing to leave England for the winter; but as the point cannot have escaped the attention of others, some one among your readers will perhaps be able to give you further information as to it.

Nature of August 31 contains an interesting letter on the importance of the study of the date of the birth of Rama by competent astronomers. For several years I have been trying to find out what was the precise time of the year when Kartikeya was born--"The Birth of the War God" does not refer to it. There is a most interesting subject which is new to science, the connection of the Pleiades with the nativity of divine heroes. I think I can at last supply a clue to the Star of Bethlehem (which Kepler imagined to have been a conjunction of planets!) in "the Christmas Stars," of the negroes, and other African races.

MSH-015 MYSTERY OF THE PREHISTORIC STONE BALLS

Lothrop, Eleanor; Natural History, 64:372-377, September 1955. (Reprinted with permission from Natural History Magazine, September, 1955. Copyright © The American Museum of Natural History, 1955.)

As the unscientific wife of a scientist, who for years has tagged along on archaeological expeditions, I have witnessed many seemingly unexplainable discoveries, but none has provided a greater challenge or teased my imagination more acutely than the unbelievable stone balls found in Central America. The riddles they pose would threaten the deductive powers of a Sherlock Holmes.

Why should hundreds of these perfectly shaped spheres, ranging in diameter from a few inches to eight feet, be scattered through the jungles of southwestern Costa Rica? How could prehistoric people have shaped them with only the crudest of tools? And how could they have moved them over hill and dale from the distant sources of stone? No other stone balls of like size have been found anywhere else in the world, except for a few in the highlands of Guatemala and in Vera Cruz. The smooth, beautiful, and almost perfectly rounded spheres give mute testimony to the artistic powers of an ancient people and tax modern man's ingenuity in explaining their workmanship and significance.

My acquaintance with them came about by pure chance.

A few years ago, my husband and I had made plans to spend the winter digging in a small Costa Rican town called Filadelfia, near the Nicaraguan border, where we had begun work the winter before. We reached Costa Rica prepared for any emergency, or so we thought, but we had overlooked the possibility of a revolution. There had been shooting and a few murders near the Nicaraguan frontier, bandits were taking advantage of the situation to loot the countryside, and Filadelfia might well be on their route. We wanted to keep to our plan, but the Lothrop's were not thought to be worth a possible international incident, and Filadelfia was declared definitely out of bounds.

Two weeks after our arrival in Costa Rica, we were comfortably ensconced in the house of friends in San Jose, with no apparent prospect of getting any further. Neither Sam nor I was happy. We were feeling especially desperate one day when our hostess came forth with the magic word "Palmar."

"Palmar? What's that?" asked Sam.

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"A banana plantation on the Panamanian border," she answered.

"And what do you find there besides bananas?" asked Sam, without much enthusiasm.

"Well," said our hostess, "there may be ancient burials, although I'm not entirely sure. But there are some very strange stone balls---obviously prehistoric, though no one knows what they represent or where they come from."

"No one knows?" said Sam. His eyes lit up, and his face took on the look of a bloodhound about to be let loose on the scent. After all, the work of an archaeologist and a detective is basically the same, with the small difference that a detective gets much better pay.

"Let's go to Palmar," said Sam. At Palmar, we found that the United Fruit Company had built an elaborate settlement for their employees in the midst of a steaming jungle some twelve miles from the Pacific coast. We were allotted the comfortable house of a vacationing employee and were soon looking for the stone balls. We didn't have far to go. Next door was the house of the company manager, and beyond it a public park. In the exact center of the park was a perfectly rounded sphere about three feet in diameter.

"Sam, we've found it," I cried, feeling like Archimedes, or perhaps Mrs. Archimedes.

"H! exclaimed the company manager. "Why, there are lots of them. Are you interested?"

We admitted we were very much interested, and the company manager straightway took us on an inspection tour. We crisscrossed thousands of acres under cultivation, and the countryside fairly teemed with stone balls. The company manager seemed to know each one personally and stopped the car six or seven times us to get out and take notes. A few days later we started work in earnest.

In two months we examined 60-odd balls in their original locations, some in ground where they had been covered with silt from overflowing rivers. There must have been hundreds or even thousands we didn't see. There were also great chunks of rock, the remains of balls that superstitious natives had blasted to bits in the belief that they might contain gold.

The balls were almost all carved from the local lava, and they varied in size and workmanship. Even the poorer ones, however, were extraordinarily well made, and our measurements showed that the ones that had apparently been shaped by the Epstein of that time were nearly perfect spheres.

On the morning we started work, I was surprised to see that Sam's equipment consisted of a tape measure and a fishing line with a lead sinker hanging from the end of it.

"Where's your hook?" I asked, wondering if he had decided to have a day's fishing on the near-by river.

He gave me a long-suffering look. This is a plumb bob," he explained. "It is attached to what is called a plumb line." He spoke slowly and clearly as if to a child. "As the bottom of many of the big balls are underground, and it would take too long to dig them out, we will use the plumb bob to measure their diameters to find out if the balls are perfectly round. See?"

"Of course," I said at once, although I didn't see at all.

I still don't see, although for many days I watched Sam performing incredible gyrations with plumb line dangling from one hand and tape measure clutched in the other, while I ran around blindly jotting down figures.

The first site we tackled contained three enormous stone balls, and after several hours of mysterious computations, Sam pronounced all three to be six feet in diameter and practically perfect spheres.

"Good," I said with relief, as the temperature had reached 94 degrees and my head ached. "Let's go home and have a cold drink."

"Not at all," said Sam. "As long as the diameters don't show any variation,

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we'd better take the circumferences."

"Why?" I asked, which is the word I use most frequently on archaeological trips.

Sam sighed. "Because anything that is six feet in diameter must be almost twenty feet in circumference, and errors will therefore be more easily detected."

This time I swallowed the "why" because I recognized that no explanation would make a mathematician of me. So we enlisted the aid of two workmen to help hold the tape.

Even so, it was a difficult job. We took five circumferences on each of the first two balls. Sometimes I would climb on top of the sphere, sometimes lie on the ground, and occasionally I tried to stand on my head. When the measurements all turned out to vary less than an inch, I decided we had done an awful lot of work for nothing; but Sam seemed pleased. And Armando, one of our workmen, a youth of 22 who was wildly enthusiastic about everything American, said "Okay." He had mastered two other English phrases: "What's cooking?" and "Nuts to you," neither of which he understood.

It was hard to believe that the stone balls could have been manufactured without some mechanical aid, but no instruments of any kind were found to give us a clue. If the conquering Spaniards ever witnessed the process, which seems unlikely, they made no record of it. As there were no stone quarries in the neighborhood, we asked Armando, who had a life-long knowledge of the surrounding country, whether he had ever seen one.

"Never," he answered. "There are none anywhere near here."

"You're sure?" Sam insisted.

"Sure," said Armando, and added, "Nuts to you."

This time, by pure chance, he had picked the right phrase.

Others we asked agreed that there were no quarries within miles, and we ourselves conducted a fruitless search. The balls must therefore have been manufactured at some remote spot, as the rough blocks could never have been moved any distance. The largest ones must have weighed a great many tons.

It is hard enough to imagine how the Indians managed to roll the finished spheres through overgrown jungle and to the tops of adjacent mountains, where some of them have been found.

"In fact, it's impossible," I said to Sam. "I believe they are some sort of cosmic phenomenon like meteors. Maybe they dropped from the sky."

"If so, it's lucky they didn't hit anyone," said Sam without a smile.

"But seriously," I insisted, "even Man Mountain Dean couldn't have transported one of these enormous things on dry land. And as for crossing the rivers..."

Sam interrupted my eloquence and put me in my scientific place. "The Indians undoubtedly built rafts for carrying them over the rivers in the rainy season when the water was deep."

"But why was it so important to get them here?" I asked. "And why did the Indians bother to make them? It must have taken a man a lifetime just to turn out one, and what could he do with it when it was finished?"

And so, not having done very well with our first problem, we found ourselves up against our second.

The stone balls were obviously of great importance to the people who made them, though they could have had no practical purpose. I spent my time trying to think of every possible use to which they might have been put, even entertaining the notion of games for the kiddies or bowling contests. Some did weigh only a couple of pounds, but most of them would have required an army of men just to set them in place.

"I have come to the conclusion," I finally pontificated, "that the balls had no useful purpose." Which of course Sam had known all along.

"Could they have been for decoration?" I asked.

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Sam shook his head. "They must have had religious significance," he said. "Their position bears out that theory."

"Position?" I asked, completely confused. "How?"

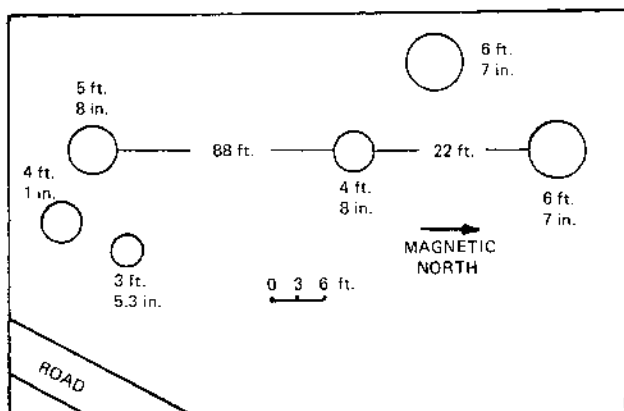
"We've examined five large groups," he explained, "of which at least three appear to be in their original positions. In each case, there was a base line of three, four, or five balls. All these groups had additional balls flanking the main line in such a fashion that three of them formed a triangle. By arranging them this way, various lines of sight were created, which may be of astronomical and ritualistic importance."

"Why?" I asked.

Sam gave me a look of patient forbearance. "Because these lines of sight may very well have had some relationship to the sun, thus showing seasonal changes and helping the people to know the right time of year to plant their crops. In certain regions of the Maya area the Indians built structures for this purpose. Some of the Maya stelae, for example, are linked to astronomy. And here the same result was probably obtained by means of the stone balls."

"But that's a practical purpose," I protested. "Not religious."

"Astronomy and religion were closely associated with the practical pursuits of life such as agriculture," Sam said.



Balls in different groups were often aligned, as shown for the two triangular groups above. (Adapted from MSH-015)

I nodded and tried to look intelligent. It was obvious even to me that the stellas must have a religious significance, if for no other reason than that it was only explanation for them.

The third question---when the balls were made---was the only one for which we found a definite, if only partial, answer. Sam had decided to devote the rest of our stay in Palmar to digging for other evidence of the people who made the balls. This delighted me, because a dig is very much like a treasure hunt; and it delighted

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the workmen even more, who were certain we would find gold. It seems that three years previously a large piece of ground was being prepared for cultivation when a Costa Rican who was driving a bulldozer noticed a glitter in the earth. Jumping out of his machine, he clawed excitedly at the ground until he extracted a pot filled with gold ornaments. He promptly removed his helmet, stuffed it with treasure and disappeared, leaving the engine of the bulldozer running.

He sold six of the pieces in Palmar for about \$240; the rest he took to San Jose where, according to local gossip, he disposed of them for \$7,000, living for one year in the capital in great style on the proceeds. He was now back at his old job penniless after his big fling.

This story had fired the imaginations of all the other Company laborers, and the spot had been pulled to pieces, although nothing more had turned up. The Fruit Company had finally been forced to decree that digging without special permission was illegal.

We found no gold, but we did find two stone balls in one of the first pits we sank. They were not far below the surface, and we dug them out in order to see if there was anything underneath. The balls were resting on stone platforms, so we knew they were in their original positions.

When pottery turned up below the area where the platforms had been placed, Sam's expression resembled that of a man who had found the equivalent of the Kohinoor diamond. The pottery was interesting, and I was pleased too, but Sam's enthusiasm seemed excessive.

"It may give us an idea how old the balls are," he explained.

Sam's optimism was justified. Some of the pottery under one of the stone platforms turned out to be of classical Chiriqui type, best known in western Panama. We already knew from other evidence that this pottery was still being made at the time of the Spanish Conquest. Thus, by the same token, the stone ball found above it must also have been made at approximately the same period. The majority of the stone balls were probably considerably older, but it is safe to say that, although their date of origin is open to speculation, the cult of making stone balls was a late one, continuing into the sixteenth century.

Some day more information may be procured, but meanwhile the balls remain as enigmatical as the huge statues on Easter Island or the monuments of Stonehenge. In each of these places, enormous stones have been quarried, shaped, and moved without mechanical devices except ropes for hauling them and inclined ramps for lifting them.

Maybe our own civilization contains elements of material culture that will survive all knowledge of their purpose. So it goes: one era's triumph is the next era's riddle.

MSH-016 ANCIENT AMERICA'S GEOMETERS

Lear, John; Saturday Review, 47:53-56, October 3, 1964.

Beginning in the neighborhood of 3,000 years ago, and coming up into the era when Christ was born, there lived on the northern land mass of earth's western hemisphere a people who numbered among them remarkably skilled geometers. They had no written language and no wheels, lived always near the water, apparently migrated along the Mississippi River and its tributaries (which is to say over two-thirds of what is now the continental United States), and left behind them thousands of earthworks in the form of perfect squares, perfect circles, perfect

MSH--017 HENGES, ORGANIZED STRUCTURES

squares within perfect circles, polygons with equal sides, ellipses, long lines in exact parallel, sweeping arcs in parallel, rhomboids, and exquisitely proportion magnifications of natural shapes like the Great Serpent pictured on the cover. . . .

Compiler's Summary: Thus begins Lear's article on the famous Poverty Point works---the ruins of a prehistoric planned city in northern Louisiana. The site consists of six concentric octagons, the outer one three-fourths of a mile across. The eastern half of the octagon was apparently washed away about 2000 years ago when the channel of the Arkansas River changed. When complete, the structure was about 35 times the volume of the Great Pyramid. It is estimated that it took 20 million 50-pound basketsfuls of earth to build it. Radioactive dating of artifacts found at Poverty Point span the period from 1300 B. C. to 200 B. C. The intricate nature of the architecture suggests a Mayan origin, but diggers have found copper, quartz, and other minerals from the territory occupied by the Moundbuilders. However, the Moundbuilder culture peaked much later than that at Poverty Point, and archeologists today favor the Mayan hypothesis. Lear's article concludes with a discussion of the problems involved in preserving America's archeological heritage.

MSH-017 A CALENDAR MOSAIC FROM 1000 B.C.

Anonymous; Science News, 103:417-418, June 30, 1973.

Compiler's Summary: Science News presented a digest of a presentation of Alexander Marshack at an AAAS session on archaeoastronomy in precolumbian Mesoamerica. Marshack had analyzed a mosaic pendant made from precisely shaped pieces of pyrite arranged in a geometrical pattern on a ceramic base. This strange artifact was discovered in 1964 at the Olmec site of Las Bocas in West Puebla, Mexico. It has been dated at about 1000 B. C. and is one of the most complex artifacts ever found from that era. To Marshack, the mosaic "revealed an extraordinary arithmetical sequence and pattern."

Each two pieces meet or join along a horizontal straight line. These two, forming a unit, are then joined to another two, along a vertical straight line. These four are joined to another similarly formed set of four below, along a horizontal. This set of eight forms the basic unit of the mosaic, it is joined to a similar set of eight, and in similar ways sets of 16, 32, 64 and 128 are established. All the evidence indicates preplanning and control counting and adjustment in the inlay process, observes Marshack.

The right margin of each section of 128 divides the width of the mosaic into three precisely equal parts. The edge of the third part, unlike the others, is a curve, whose arc begins at precisely the two-third point. Reconstruction of missing pieces along the arc gives a sum for the third section of 98. The total number of days in 12 observational lunar months ($12 \times 29.5 = 354$).

Anomalies in the mosaic's pattern were also found to have astronomical significance. Several participants at the session disagreed that the mosaic could be a lunar calendar. "Where is the evidence for the development of a tradition this complex?"

ISP-001 THE ARCHITECTURE OF THE CIVILIZED RACES OF AMERICA

Peet, Stephen D.; American Antiquarian, 11:205-235, 1889.

Stephen Peet wrote several excellent surveys of American and world archeology. The present one, on architectural similarities, provides a wide panorama of ancient structures and how they compare on different continents. The reader should remember that Peet was bound by the prejudices and hypotheses of his day.

It is well known that the American continent contains the traces of a civilization which existed here long before the advent of the white man. What that civilization was and what its position in the ranks of the other civilization of the world is an important question. It was the impression at the time of the discovery that there was, hidden away in the interior of this continent, a civilization which was quite equal to that which prevailed in most of the European countries. The ancient cities which were then discovered were compared to the cities of the eastern hemisphere. This impression was produced by the reports of the conquerors and by the testimony of the historians, and was not lessened as the conquests proceeded. It appears that new regions were opened before the conquerors and new cities were discovered, each city yielding an untold amount of gold and silver, and, astonishing the people with the magnificent specimens of art and architecture which they presented. It was indeed a tale of wonder and one which excited the greatest surprise throughout the whole of Europe: first, Mexico, with its wonderful mountain lakes, its floating gardens, its streets and bridges, its magnificent palaces, its lofty pyramids and many temples; next, Yucatan, with its ancient cities, its tropical verdure, and its many and varied scenes; next, Peru, with its marvelous display of gold and other treasures, its populous villages, its paved, far-reaching roadways, its powerful system of government, its wonderful Inca dynasty. It was an era of romance and adventure. The world was ready to receive strange tidings, was glad to hear the tales of wonder which followed in close succession. The impression which was formed so early did not soon die away. The testimony of the historians seemed to confirm it, each new author adding to the story some marvelous feature. The impression has continued almost to the present day, and modern historians have thought to vie with the early writers in their descriptions of the magnificence which then prevailed. It was only during the present generation that any doubts arose as to the truthfulness or accuracy of these accounts; but when they arose a literary reaction took place and many have been inclined to go to the opposite extreme. This tendency has also been increased by certain scientific writers, who have been disposed to look upon the accounts of the Spanish historians as altogether imaginative, and have endeavored to reduce everything to a plain matter-of-fact and ordinary condition, such as might correspond with their own theories of the civilizations of the continent. These writers have considered the populations of America to be all the same, calling them all Indians, and have reduced all the systems of government and all the conditions of society under one general class, which with its variations might be in accord with the communistic state and the clan life. Thus we have the two extremes. It will be our endeavor in this paper to so balance the probabilities and weigh the evidence as to decide which of these two classes of writers is the more correct, and to ascertain what the truth is concerning the ancient civilizations of this continent. While so doing we shall avoid the descriptions of the historians and the speculations of the scientific theorists, and shall seek evidence from an entirely different source: namely, the testimony of the monuments. It is well known that new monuments have been discovered and that the old monuments have been studied anew, and much additional testimony has been furnished,

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so that if there were no other reason than this, this of itself would be sufficient for us to go over the ground and take again the testimony of the monuments. So many explorations have occurred during the last thirty and forty years that we can not ignore them, but must take the descriptions which have been furnished by the explorers, and see whether they confirm or refute the testimony of the historians. The testimony which we shall specially examine will be that which comes under the department of which we are treating: namely, primitive architecture. We are to examine the prehistoric monuments to ascertain what their testimony is in reference to architecture. Is it the architecture of a civilized race which they present? If so, what is the position as compared with the architecture of other civilized races? If compared with that of the prehistoric and uncivilized, what rank or grade did it reach? With what age is it to be compared? What style does it represent? What are its peculiarities?

We turn then to the monuments for our evidence. The point which we make is that the monuments furnish a sure index of the civilization, for they not only show the position which was reached by the art and architecture, but also the grade of culture which was reached by the people. Our manner of treating the subject will be by comparison. We are to compare the prehistoric monuments of this country with those of the historic races of the Old World, but we are to take only those which belong to the civilizations of both countries. There is one thing noticeable about the monuments of America: they overlap the early stages of the civilizations of historic lands, and they show after close examination exactly the stage or grade which was reached in this country during the prehistoric times.

Here, Peet equates civilization with architectural accomplishment; a connection which is rather narrow and which perhaps glorifies technology too much. Grand buildings do not necessarily connote grand cultures.

There were, to be sure, several grades of civilization in this country, and these overlapped as many grades in the Old World. Yet we may by comparison ascertain the limits of each, and we may find also the stages of civilization which were correlated to these grades. It is plain that civilization here passed beyond the earliest stages discovered elsewhere, and that it reached a position which entitled it to stand alongside with that found among some of the more advanced of the ancient kingdoms of the Old World. There are indeed some features of it which seem very rude, and if we were to confine ourselves to these we should say that civilization here was at a very low stage, but there are other features which carry it on to a high degree, and if we dwell upon these we shall be convinced that it was at an advanced stage. The question of time is not to be considered, but only the question of degree. In time, the civilizations of the Old World ante-dated by many centuries those of the New World, the earliest rise having been there as early as 2300 B. C.; but here perhaps not earlier than 600 years after Christ, a lapse of nearly three thousand years being found between them. As to the styles of architecture, however, we may conclude that the early stage which was represented by the Chaldean empire has its correlative among the monuments of America, but at the same time the stage which was reached by some of the later Assyrian monarchies has also its correlative. There is significance in this fact. The civilization of the New World had a much more rapid growth than that of the Old World, and yet it seems to have been a growth which was independent and in a parallel line, but separated and isolated.

Civilization in America may have been older than Peet suggests. The Mayan culture probably predates Christ, and some claim that the Tiahuanaco culture in the Lake Titicaca region was much older.

I. We begin with the earliest stage and take the pyramid as the structure which represents it. There are pyramids in America as well as in oriental countries. We therefore have a good opportunity for comparison. The pyramids of America may not be as old as those of Egypt or Chaldea, and yet they are nearly as primitive, and so illustrate the primitive stage of architecture. We shall first take up the pyramids of the Old World and show the differences between them as well as the resemblances, and then compare the American with them. The first specimen will be the famous Temple of Mugheir, which is said to date back to the times of Abraham, and even before. According to Rawlinson it was dedicated to the sun divinity, and was first founded by King Uruk 2230 B.C., the name Ur being suggestive of the Biblical Ur of the Chaldees. The kernel of this solid structure is of sun-dried bricks; the face is divided by buttresses. There are the remains of a terrace, which consists of two oblong steps, the lowest measuring 60 x 40 metres, 12 metres in leight, standing upon a platform six metres above the surrounding country. This is the oldest temple in the world. It is supposed that the Chaldean temple consisted of a simple and massive terrace, crowned by a chapel and richly decorated with gold ornaments; the sides plainly buttressed and solid throughout. The next specimen is that given in the cut which represents the Temple of Borsippa, which tradition makes the same as the tower of Babel; though it was frequently rebuilt, Nebuchadnezzar completing the structure, called it the Temple Pyramid of the Seven Spheres.

This immense hill of rubbish stands entirely isolated in the desert. It has a lower circumference of 685 metres. It is uncertain whether it was all artificial or whether a natural elevation was selected on which to erect a terraced temple. It appears that it was a temple devoted to sun-worship, as many of the terraced temples in Chaldea were. The dimension agrees tolerably well with the six stadia given by Herodotus, as the measure of the first step of the terraced pyramid. There were regularly diminished seven steps in this pyramid, and upon the summit stood the small temple which was devoted to the sun divinity. Each of the seven terraces was dedicated to one of the seven planets and was characterized by its color--the upper, gold; the second, silver; the next, red, blue, yellow, white, and the lowest black, according to the colors assigned to the sun, the moon, Mars, Mercury, Jupiter, Venus and Saturn.

The next specimen represents the pyramid of Meydoum, a pyramid which was erected soon after the pyramid of Gizeh. It shows the manner of constructing pyramids in Egypt, namely in terraces, exactly as the pyramids of Assyria were constructed. There is to be sure a difference between them, in that the steps of the Assyrian pyramids are broader and farther apart than in the Egyptian. The difference is owing to the fact that the object in Assyria was to erect a structure on which processions could ascend, and on the summit of which a shrine or temple could be constructed; while in Egypt it was to construct a tomb in which their kings might be buried. The pyramids in America were in this respect more like the pyramids of Assyria or Chaldea. They were connected with palaces and were used as shrines and temples and for sacrificial purposes; the kings having their abode in the palaces close by those of the priests.

As to the manner of constructing the pyramids, there was a difference between the Chaldean and the Egyptian. The remains in ancient Chaldea are generally nothing more than formless heaps of rubbish, many of which have not yet been opened; but enough of them have been opened to show the manner of their construction. In Egypt the pyramids were built of layers of solid stone with a large chamber in the center. In Chaldea they were built of brick, and were solid throughout, making up by thickness of the masonry for the firmness lacking in the material. They further strengthened the massive walls, with a facing, or with buttress-like piers of burnt brick. The Chaldean temple consisted of a single massive temple of few steps, crowned by a chapel, which was richly decorated with colors

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and gold ornaments, with gold plating to represent the sun. In America the pyramid was built in terraces and may have been solid throughout, though there are evidences that some of them contained arched chambers within the mass, and yet those which were solid had air-channels similar to those found in Chaldea.

The specimen which we first select in America for comparison is that of Cholula. This is one of the largest and perhaps one of the most ancient of the American pyramids. What is more, there is a tradition of the deluge connected with it. The method of constructing this pyramid was by terraces, the terraces being made on the sides of a natural hill, but the summit crowned by an artificial pyramid and temple. We here call attention to the resemblance between the American and the Chaldean pyramids. One peculiarity of the American pyramid was that it was partly natural and partly artificial. This was also the case with the Oriental pyramids. Refer says "that the terraced pyramids of Koyundjic was a terraced structure of three or four steps, situated upon a natural elevation." The lower terrace is decorated with pilasters in low relief. This is one of the earliest of the Oriental temples.

We refer to another specimen of an American pyramid to illustrate this point. It is a pyramid found in Peru---a pyramid built in terraces, the terraces on the side of a natural elevation. We do not claim this to have been a temple, for it was a fortress---the fortress of Huatica. Yet terraces on the side of the hill show how the pyramids in America are constructed. There is another heap of ruins in Peru, a cut of which we do not present. This was the temple of Pachacamac, twenty miles south of Lima. It was constructed of terraces and was devoted to the worship of a fish-god, and is said to have been resorted to by pilgrims from all parts of the coast. Some maintain that the Incas erected on the summit of this hill, a temple of the sun. There are rooms in this temple which are filled with enormous quantities of earth, though how it came to be there is unknown. The ruins are largely artificial, but it is supposed that the central core of them is natural, but that the terraced pyramids sustained or supported an ancient temple of magnificent proportions.

Other specimens of American pyramids are found in widely separated localities and embrace structures which were devoted to very different uses, but they show the American peculiarities. The pyramids were used here for fortresses as well as for temples. In fact pyramids sustained palaces as well as temples and both were regarded as fortresses. In Peru the differentiation may have been more marked, for there are pyramids which were used for fortresses, others for burial towers, and still others for temples, while in Central America they were all combined in one.

Another point in connection with the pyramid in America is that in finish and elaborateness it was unexcelled by any of the pyramids of the Old World. The Egyptian pyramids were very plain structures. They were never covered with carving and never showed art or architecture at a high stage. The terraced pyramids of Assyria were much more advanced than these, but the pyramids themselves, if we leave off the palaces which were built upon them, were not at all equal to those in America.

We give two specimens of perfect pyramids which have been found in America, namely, the pyramids of Copan and those at Teotihuacan; these we think compare with any of the Egyptian pyramids in symmetry and beauty, though they are not as large. If, however, we were to restore the palaces which formerly stood near these pyramids and could show the broad path of the dead, so-called, lined with the elaborate structures which have now disappeared, we should conclude that the American civilization was fully equal to the Egyptian at the time that the pyramids were built. These pyramids are, however, not the best. There are pyramids at Tusapan and Papantla, which have their exteriors built up with seven terraces, each terrace having an elaborate cornice, with panels below the cornice. Tall

buttresses also project from the terraces, forming a massive and elaborate finish to the whole structure. There is at Chichen Itza also a pyramid which has a stairway running up its entire side, which in massiveness and breadth and elaborateness of detail is not excelled by any of the stairways of the Assyrian palaces. Charnay has spoken of this pyramid and has given a new and interesting description of it. The same is true of the pyramid of Uxmal, at Tikal, Kubah, Izamal and several other places. The south side of the pyramid at Izamal is built up of stone, laid without mortar and rounded off at the corners. On its side near the basement stands a gigantic face, which was reproduced by Stephens, 7 feet 8 inches high, the features rudely formed by small rough stones fixed in the side of the mound by mortar, and afterwards perfected by stucco. The pyramid at Ake has also a face, and has also on its side a colossal head 13 feet high, formed by rough stones coated over with mortar, and one of the finest bas-reliefs, its principal subject being a crouching tiger with a human head, reminding us of the order of knighthood in which the tiger had the pre-eminence. It would appear from this that the pyramid in America combined the massiveness and solidity of the Egyptian, the terraced form of the Chaldean, the walled and palace-crowned quality of the Assyrian, and at the same time embodied the carved specimens which resemble the sphinxes of Egypt, and sustained on their summits temples and palaces which remind us of the Median and Persian. There is certainly nothing in all this to show that the American architecture was of an inferior or low grade, but there is everything to show that it was equal to that of the civilized races of the ancient monarchies even in their most advanced stage.

The style of the pyramids, however, does not fix the status of American civilization. There is evidence enough to show that the architecture of America passed beyond this elementary stage. We have dwelt upon the particulars only to show that there were elements or features which were like the early stages of architectures in the Old World. We now turn to consider the more advanced stages. We here find resemblances to the Assyrian style of building. It will, of course, be acknowledged that there was a similarity between the early Chaldean and the later Assyrian, but the Assyrian was much more advanced of the two. Reber says "that the difference arose chiefly from the superior material at the builders' disposal in Upper Mesopotamia. The terraces of Assyria, like those of Chaldea, were solidly constructed of sun-dried bricks and stamped earth, but the neighboring mountains provided stone for the complete revetment of these masses with quarried blocks. Carefully hewn slabs existed upon the terrace platform of Sargon's palace, and upon the substructure of the pyramid of Nimrud, while there was rough Cyclopean stone-work employed in the construction of the city walls at Kiser-Sargon."

II. We next come to the walled structures of America. Here again we have all the variety which we find in the Old World, and we may believe that even these passed through many stages of development.

1. We first consider the Cyclopean wall. We take this wall as the earliest found in America as well as in the East. This might be regarded as evidence of a very primitive type of architecture. It is generally supposed to belong to the earlier ages. "Between the Tiber and the river Arno there exists extensive remains of Cyclopean masonry as well as walls of hewn and squared stones. The age of these works can usually be roughly estimated; they are evidently of later antiquity than the carefully fitted masonry, the irregular horizontal courses of unequal thickness which form the older Latin ramparts, and these precede in point of time the exactly pointed blocks of the Servian walls of Rome.

There are many specimens of walls in America, which resemble those built by the Etruscans, Pelasgians and early Latins, though they had an entirely isolated history and cannot be traced to any other country. We give here a cut to illustrate this point. It is a wall found in Cuzco, Peru. This city, it appears, stands on the

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slopes of three hills. The ancient builders had to resort to extensive terracing in order to secure level surfaces on which to build. These terraces, built in a substantial manner and faced with stone, are still standing in many places. It is part of a fortress which was a remarkable structure. The walls support terraces but they rose above the terraces so as to form a parapet, and yet they projected out at angles so as to form bastions. The height of the outer wall is at present 27 feet, the width of the terrace 35 feet; the second wall is 18 feet high, terrace 18 feet wide; the third is 14 feet high. To prevent the accumulation of water, channels were cut through the walls at regular intervals. This structure constituted a citadel which overlooked the city of Cuzco. The height was very precipitous and the ascent difficult, but it was a place of resort in time of danger.

There is another example of the Cyclopean wall in the Temple of the Sun at Cuzco, which is the grandest structure in the region. The Cyclopean wall forms the foundation for the temple, but the temple itself is built of regular blocks of stone, with perpendicular walls and with the corners rectangular and perforated by windows, very similar to a modern building. The structure has been modified and now contains a balcony and arched windows and modern additions, three types of architecture in one building.

In reference to the walled structures of America it would seem as if they gave a complete history of so-called wall-architecture. There are walled chambers or cists among the mounds, walled houses among the Cliff-dwellings, walled palaces and temples among the ruins of the ancient cities as well as the walled fortresses found in Peru. It is interesting to notice the variety and at the same time to study out the various ages of development.

We give cuts here to show this point. The first represents a stone cist in a mound in Missouri. The second represents different kinds of masonry in walls of the Cliffdwellers' houses. The third represents a wall found on the mesa in Colorado. It may be the remains of an old pueblo house. The fourth is the two-storied, walled house in the ruins on the island of Titicaca. The fifth is the structure at Uxmal called the Governor's House. These five cuts give us the different specimens of walls found on the continent of America, and represent the different grades of architecture prevalent, namely that of the Mound-builders, the Cliff-dwellers, the Pueblos, the Peruvians, the Central Americans. It will be noticed that as we ascend in the scale, the wall is more complete and finished; that of the civilized races of Central America being the most complete of all. This is seen in the manner of building the wall as well as in the material used. The Mound-builder used the flat stone which abounded in the region; his skill was exercised in making a square chamber out of stone laid up in a dry wall. The Cliff-dweller also used flat stone, such as was found in the vicinity; the layers in this wall varied according to the size of the stone; his skill was exercised in erecting so many square buildings on such ledges as were found in the cliffs, and in adapting the size and shape of the building to the surroundings. The Pueblo used different material; adobe, limestone, anything that was convenient, but his skill consisted in erecting walls which were thick and massive, so as to sustain heavy, many-storied buildings. The Peruvian also used such material as was presented. His skill is shown in erecting finished buildings, buildings which contain doors and windows, and the various elements of architecture which are found in modern structures. The Central American excelled them all; he used rough, dressed stone for the lower part, but carved, wrought stone with cornices and entablatures and occasionally columns for the upper part. There are no very large stones in any of these buildings. The only structure in which large stones were used is the one in the cut which represents the wall in the southwest part of Colorado, and this was probably more a matter of convenience than a matter of skill. The masonry of America is in this respect in strong contrast with that of the Oriental countries, especially that of Egypt, the peculiarity of which was that such massive

blocks were used. We call attention to the temple at Carnac and to the tomb in the pyramid at Gizeh. In these the stones are all massive blocks, which must have required great strength to put in place. In the ancient wall in the temple at Jerusalem the stones are also large and heavy, and have a beveled form of dressing. No such walls as these are found in America. The skill of the American races did not consist in lifting great weights nor in building walls with massive and beveled stones. Still that there was skill exhibited in the walls in America is evident from various specimens presented, especially in Central America. Here the wall is highly ornamented, great skill having been exercised in sculpturing figures upon the face of the wall.

2. This brings us to the finish and ornamentation of the wall. In this there are some remarkable resemblances between the architecture of the New and the Old World. We first refer to one peculiarity which has impressed many writers on architecture---the imitation of wood-work which is found in the stone structures. This was first noticed by Fergusson in Assyria. It, however, may be seen in Egypt and is very common in America. We give cuts to illustrate the point. One of these represents an Egyptian tomb, the stone sarcophagus of Mycerinus. On the front of it may be seen the imitation of wooden frame-work, as well as wooden cornice, the whole surface being covered by projecting columns, beams, with panels and doorways between them. This peculiarity has been noticed in America. The facades of the palaces are frequently ornamented in this way. A specimen may be found in the facade of the Casa de Monjas at Uxmal, where the upper part of the wall is covered with lattice-work in stone---a close imitation of wooden lattice-work. Another part of the same building is ornamented with lattice-work, on which are eight parallel, horizontal figures, resembling wooden bars, each terminating at either end in serpent's heads with open jaws, the bars increasing in length as they approach the upper cornice. Violet le Duc imagines this to have been an imitation of a primitive style of wood-work. The same peculiarity will be noticed in the cornice; in this there are ornaments which resemble small blocks of wood, and others resembling rosettes. We call attention to this peculiarity of the walls, for it illustrates a point. The primitive ideas were retained in America even when the architecture reached a high stage. The same features which in Oriental countries were dismissed and disappeared, survived throughout all stages of development. We think that any one who looks at the ornamented walls and takes the pains to trace the many and elaborate patterns found upon them will see much skill in execution. Some of the patterns are so elaborate as to almost defy analysis. They would be very difficult if they were carved in wood, but here they are wrought in stone and are objects worthy of admiration. These ornaments, however, are not as simple as they at first appear. They contain not only the imitations of wood-work, but many elaborate and highly finished conventional patterns as well as symbolic figures, three qualities combined in one. In this the American architecture is peculiar. The rock-cut tomb of Beni-Hassan contains imitations of wooden beams and cornice, and some of the Assyrian palaces contain imitations of lattice-work; but the American facades contain symbolic figures, which make them representatives of a native mythology, the face of the divinity frequently peering out from among the elaborate ornamentations found here. We find also some strange resemblances to Old World patterns; specimens of the so-called Roman key or Greek fret, occasionally specimens of the cross and the "suastika," but along with these the so-called elephant's trunk and eye ornaments, which remind us of the Chinese way of decorating their pavilions, a wonderful mingling of familiar figures with those which are outre and unfamiliar. They are suggestive of a barbaric splendor which was equal to that reached by many of the monarchies of the Old World; yet it was a splendor that was peculiar to America. We can hardly compare the two, though we may fix the stage which was reached by American ornamentation.

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The "elephant trunks" mentioned above are sometimes used as evidence that either: (1) the mammoth still survived and was known to the early American civilizations; or (2) the elephant was known because of oriental influences.

A long section on architectural details is omitted here. The most important fact noted is that the American cultures did not employ the true arch using the keystone.

MSP-002 SUN-CULT AND MEGALITHS IN OCEANIA

Rivers, W. H. R.; American Anthropologist, 17:431-445, 1915.

Only the last third of this article is reproduced below. This is the portion dealing with the megalithic remains in Oceania and their relation to a possible world-wide megalithic culture.

The conclusion so far reached is that the secret rituals of Oceania which have the sun as their object belong to an immigrant culture which has come from a widely distant part of the world. I have now to consider whether it is possible that this same people may also have been the architects of the stone buildings and images which form so great a mystery of the islands of the Pacific.

Here again I will begin with eastern Polynesia. The Areoi societies held their celebrations in an enclosure called marae or marai at one end of which was situated a pyramidal structure with steps leading to a platform on which were placed the images of the gods during the religious celebrations of the people. The marae was used for religious ceremonial unconnected with the Areoi societies, but there seems to be no doubt that the Areois were of especial importance in connection with it. In the pyramid of the marae we have one of the best examples of the megalithic architecture of Polynesia. One such pyramid in the western part of the island of Tahiti was 267 feet in length and 87 feet in breadth at the base. All were built of large stones without cement, but so carefully shaped that they fitted together closely and formed durable structures.

In the Marquesas, another home of the Areois, there were platforms similarly constructed a hundred yards in length, and many of them shaped and closely fitted blocks of which these structures were composed were as much as eight feet in length. On these platforms were pyramidal "altars" and they were surrounded by enormous upright stones. This association of the distribution of the Areois with the presence of megalithic structures suggests that the immigrants to whom I have ascribed the cult of the sun may also have been the people who introduced the art of building the stone structures which have so greatly excited the wonder of visitors to Polynesia.

The part of the Pacific ocean where these stone structures have reached their acme in size and complexity is the Caroline islands. If there be anything in my hypothesis, we should expect here also to find manifestations of the religious ideas of those who founded the Areoi societies, and they are not lacking. In the Marianne or Ladrone islands there were associations of persons which seem to furnish an intermediate condition between the Areois of Tahiti and the occupants of the clubhouse of Melanesia. We know very little about these associations, but their relation to the Areois of the east is shown clearly by the name they bore, Urritois or Ulitaos, which is merely another form of the Tahitian word, Areoi, the latter word having suffered the elision of a consonant so frequent in Polynesia. Similar associations flourished in the Carolines, and though we know still less of them than of the Urritois of the Ladrone, we can be confi-

dent that they had a similar character. Societies very closely related to the Areoi thus existed in this region in conjunction with stone structures similar to those of eastern Polynesia.

There is a remarkable point of similarity between the traditions concerning the origins of these stone structures and of the Areoi societies of Tahiti. The ruins of Nan-matal on the east coast of Ponape in the Carolines are reputed to have been built by two brothers, Olochipa and Olochopa. In the tradition of the foundation of the Areois of Tahiti, a very prominent part was taken by two brothers, Orotetefa and Urutetefa. The interchanges between r and l, t and ch and p and f are so frequent in Oceania as to suggest that these two pairs of names are variants of one original, so that we should have in the traditions of these two groups of islands nearly four thousand miles apart a most striking similarity of the names of pairs of brothers to whom prominent features of the culture are ascribed. In one case the brothers founded societies whose aim it was to celebrate the annual changes of the sun, while rude stone buildings were the handiwork of the others.

A recent account by Hambruch shows that the resemblance between the Ponape and Tahiti names is not quite as close as would appear from previous records. Hambruch calls the two founders of the stone buildings, Sipe and Saupa but to put against this, he states that the place, Matolenim, where the structures were built, was formerly called sau nalan which means "the sun."

Though the resemblance in the names of the two culture heroes of Ponape and Tahiti is not as close as once seemed to be the case, it cannot be neglected. It may be that the two words have some meaning which would reduce the importance of the similarity, but taken in conjunction with the close resemblance of the names of the societies in the two places, it affords striking corroborative evidence supporting the conclusion suggested by the distribution of societies and monuments that both are the work of one people.

If the stone monuments and secret societies of Polynesia have had a common source, we should expect to find an association between the two elements of culture in Melanesia, and so it is. We know of stone structures in several parts of Melanesia, viz., the northern New Hebrides, Santa Maria in the Banks islands, Loh in the Torres islands, Ysabel in the Solomons, and Fiji. The Banks and Torres islands and the northern New Hebrides are strongholds of the secret cults, and though the only island in the Solomons in which we know of the existence of secret societies is Florida, there is a definite tradition that this society came to Florida from Ysabel. The distribution of stone structures in Melanesia is just as it should be if the ghost societies and the stone buildings were the work of one and the same people.

The evidence for the connection of stone structures with secret societies is even more definite in Fiji. The Nanga societies of Viti Levu take this name from their meeting places, oblong enclosures, consisting of two or more compartments, surrounded by stone walls. The resemblance of these enclosures to the marae of Polynesia has struck more than one observer and the similarity extends to detail. At one end of each main compartment of the nanga there were truncated pyramids which served as platforms, evidently representatives of the pyramids of the marae of Tahiti measured by Captain Cook. Further, both marae and nanga were oriented with their long axes east and west, though the two differ in that the pyramids were at the western end of the marae and at the eastern end of the nanga.

There is thus a remarkable correspondence between the distribution of stone structures and secret societies in Oceania which points strongly, if not yet decisively, to the introducers of the secret cult of the sun having been the architects of the stone buildings which form one of the chief mysteries of the islands of the Pacific.

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It is even possible that we may have here the clue to the greatest mystery of all, the great stone statues of Easter island. There is reason to suppose that these statues are not so unique as is often supposed. According to Moerenhout, similar statues, though not so large, exist in the islands of Pitcairn and Laivaiv he believes that such colossal figures once existed in many other islands, but have been destroyed or have fallen into ruins. In the Marquesas and Society islands, also, stone figures in human form have been found which are sufficiently like those of the smaller and more eastward islands to suggest a common origin. Moerenhout believes that such stone figures and statues had a common meaning and were all representatives of beings called tii whose function it was to mark the limits of the sea and land, to maintain harmony between the two elements and prevent their encroachment upon one another. I venture, though very diffidently, to extend the comparison. At one end of a clubhouse of Santa Maria in the Banks islands there are ancient stone figures which, in one respect at least, resemble the colossal statues of Easter island. In each instance the head is covered. This head-covering is very frequent in one variety of the representations of the human figure found throughout Melanesia, and is almost certainly connected with the importance of head-coverings in the ritual of the secret societies. It is therefore of interest that a head-covering should be a prominent feature of the statues of Easter island. Such a point of resemblance standing alone would have little significance, but taken in conjunction with the other correspondences and similarities pointed out in this paper, we must not ignore the possibility that we may have here only another expression of the art of the people I suppose to have introduced the cult of the sun into Oceania.

I cannot consider here how far it is possible to connect the stone work and sun-cult of Oceania with the megalithic monuments and sun-cults of other parts of the world. Megalithic monuments elsewhere are associated with a cult of the sun and the occurrence of this association in the islands of the Pacific ocean must serve to strengthen the position of those who hold that the art of building megalithic monuments has spread from one source. I must be content here to mention certain megalithic monuments of Polynesia which raise a difficulty.

The island of the Pacific which holds examples of megalithic structures most closely resembling those of other parts of the world is Tongatabu, where there are trilithic monuments so like those of Europe that the idea of a common source must rise to the mind of even the most strenuous advocate of independent origin. It is not possible at present to bring these monuments into relation with those of other parts of Oceania by connecting them with a cult of the sun, but Hambruch tells us that tradition points to the builders of the stonework of Ponape having come from Tonga. It may be that Tongatabu forms the intermediate link between the stonework of the Carolines and the megalithic monuments of other parts of the world.

I have dealt elsewhere with the relation between these Tongan monuments and the pyramids of other parts of Oceania, and have suggested that these two ancient forms of monument may be expressions of the ideas of two different streams of the megalithic culture. I cannot deal with this matter here: to do so would take me far beyond the relation of sun-cult and megaliths which is the subject of this article.

***S-001 THE MYSTERY OF THE PACIFIC

Leaton, Oliphant; Westminster Review, 144:29-47, July 1895.

Smeaton develops the Atlantis theory in this article, bringing in Easter Island (the "mystery of the Pacific") as an example of Atlantean culture similar to that in Egypt and South America. There is much speculation in what follows, but the outlook presented is in keeping with the times, particularly the free-wheeling days of Ignatius Donnelly, author of Atlantis, the Antediluvian World.

The technique of the author is typical of most Atlantis enthusiasts. Drawing from diverse sources, bits and pieces are assembled to "prove" the grand thesis. These sourcebooks also draw upon the same reservoirs of data but, hopefully, with less bias and certainly without preconceived conclusions. Much of the evidence in the present article is architectural, thus the MSS assignment. The "facts" offered herein are mostly secondhand or worse; however, it is instructive to see how the proponents of Atlantis and other great archeological syntheses work.

About 1200 miles off the coast of Chili, in lat. 27° 8' South, long. 109° 24' West, separated by many a league of heaving ocean from the nearest atom of inhabited or even habitable territory, lies the island fittingly designated "The Mystery of the Pacific." The epithet is not the result of mere sensation-mongering. The reasons why the term should be applied to it are so apparent to all who visit the spot, while the facts in themselves are so inexplicable, save on one hypothesis, that "mysterious" is the only adjective which seems adequately to comprehend the manifold aspects of the case.

That Easter Island represents the last remains of a long extinct civilisation, utterly diverse from aught with which the world of to-day has, as yet, been brought in contact, I have, for many reasons, been led to conclude. In central America and in Egypt alone do we discover the analogues of it. Ocean hath her mysteries as profound and startling as those of land. If the evidences of volcanic activity on a colossal scale, in ages long gone by, be present with us in wellnigh every country on the globe, so may ocean carry her indelible records of the same agency, though she veil the characters from our view under fathomless depths of superincumbent water. That such records may exist, not only does analogy, with strong show of probability, permit us to argue, but the catastrophes within comparatively recent years at Tamboro, Krakatoa, and Sangwin, by exhibiting on a small scale what in prehistoric ages occurred on a large, place the matter beyond doubt, that if the surface of the land has been so materially altered by this means, so the relative proportions of land and sea may be equally affected by the submergence of large portions of territory.

The theory of a lost continent has been scouted as improbable by many, simply because any such fact has never been recorded within historic epochs. But do not the processes of denudation and deposition daily revealed to us in the operations of Nature, only confirm what geology asserts as having occurred long ago, "in the deep backward and abyss of time," with regard to "continent-making" and "continent-wearing."

Accepting in accordance with the nebular hypothesis the age of the world, from the epoch when the natural conditions became sufficiently favourable for cooling by radiation to commence, as dating back many millions of years---not less than 250,000 years having elapsed since the beginning of the last Glacial Period, as calculations founded on the known changes of the eccentricity of the earth's orbit have demonstrated---the lapse of time is more than sufficient to account for the denudation of more than one continent by the ordinary process of weathering and

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wear, without taking into account the action of the great subterranean forces, volcanoes, earthquakes and the like.

My contention, then, is that as South America is slowly but surely being submerged on both the Atlantic and Pacific sides, Easter Island at one time formed part of that great continent, then extending from the Azores in the north-east to this extreme point in the south-west; that by the joint action of terrific volcanoes--- of which those in the Andes chain convey to us some faint idea---and the patient denudation of the sea, the intermediate portions had been first rent asunder and then worn away, until the existing configuration is presented. I maintain that the story of Atlantis reported by the ancients, though encrusted with an after-growth of myth and legend, was no figment of the perfervid Egyptian and Greek imagination, but a historical fact handed down through the ages and of which strong confirmatory testimony can to-day be cited.

The investigations of the British vessels, Challenger, Hydra, and Porcupine, the German frigate Gazelle, and the United States surveyship Dolphin, have accumulated a mass of evidence in favour of the original connection of the islands of the Azores, St. Paul's and Ascension, with the present South American continent. The submarine ridge or plateau, extending from a point in the same parallel of latitude with Land's End to another in that of Rio de Janeiro, has been proved to be wholly of a volcanic nature, and to be covered with volcanic debris, traces of which are to be found right across the ocean to the South American coast. Viewing this fact in conjunction with the tradition respecting the great territory called "Atlantis," I consider the hypothesis of a lost continent as something more than possible, exclusive altogether of the arguments drawn from similarity of language, custom, mode of life, social institutions and architectural remains, between Egypt and the buried cities of Central America, Ecuador and Peru (lately investigated by M. Desire Charnay) on the one hand, and between the latter and the remains Easter Island on the other. In other words, I would argue that Easter Island, Central and South America, and Egypt derived their artistic impetus from a common source---Easter Island with its ruins of marvellous buildings on a scale and of a style of architecture suitably designated only by the adjective "Cyclopean"; with its weird colossi or gigantic statuary, in whose impressive features can still be traced the elemental germs of that Egyptian art which found its highest expression in the solemn majestic grandeur of the Sphinx, or in the godlike repose of the seated figures in front of the southern propylae of Karnac; as well as the germs of that exquisite Aztec and Toltec sculpture discovered amid the remains of the buried cities of Central and Southern America. That this great empire---for purposes of convenience we may style it Atlantis---was a centre whence radiated culture, the arts, religion, and all the characteristics of an advanced civilisation, to Europe on the east, and to that portion of the vast continent now designated Easter Island on the west, will, I think, be admitted as at least probable when the facts yet to be adduced have been adequately appreciated.

Let it be premised that the results of the Dolphin and Challenger expeditions, referred to above, have conclusively proved that at some period, not so very remote in a geological sense, the ocean bed in the neighbourhood of the Azores had been visited by volcanic disturbances on a gigantic scale, of which the marks and the debris remain to this day. The reader is referred to the volumes descriptive of these expeditions for fuller information on points that can only be adverted to in passing.

The first argument I would adduce is one drawn from the consensus of ancient testimony with the results obtained by recent investigation. Down the epochs of history, unwritten and written, has passed the tradition of a great continent, the cradle of the human race, that was lost through some frightful cataclysm in the grey dawn of human record. The mist of myth has so densely enveloped all accounts of it that the utmost caution must be observed in any survey to distinguish what are

really reliable facts concerning a bygone age, from the accessories the reverent fancy of later humanity has added.

In every mythus, however, as Mr. Ignatius Donnelly remarks in his admirable and suggestive work on Atlantis (from which I select several facts bearing upon this question) there is a definite basis of truth, on which depends its existence. In bearing witness to the past existence of a vast continent now no more there is a curious accordance, I have said, between ancient testimony and modern scientific research.

That remarkable extract in Proclus, taken from a work no longer extant, states that, in one of the exterior seas, beyond the Pillars of Hercules, "the inhabitants preserved from their ancestors a remembrance of Atlantis, an extremely large territory, which for a long time held dominion over all the islands in the Atlantic Ocean. Theopompus (400 B. C.), according to Aelian in his Varia Historia, is the authority for the record of an interview between Midas, king of Phrygia, and Silenus, in which the latter reported the existence of a continent beyond the Atlantic, larger than Asia Minor, Europe, and Libya (Africa) together. He also affirmed that the inhabitants were named Meropes, and had built vast cities, larger than any in the then known world.

Didot Muller, in his interesting volume, Fragmenta Historicorum Groecorum, presents certain extracts from the lost work of Marcellus on the Ethiopians, where in the latter states that the islands in the Atlantic Ocean preserve the tradition of a great country named Atlantis, which had for a long time exercised dominion over the smaller ones, but which had been destroyed by fire from heaven. The Phoenicians, according to Diodorus Siculus, were aware of a large territory in the Atlantic Ocean, many days' sail beyond the Pillars of Hercules. This country was exceedingly wealthy, in soil most fertile, in civilisation far in advance of Greece, in climate delicious. Fish and game existed in abundance, and the trees bore fruit all the year round. Homer, Herodotus, Thucydides, Plutarch, and other ancient writers all make distinct reference to a great empire lying beyond the Pillars of Hercules. Students of theology also will remember that St. Clement, in his Epistle to the Corinthians, speaks of "the other worlds beyond the western ocean."

It is, however, to Plato we owe the most detailed account of this continent, named by him Atlantis. Why his account of the alleged conversation between Solon and the priests of Sais in Egypt should have been characterised, both in ancient and modern times, as an ingenious fable, has always been a mystery to me. Not until the wonders of Toltec and Aztec civilisation had been fully appraised by modern research did the statements of the great Greek philosopher receive singular confirmation from an independent source. The picture histories of the Aztecs proved the correctness of his account.

Not too much is it to say that within the past seventy years the probabilities in favour of a large substratum of fact underlying Plato's account of Atlantis have been increased a hundredfold.

To Solon, according to Plato in the Timaeus, the priests of Sais conveyed the information of "a mighty country which subjugated the whole of Europe and Asia nearly 9000 years before that date (600 B. C.). That power was situated away out in the Atlantic Ocean, directly opposite the straits called the Pillars of Hercules. The country itself was larger than Libya (Africa) and Asia (viz., Asia Minor) reckoned together, and was directly on the track to other lands which lay beyond it (the American continent before it was broken away). In the land of Atlantis there was a powerful and magnificent kingdom, which exercised authority over the whole continent and all the islands around; and besides had conquered those districts of Libya inside the Pillars of Hercules, extending as far as Egypt, and of Europe even to Tyrrhenia. After some time had elapsed, terrible earthquakes and volcanic eruptions.....occurred, and in a single day and night of floods, all the men-at-arms were swallowed up into the yawning earth, while the land of Atlantis itself

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also vanished, sinking into the depths of the ocean. To this cause is due the fact that the sea in those places is impassable and dangerous, owing to so great a quantity of shallow mud interfering with navigation, which obstruction was caused by the sinking of the island."

Confirmation of the story recounted in the Timaeus is discernible in the following facts relative to the Azores---viz., that traces of lava rocks and of volcanic activity on a gigantic scale are everywhere visible. Sir C. Wyville Thomson, in his volume The Voyage of the Challenger, when describing a jutting headland, Monte Queimada (the burnt mountain, near Fayal, remarks: "It is formed partly of stratified tufa of a dark chocolate colour, and partly of lumps of black lava, porous, and each with a large cavity in the centre, which must have been ejected as volcanic bombs in a glorious display of fireworks at some period beyond the records of Acorcan history, but late in the geological annals of the island."

Precisely similar physical features are visible to-day in Easter Island, where the evidences of volcanic and seismic convulsions, at an epoch historically remote but geologically recent, meet the eye on all sides. Again, in the account in the Timaeus, Plato refers to the numerous hot springs in Atlantis. Any one who has visited the Azores must be aware that these are a prominent characteristic of the islands in question. Further, the investigations and soundings by the Dolphin and Challenger Expeditions prove the sudden shallowing of the Atlantic Ocean from a point a few hundred miles off the coast of Ireland right over to Cape Orange on the coast of South America, thence south-easterly towards the African coast near Sierra Leone---leaving only a deep narrow strait a little over 100 miles wide---then trending southerly towards Tristan d'Acunha. On the western side of the South American continent, the shallowest part of the Pacific Ocean is that which covers the long low reef stretching from Caldera, on the Chilian seaboard, over to Easter Island, and, about half the distance across, rising above the surface of the waters in the lonely volcanic island-peaks of St. Felix and St. Ambrose.

Focussing all this evidence upon the question at issue, keeping in view also the fact of the volcanic character of Easter Island and of the whole land intervening between it and the Azores, is there any impracticability in the hypothesis that at one time they were connected and formed part of the same continent? Already the theory has received wide acceptance. The Scientific American for July 28, 1877, when criticising it, remarked: "The inequalities, the mountains and valleys (the connecting reefs or ridges) of its surface, could never have been produced in accordance with any laws for the deposition of sediment, nor by submarine elevation, but, on the contrary, must have been carved by agencies acting above the water-level." In Nature for 1877, Mr. J. J. Wild indicated his adherence to the main outlines of the hypothesis; while a member of the staff of the Challenger, in a lecture delivered in London soon after the return of the Expedition, declared he had no doubts of the fact that this great submarine plateau constituted the remains of the long-lost continent of Atlantis.

Another strong argument in favour of the existence of some great original continent, whence the existing types of plants and animals in Europe and Asia on the one hand, and America on the other, were derived is furnished by the striking similarity between the flora and the fauna of the Old World and the New.

A well-known scientist, writing in the Westminster Review for January 1872, on the subject of the former land connection between Europe and America, remarks: "When the animals and plants of the Old and New World are compared one cannot but be struck with their identity; all or nearly all belong to the same genera, while many even of the species are common to both continents. This is most important as indicating that they radiated from a common centre after the Glacial Period." The mass of information Donnelly has accumulated on this point is in the highest degree important. According to him, recent discoveries in the fossil beds of the "Bad Lands" of Nebraska prove that the horse originated in America. Pursuing

this line of inquiry, Professor Marsh of Yale University has traced its evolution from a creature about the size of a fox, through the hipparion, to the animal familiar to us to-day. Yet it existed in Europe long prior to its domestication; and in Easter Island there are unmistakable fossil remains of this quadruped, together with carvings on the rocks representing it. Yet it has long been extinct there. But how could it reach such widely separated localities unless uninterrupted communication existed between them?

Again, in India, Africa, Kansas, South America and Easter Island are found the fossilised bones of the camel, while the cave bear, whose remains are discovered in the same strata with the bones of the mammoth and the memorials of Pleistocene man, was very much akin to the grizzly bear of the Rocky Mountains. The extinct musk ox of the Liege caves is still found in arctic America, while Rutemeyer asserts the bison (*Bos priscus*) of Europe to be the same as the prairie buffalo of to-day. The Norwegian elk is simply the American moose under a different name, of which there are also traces in Easter Island, while the tailless hare of the European Stone Age still exists in Alaska. The reindeer of Lapland once had its home in America, and remains of the cave lion of Europe have been discovered on the shores of the Mississippi; and in February 1893 the quaternary strata of Lake Mulligan in South Australia were discernible portions of the skull and the teeth of the terrible Thylacoleo---the "cave lion" under another name. Bones strangely akin to these have also been discovered in Easter Island. To prove the wide distribution of closely allied fauna over Europe, Asia, America and Oceania, many other facts could be adduced did space permit, but what has been cited will be sufficient to serve our purpose.

As regards the flora, a similarly wide distribution prevails. The Swiss fossil beds of the Miocene Age contain the remains of more than 800 different kinds of flower-bearing plants, to say nothing of ferns and mosses.

As Donnelly says, the majority of these have migrated to America, others to Africa, Asia and Australia, and, as I can personally testify, some of them to Easter Island. The analogues of the flora of the Miocene Age in Europe now grow in the forests of Virginia, North and South Carolina, and Florida, in the dense bush of Australia and New Zealand, in the undergrowth of Easter Island. Among these are magnolias, tulip-trees, evergreen-oaks, maples, plane-trees, robins, sequoias, ratas, papaws, bluegums and ironbarks. How could these have migrated from Switzerland to the Pacific, if territorial connections did not formerly exist? Professor Otto Kuntze makes a strong point out of the banana or plantain. Indigenous to Asia and Africa, and moreover seedless, it is nevertheless found in America, and not only in Easter Island, but all over the South Sea Islands. How then, asks the Professor, was this plant, which cannot stand the climate of a temperate zone, carried to America? He admits that the roots must have been transported from one country to another by civilised man, but will not allow that it could have crossed the Pacific Ocean from Asia to America, because the Pacific is thrice or four times as wide as the Atlantic. Is not the explanation perfectly simple when we accept the theory of uninterrupted land communication between the two? The cultivation of cotton was known to both the Old World and the New. Herodotus calls it "The tree of India, bearing a fleece as beautiful as that of a sheep." When Columbus reached the West India Islands he found it flourishing there, as did Cortes and Pizarro in Mexico and Peru. Frequently is the cotton-plant found wild in America, but never elsewhere. Would this fact not seem to indicate the place of its origin? The potato, maize and tobacco plants are commonly credited as owing their introduction into Europe and Asia subsequently to the discovery of America by Columbus. But a traveller who recently visited China remarks: "The interior of China along the course of the Yang-tse-Kiang is a land full of wonders. Plants yielding drugs of great value, the familiar tobacco and potato, maize, white and yellow corn, and other plants believed to be indigenous to America, have been cultivated there from

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time immemorial." It may also interest smokers to learn that in the raths and tumuli of Ireland and Denmark, pipes have been found in which some kind of tobacco was smoked at a period immensely anterior to Sir Walter Raleigh (Report of the Smithsonian Institute, 1875). Of the great cereals---wheat, oats, barley, rye and maize---no original plant in a wild state can be discovered throughout the known world. Either it must have been domesticated from an immense antiquity, says Donnelly, or in some continent which has since disappeared, carrying the original wild plant with it. By these facts, I think, the fact has been established of so close a similarity between the fauna and the flora of the Old and New Worlds, only explicable by one of the following hypotheses---either there must have been uninterrupted land communication between the continents of Europe and America, or we must view both as having been colonised from some third continent which has long since disappeared. Both hypotheses favour my theory.

Another very strong argument in favour of the theory of a connection between Easter Island, Egypt and the buried cities of Central and South America, is furnished by the strange similarity existing between their architectural remains. In Easter Island are the ruins of numerous enormous buildings, erected entirely of gigantic slabs of hewn stones, many of them several tons in weight. In front of these edifices are immense platforms also formed of hewn stone, surmounted by colossal statues, exhibiting a strange weird beauty all their own. The chiselling of the features, notwithstanding the thousands of years that have elapsed since the sculptors completed their work, exhibits a vigour of conception and a delicacy in execution, rivalling, and sometimes excelling, the highest type of ancient Egyptian art. The artistic genius of the long vanished race was not only expended on their colossi, but on every rock around the island are carved strange and fantastic images of mythical animals---the early gods, human beings, fishes, and pyram---that are obviously akin to the art of the Toltecs. Within the numerous caves wherewith the lava rocks of the island are honeycombed, and wherein lie the mouldering remains of hundreds of thousands of the ancient inhabitants, also on the walls of the houses, are still variable the fading traces of curious and grotesque frescoes, painted with many coloured pigments, all exhibiting the same curious type of design which, for want of a better term, I must characterise as "Toltec," though they were executed long anterior to the date when the scanty remains which have reached us of that style of art and sculpture were produced.

Most accounts of Easter Island dwell at length on the great brooding stone statues, but these may be primitive compared to the buildings and the written material ("talking boards").

Again, many of the ruined buildings in Easter Island bear distinct traces yet of their original pyramidal shape; in other places the lava rocks themselves have, by the hand of man, been artificially shapen, until they too exhibit a similar design. The whole island is filled with the Cyclopean handiwork of these long dead architects and sculptors---colossi, ruined edifices, broken pillars (strangely Egyptian in their pattern), carven rocks, and crumbling pyramids meeting the eye everywhere. To the present inhabitants of Easter Island it is vain to look for an explanation of these wonders, for besides being comparatively recent settlers on the island---that is, within the last two or three hundred years, and probably reaching it from Hawa they simply invest with legendary fables what they cannot otherwise explain. By comparative archaeology, however, some light is let into the almost impenetrable mystery enveloping the remains upon Easter Island. Egypt and Central and South America furnish the key.

I need scarcely reiterate the fact, so well recognised is it, that the origin of Egyptian civilisation has been the enigma of the world for the past twenty-five centuries. Presenting no historic or even mythic infancy, it appears before the

world at once as a highly civilised and organic community centuries before Moses was a boy. Upon this subject Renan says: "Egypt has no archaic epoch, but suddenly takes its place in the world in all its matchless magnificence, without father and mother, and as clean apart from all evolution as if it had dropped from the unknown heavens." Would not an explanation at least feasible be found in the hypothesis that it received its civilisation from some source no longer existing? Menes, the first historic figure in its long line of dynasties---the outlines of whose personality loom up waveringly indefinite but grandly impressive against the deep mythic background of prehistoric story---at least 4500 B.C., conceived and executed enterprises, extorting the warmest admiration from the best engineers of the nineteenth century. Did he not alter the course of the Nile by vast embankments, to gain stable foundations other than in shifting sands for his sacred city of Memphis; construct the artificial lake of Moeris, 450 miles in circumference and 350 feet deep, as a reservoir for the waters of the Nile? Look, too, at the colossal achievements of his successors, in architecture, sculpture, engineering, astronomical, political, medical, social and military science, to say nothing of navigation and theology. Witness the ruins of the Labyrinth recorded by Herodotus, which had 3000 chambers, half of them above ground and half below, a combination of courts, chambers, colonnades, statues, and pyramids. Witness the wonders of the magnificent temple of Karnac which still awakens our admiration---a temple, as Denon says, wherein the Cathedral of Notre Dame in Paris could be set inside one of its halls and yet not touch the walls. Witness the sublime pyramids, originally built in honour of the Sun god Ra, and for use as astronomical observatories, the splendours of Memphis, Thebes, and Heliopolis, of the Sphinx and the obelisks, the statuary, and the numerous temples, with the ruins of which the land is still filled. To merely enumerate these stupendous works of Egyptian genius would require the space of a volume, and more than once has the question been asked, Where can they be paralleled? I would reply, that in Central and South America have been discovered, of recent years, architectural marvels, not only rivalling in their colossal size the wonders of Egypt, but in their design and execution betraying so close an essential identity, amid accessorial differences, as to prove to any unbiassed investigator their development from a common order of genius.

M. Desire Charnay, to whose excellent volume, The Buried Cities of Central and South America, I refer the reader desirous of fuller information, contends that the ancient Toltecs, or predecessors of the Aztecs, living at a period long anterior to the birth of Christ, had then attained to a pitch of civilisation superior to that of Europe in the days of Columbus. To prove this assertion he adduces a mass of information---drawn from all sources---that is very conclusive. To consider the argument from architecture first. At the ancient city of Teotihuacan he remarks that the ocean of ruins visible on every side were not a whit inferior in size to those of Egypt. One building was 2000 feet (666 yards, or exceeding a quarter of a mile) wide on either side; also fifteen pyramids---in shape identical with those of Gizeh---each of which had a base almost as large as the great Pyramid of Cheops. He then goes on to say: "The city is indeed of vast extent, the whole ground over a space of five or six miles in diameter is covered with heaps of ruins of the remotest antiquity, because the very highways of the ancient city are composed of broken bits of pottery and bricks, the debris left by earlier populations." This continent is a land of mysteries. We here enter an infinity of antiquity, whose limits we cannot estimate. The long streets are flanked with the ruins of public buildings and palaces, forming continuous lines, as in the streets of modern cities. Still all the edifices and halls are as nothing compared to the vast substructures which strengthened their foundations.

The ruins at Easter Island exhibit almost identical features with these, nothing striking the observer with more profound astonishment than the enormous strength of the foundations of all the buildings. To Egyptian architecture, M. Desire Char-

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may find the ruins of Central and South America to bear an identity almost complete, and of those at Easter Island I may say the same. The masonry is similar, the cement is the same, the sculptures are alike; both peoples use the arch; in both continents we find bricks, glassware, and porcelain.

In Egypt, America, and Easter Island the sacred letter "Taw" is discovered on all sides, which must be regarded as the earlier form of the great Christian symbol of the Cross. On this point, a writer in the Edinburgh Review for July 1870 remarks: "Among the earliest known types (of the Cross) is the crux ansata, vulgarly called 'The Key of the Nile,' because of its being found sculptured or otherwise represented so frequently on Egyptian or Coptic monuments. It has, however, a very much older and more sacred significance than this. It was 'the symbol of symbols,' the mystical Taw, the 'hidden wisdom,' not only of the ancient Egyptians, but also of the Chaldeans, Phoenicians, Mexicans, Peruvians, &c., and is formed very similarly to our letter T, with a roundlet or oval placed immediately above it. . . . As in the oldest temples and catacombs of Egypt, so this type likewise abounds in the ruined cities of Mexico and Central America, graven as well upon the most ancient Cyclopean and polygonal walls as upon the more modern and perfect examples of masonry, and is displayed in an equally conspicuous manner upon the breasts of innumerable bronze statuettes which have been recently disinterred from the cemetery of Juigalpa (of unknown antiquity) in Nicaragua."

On visiting Easter Island, my earliest efforts were directed towards deciding this point, whether the symbol of the "Taw" was discoverable there. But a cursory examination sufficed to reveal its presence, and thus a connection was established at once between the early inhabitants of the island and those of Central and South America, and, further, between the two and the ancient Egyptians.

In Peru the early civilisation of the Toltecs and Aztecs has left its most splendid architectural remains. The ruins of the capital city of the Chimus in Northern Peru cover an area of twenty square miles. Tombs, temples, palaces, obelisks, are visible on all sides, also immense pyramidal structures, some of them half a mile in circuit; vast areas shut in by massive walls, each containing its immense water tank, its shops, its municipal buildings, as well as the dwellings of its inhabitants, and each a branch of a larger organisation. Prisons, museums, colleges and schools, furnaces for smelting metals, and almost all the concomitants of civilisation existed in the ancient Chimu capital. One of the great pyramids called "The Temple of the Sun," says Charnay, is 812 feet long by 470 wide and 150 high. Donnelly also points out that at Cuclap in Peru some remarkable ruins have been discovered, consisting of a wall of wrought stones 3600 feet long, 560 broad and 150 high, constituting a solid mass, with a level summit. Resting on this "foundation" was another building 600 feet long, 500 broad and 150 high, making an aggregate height of 300 feet. The purposes to which it had been put were those of sepulture, as the cells and recesses remain wherein the mummies were placed---in some instances still occupied by them. In more than one of the Easter Island buildings similar recesses are visible, comparative archaeology here demonstrating a fact that puzzled Roggervin who visited the island in 1722, Cook in 1774, Kotzebue in 1816, and Beechey in 1836, as well as many other more recent travellers.

All over Central and South America, concealed now in many cases by the dense overgrowth of immemorial forests, these buried cities have been traced, and excavations on a large scale are proceeding. The native traditions regarding them, as reported by Baldwin in his interesting volume Prehistoric Nations, Bancroft in Native Races, and Foster's Prehistoric Races, state that "they were built by bearded white men who came to the country long before the time of the Incas and established themselves there." How came this high state of civilisation to exist so far from European influences, yet betraying, in all essential points, an almost complete identity with the culture of Egypt in the best epochs? That the antiquity

of the Central and South American remains is immensely greater than that of Egypt is demonstrated, according to Gliddon, by the fact that from the ruins of Nineveh, Babylon, and the cities, pyramids and catacombs of the Nile Valley, we have skeletons and mummies brought to us, at least 3500 or 4000 years old, from which crania have been taken in all respects perfect, while those of the mummies of the Aztec and Toltec cities, preserved by identically the same process, are crumbling into dust through age alone. This fact more than any other would answer the question put by a writer in Blackwood many years ago, when considering, in a very able and exhaustive article, the question of the origin of Egyptian civilisation. "What are we to think [says the article] when an antiquary, grubbing in the dust and silt of 5000 years ago to discover some traces of infant effort---some rude specimens of the ages of Magog and Mizraim, in which we may admire the germ that has since developed into a wonderful art---breaks his shins against an article so perfect that it equals if it does not excel the supreme stretch of modern ability? How shall we support the theory that before Noah was cold in his grave his descendants were adepts in construction and in the fine arts? As we have not yet discovered any traces of the rude savage Egypt, but have seen her in her very earliest manifestations already skilful, erudite, and strong, it is impossible to determine the order of her inventions. Our deepest researches have hitherto shown her to us as only the mother of a most accomplished race." The answer, as suggested by the absolute identity of the architectural remains in Easter Island, America and Egypt, is that all of them derived their civilisation from a common source---the cultured land long since buried beneath the ocean---to which, in default of a better name, Atlantis has been given.

Among the ruins of Easter Island, the prevalence of the pyramidal form as the original design of several of the buildings is, I think, beyond a doubt. Were this, however, disputed, the fact that the pyramid is sculptured on the surrounding rocks, and that many of these rocks themselves have been artificially cut into that shape, is undubitable. Further, the existence of the colossal human heads previously considered to be peculiar to Egypt, as typified by the Sphinx and the colossi at Karnac and those now in the Boulak Museum, are additional proofs of ancient affinity. For many ages the pyramid was supposed to be a style of architecture peculiar to Egypt, until India unfolded her wonders in the sacred city of Benares on the banks of the Ganges, where formerly stood the great pyramidal temple of Buidh-Madhw or Vishnu (vide Thornton's Gazeteer of India, p. 91), destroyed by Aurungzebe in 1690, to signalise the triumph of Islamism over Brahminism, and the materials of which were employed in building the present mosque. Tavernier, who visited Benares in 1680, prior to the capture of the city by this Moslem Alexander the Great, describes the temple as covering an immense area, and refers to similar structures at Mhuttra on the Humna, at Elephanta, Ellora, Chillambrun and Salsette. Eclipsed, however, by far are both the Egyptian and Indian pyramids by those in Central and South America. The great pyramid of Cheops in Egypt is 746 feet square, 450 feet high, and covers an area of thirteen acres. The pyramid of Cholula in Mexico, as measured by Humboldt, is 160 feet high, 1400 feet square at the base, and covers an area of forty-five acres. It must be stated with respect to the height, that the structure had originally attained a much greater altitude, but owing to its greater age it is in a much more ruinous state than its Egyptian rival. At Teotihuacan and Cholula are still visible upwards of 400 pyramids, all similar in design and execution to the Egyptian, having, as in the case of the latter, according to Professor Piazza Smyth, their four corners directly facing the four cardinal points of the compass, but differing sometimes in this particular that they do not attain the perfect apex of the Egyptian structures, but are slightly flattened, so as to admit of a small edifice being placed on the top for astronomical purposes. Most of them, however, are absolutely identical with those of the Nile Valley, though they exist now in a more ruinous condition. Upon this point Bradford (North

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Americans of Antiquity) affirms that from a careful survey of all the buildings in Mexico and Peru, it is now the received opinion among leading archaeologists that these pyramidal ruins of the Toltecs and Aztecs are of a higher antiquity than those of Egypt, and as they exhibit a perfect identity in their interior arrangement of passages and galleries, they were in all probability intended for a similar purpose. The passages, galleries, and platforms of the structures in Easter Island are also to this day perfectly traceable, albeit, owing to their enormous antiquity, they are in a condition even more ruinous than the other two.

Today, most scientists hold the Egyptian pyramids to be much older than those of the New World.

The next argument to which attention is directed to explain the mystery of Easter Island and to strengthen the hypothesis of its affinity with Central and South America and Egypt is that drawn from tradition and legend lore. The present inhabitants of Easter Island, though mainly an altogether different race, yet through intermarriage may retain a slight strain of the blood of those who anciently peopled the island. They account, as I have previously remarked, by the vagaries of a later and gross mythology for the wonders they cannot sufficiently explain. Still I think I am justified, in instances where their tradition corresponds with that of America, and in some instances with that of Egypt, in esteeming those cases as genuine remains of the more ancient tradition and mythology. As the Maori of New Zealand retains in his religious records distinct references to the original home of his race, to wit, Howaiki---our modern Hawaii---so the Easter islander affirms the same.

But over and above this, dating from an immensely anterior period, is the tradition of an older migration from a place they designate "Itlan." They assert that their forefathers were much lighter in complexion than now, but that, owing to the anger of the gods, much of their ancient home had been swept away by terrible floods and burned up by fire from heaven; while the survivors were so much scorched by the conflagration that ever afterwards they remained of a dusky hue. Bearing this in remembrance, let us see what we can elicit from America and Egypt.

The flood legends of America, according to Alfred Maury, approach very much nearer to the Bible narrative and to the traditions of the ancient Chaldaean religion than those of any other people of the Old World. Some writers would explain the difficulty by asserting that the traditions reached the American continent from Asia by way of the Kourile and Aleutian Islands. But in that case would not the flood legends then exhibit a nearer approach to those of China and India than to Chaldaea? But the facts are exactly the reverse. Is not Donnelly's hypothesis here preferable, that the legends of the Flood did not pass into America by way of the Aleutian Islands, or through the Buddhists of Asia, but were derived from an actual knowledge of the fate of Atlantis possessed by the people of America, and disseminated to the European colonies of Atlantis by the survivors of that terrible cataclysm?

From the symbolic and picture writings of the Toltecs, Aztecs, and Miztecs, we learn that after the great flood which happened at Aztlan or Atlan, the Noah of the Mexican Deluge, who was named Coxcox, accompanied by his wife, Xochiquetzal, saved themselves on a raft made of cypress wood. Is not this the "Itlan" of Easter Island? From the Aztec Codex Chimalpopoca, the Abbe Brousseau de Bourbourg translates a flood legend, wherein the man and woman saved are called Nata and Nena, and where it is also stated that, after their release, they offered a great sacrifice to Titlacahuran or God. Does this not resemble Genesis viii. 20? How came the likeness? They could not be the interpolations of Christian missionaries soon after the discovery of Mexico by Cortes, or Peru by Pizarro, because the narratives amidst essential similarities exhibit also radical diversities. But a singular identity does exist between the account given by Plato in the Timaeus of

the facts detailed to Solon by the priests of Sais regarding the destruction of Atlantis, and the Toltec, Aztec, and Miztec flood legends. Take, for example, the story of the Deluge as told in the Popul Vuh, or Sacred Book of the Toitecs. It runs as follows: "Then the waters were agitated, and by the will of the God of Heaven, and a great inundation fell upon all earthly creatures; because they had offended him by their sins. They were engulfed, and a resinous darkness descended from heaven. . . . the face of the earth was obscured, and a heavy darkening rain commenced, rain by day and rain by night. There was heard a great noise above their heads as produced by fire. Then were men seen running and rushing about frantic, and filled with despair. They wished to climb upon their houses, but their houses tumbling down, fell to the ground; they wished to climb the trees, but the trees were uprooted; they tried to enter the caves, but these either closed themselves up before them, or covered them up when they were inside. Water, fire, smoke, thunder, and wind all united to bring about the great ruin to mankind in the great cataclysm of Aztlan."

One of the oldest natives to whom I spoke on the subject, with difficulty making my meaning understood through an interpreter, said, "Our fathers, many many 'seasons' ago, lived far nearer to the sun [viz., further East] than we do now. They lived in the great Itlan, or home of all people; but the great 'Tericacala' being angry with them, because they did not do what he had ordered them, sent a tempest of fiery rain and floods and a mighty wind, and the mountain-gods vomited up flame, and the sea-gods vomited up waters, by the great Tericacala's command, and Itlan and many of our forefathers were swallowed up in one day and were seen no more. But our father Nahata and his wife alone escaped, and after many wanderings came here and built his house here."

The two wonderful picture histories of the Aztecs, preserved, as Donnelly notes, in the Boturini collection by V. Gamelli Careri, gives a record of the migrations of their forefathers after the great cataclysm, and in both of these the original home of the race is designated Atlán, while the older race of the Toltecs, as Bancroft states, traced their generations back to the great emigration of their fathers from their former home at Aztlan, after the general cataclysm (vide the Relaciones of the native Mexican historian, Ixtlilxochitl). The Miztec traditions vary the story a little, and would seem to imply that the migration from the original seat of Aztlan had occurred some time before the great cataclysm. Their records relate "that three sons of the king of the Quiches, upon their father's death, determined to go to the East, over the sea, even unto the place called Aztlan, whence their fathers had come." And Bancroft further relates that at Aztlan, notwithstanding the great offshoots and emigration of population which had occurred from time to time, apparently great state was maintained, and a suzerainty exercised over the American as well as the European colonies. For in his monumental work, Native Races, Bancroft records that "the youths went to the East to receive the royalty. Now this is the name of the Lord, of the Monarch of the people of the East, where they came, even Lord Nacxit. And when they had arrived before the Lord Nacxit, the name of the great Lord, the only Judge whose power was without limit, behold he granted them the sign of royalty and all that represents it, and the insignia of royalty, all the things in fact which they brought back on their return, and which they went to receive from the other side of the sea---viz., the art of painting from Tulan, a system of writing, they said, for the things recorded in their histories." That other tributary princes came to Aztlan "from the West over the sea" for a similar purpose, evidence exists in the old Aztec records which detail the splendor of the original empire. Do not these traditions bear out in a marked manner Plato's statements in the Timaeus---those statements hitherto ranked as a piece of excellent "romancing" on the part of the great Greek philosopher; but now, since the unlocking of the Toltec and Aztec records, proved to contain a very large admixture of truth? Collateral proof of the correctness of Plato's narrative

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reaches us from India, which ethnological science has demonstrated to have been peopled from Egypt, or at least through Egypt, from an original source now lost in the mists of antiquity. Sanskrit scholars will remember that the Bhagavata-Pura and Brahmanism generally contains many legends pointing to the West as their original habitation, also to a country "in the West" of surpassing greatness and power, which exercised a lordship over the world, but was lost in a terrible deluge from which only Satyravata escaped.

Another argument in favour of the affinity of Easter Island, Central and South America, and Egypt is derived from theology and ethnology, in the identity of many of the religious ceremonies and customs, either presently or formerly practised in all three. As far as can be discovered now, the "older" worship in Easter Island, before it became corrupted and debased by the introduction of exclusively Polynesian elements, was pure and elevated. The earlier inhabitants, as their buildings indicate, were undoubtedly Sabaeans, or sun-worshippers. The representations of the full-orbed luminary are frequently met with on the sculptured rocks, particularly near Perouse Point and in the vicinity of the village of Maihu. Though cannibalism has prevailed here in historically recent times, that has only taken place, I have reason to believe, since the immigration from Hawaii set in, some two or three hundred years ago. The old worship, in existence before civilisation was completely overthrown by the savage Hawaiians, was directed towards One Supreme Being, whose visible symbol was the sun, and who had many subordinate divinities under him to execute the more mechanical offices of his rule throughout the realms of the natural world. The ancient sacrifices were confined to fruits, flowers, and green boughs. Does not this bear out the remarks of Plato in the Timaeus with regard to the religious ceremonies of the people of Atlantis, who worshipped a single deity, typified by the sun, and whose sole sacrifices were those of the fruits of the earth and flowers. The majestic colossi to which the attention of visitors to Easter Island is always immediately directed, represent the great sun-god along with his subordinate deities, and in one of the great lava quarries of the island there is yet to be seen a huge symbolical statue of the Supreme Deity in an unfinished state, the work having been interrupted thousands of years ago by some great foreign invasion, which terminated adversely to the original inhabitants of the island. There it stands to this day, together with other statues also lacking the finishing touches, affording us a vivid glimpse into the social life of this mysterious and wonderful race.

To the religious customs of the ancient inhabitants of Central and South America all these symbols bear a striking and a close affinity. Differences there are, but such can scarcely be considered worth mentioning.

In Peru a single deity was also worshipped---the sun, as his most glorious representative, being the object of adoration also, to whom however, Quetzalcoatl, the founder of the Aztecs, forbade all sacrifices save of fruits and flowers. In Peru the great annual festival of the sun was termed Ra-mi. Compare with this the earliest religion of Egypt, before the revolution of the Hyksos kings, with whose advent Isis and Osiris became the presiding deities. Was not the worship of Ra, the sun, as pure and simple at Memphis and Heliopolis as afterwards that of Isis, Osiris, and Horus at Thebes and Abydos was magnificent and full of pomp? Does not the similarity in name between the Supreme Being (Ra) in Central and South America on the one hand, and in Egypt on the other, suggest a close affinity? The earliest sacrifices in Egypt also were only flowers and fruit. The Guanches of the Canary Islands, whom Donnelly upon no slight authority considers the purest remnant of the old population of Atlantis, likewise observed precisely the same religious observances, as directed to a deity bearing a name almost identical, to with, Rea. They furthermore believed in the immortality of the soul, as well as in the corporeal resurrection of the individual, and therefore preserved their dead as mummies. The Egyptians, the Toltecs, Aztecs, and the inhabitants of Easter Island all observ-

ed precisely the same method of embalming, as was recorded by Herodotus (Bk. ii, chaps. 86-90). The Proverbs of Ptah-hotep, the earliest religious book of the ancient Egyptians, reveal in a most impressive manner the sublime monotheism of the Egyptians in the earlier dynasties of Memphian supremacy. But they do not excel the pure simplicity traceable in the worship of the early Toltecs and Aztecs. Their dead they did not mourn for any length of time. If they had lived righteously, they would be rewarded by Ra, but punished if their actions had been sinful; while after death the soul at once passed to the enjoyment of a pure happiness, not savouring of sensual delights, as in the Mahomedan's Paradise, nor of indulgence in brutal pleasures as in the case of the Scandinavian Valhalla, but of social and intellectual enjoyment, wherein the soul rose to its highest possible development.

Again, the ancient inhabitants of Easter Island, the Egyptians, and the early races of Central and South America, believed in vicarious sacrifice as propitiation for sin; in the cat as a sacred animal; in augurs who practised divination by observing the flight of birds; in solemnly sprinkling the bodies of the dead with water. In the religious ceremonies of all three, the burning of incense constituted an important factor; in all, celibacy was practised as a virtue, while among the Toltecs and Aztecs, as among the Egyptians, and later among the Greeks and Romans, Vestal Virgins existed as a distinct religious order. The Brahmin of India, the priests of Memphis, as well as those among the Aztecs and Toltecs, should the holy light in their temples by chance be extinguished, churned their sacred fire out of a log, by causing a pointed stick to revolve in a circular groove with great rapidity. In ancient Egypt and America huge fires were lighted to stay pestilence, and traces of the same custom exist in Easter Island to this day. The sacred bulls of Apis among the Egyptians find a parallel in the sacred cows of Ra among the Toltecs, and the sculptured figures of the cow on the rocks in Easter Island undoubtedly point to a peculiar sanctity being attached to this animal. The Aztecs and the Egyptians both manufactured a fermented drink from grain, the one distilling it from maize, the other from barley; both pledged toasts, both had the institution of marriage, an essential portion of the rite consisting in the joining of hands, of which also distinct traces remain to this day in the customs of Easter Island, where the bride and bridegroom clasp hands before their relatives and friends in token of union. In Easter Island, divorce was and is only recognised under certain defined circumstances; among the Aztecs and Toltecs, conjugal separation was granted only for reasons closely approximating, and special courts were appointed to arbitrate in such matters. A similar institution is traceable in the priestly council among the ancient Egyptians, to deliberate upon analogous cases. In Easter Island are still visible the remains of arches evidently commemorative of some triumphal celebration. The Egyptians, the Aztecs, and the Toltecs erected similar tributes to their heroes, those at Teotihuacan in Central America being especially magnificent. Circumcision was undoubtedly practised at Easter Island in ancient times, as extant carvings still demonstrate. That the Egyptians, Phoenicians and Hebrews rigidly observed this rite is beyond a doubt; quite as rigorously also, for hygienic reasons, was it enforced among the Toltecs, Aztecs and Peruvians.

Need more be said to prove the theory? A vast mass of material is still beside me unutilised, all tending to strengthen the hypothesis I have suggested, that the "Mystery of the Pacific" need be considered a mystery no longer, if we admit the key to lie in the ancient connection of this island with Central and South America in ages long gone by. That the affinity between Egypt and the ancient Toltecs and Aztecs, as emanating from a common source, was exceedingly close, may, I think, be at least considered possible. More than this to be admitted at the present state of investigation would be as unfair to expect as it would be unwise to admit. But this at least can, I think, be allowed, that the analogies traced between the remains at Easter Island with those of Egypt and of the buried cities of Central and South

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America are not the result of accident, but exhibit similarity in design and an identity in execution, which create a strong presupposition in favour of both types of architecture and sculpture emanating from a kindred order of genius, and, as a consequence, from a kindred people.

MSS-002 6,000-YEAR-OLD CITY IS FOUND OFF SPAIN

Anonymous; New York Times, July 29, 1973.

Cadiz, Spain, July 21 (UPI)---Members of a United States expedition released yesterday photographs of roads, columns and walls of an apparently ancient city under water off the coast of southwestern Spain that they believe could be the legendary lost civilization of Atlantis.

Eggerton Sykes, an archeologist told a news conference, "We can be fairly sure of the date because it is at least 6,000 years since this area was above water."

Mr. Sykes, a Briton, said there was no chance that the sunken ruins were merely Roman or Phoenician remains. These are not uncommon in the Gulf of Cadiz, where the coast has been receding for centuries.

He said that, after studying photographs and drawings made by a team of divers, he "had no doubts that what they found dated from an earlier era."

In recent years many archeologists have come to believe that the Atlantis described by Plato and other early Greeks was the Minoan civilization based on Crete and the Aegean Islands.

The discovery of volcanic ash spread across the floor of the Mediterranean a number of centuries before Plato's time has been taken as evidence that a catastrophic volcanic eruption was responsible for the fall of the Minoans.

Egerton Sykes (name spelled incorrectly above) has long been an enthusiastic proponent of Atlantis and Hoerbiger's theory of recurring terrestrial catastrophes. As for Atlantis, it has been reported as found in many places---the Mediterranean and the North Sea, for example. One must remain skeptical and open-minded at the same time.

On August 6, 1973, UPI debunked the dispatch quoted above. The entire text of the second article will be reproduced (with permission of UPI) in the next volume in the M series, M2.

MST-001 ANCIENT MINING IN NORTH AMERICA

Berry, J. S.; American Antiquarian, 11:164-167, 1889.

The ancient copper mines on Lake Superior have been fully described by many writers. I have been much in that country and can testify to the accuracy of the descriptions of the ancient copper mines given by Whittlesey, Foster and others, as well as the review of the subject now presented by Mr. Appy. [viz., MST-001] I will only add that so far as my observation has extended all the ancient workings on Lake Superior were abandoned many hundred years ago, for the heaps of debris that surround the pits made by the ancient miners were covered with forest trees which had obtained their maximum size, and I have never heard of any of the old mines which did not show evidence of abandonment at least four hundred years ago.

The old mica mines of North Carolina and the quarries of serpentine in the Alleghanies, worked by the ancient inhabitants to procure materials for their pots, pipes, etc., show the same rude processes and I may add the same antiquity as the copper mines of Lake Superior, for they, too, were overgrown by what seemed the primeval forest when first visited by the whites.

To all the evidences of ancient mining industry in our country cited by Mr. Appy, I will add that some population of the Mississippi valley in ancient times worked our oil fields in many places, and at least in one case opened and extensively worked a vein of lead. This lead vein is situated on the Morgan farm, about six miles northeast of Lexington, Kentucky. Part of the area traversed by it has been long cultivated and the evidences of excavation have been thereby to some extent obliterated, but a part of the course of the vein runs through a tract of woodland which has never been touched by the axe. Here the ancient working is in the form of an open cut, six to ten feet wide, of unknown depth, and now nearly filled with rubbish. On either side of this trench the material thrown out forms ridges several feet in height, and these are everywhere overgrown by trees, many of which are as large as any found in the forests of that section. We learn from this that the work was abandoned at least five hundred years ago. Galena has been found in a great number of the ancient works in Ohio, both in mounds and fortifications. It has never been smelted, however, and seems to have been valued merely for its brilliancy, though it may have been calcined and used for the production of a pigment.

In regard to the working of our oil fields in former times, I would say that I have found conclusive evidence that wells were sunk and oil collected on Oil Creek, near Titusville, Pennsylvania, in Mecca, Ohio, and at Enneskillen, Canada. In 1860 the first fountain well was opened by Brewer and Watson, just below Titusville. I then resided in Cleveland, Ohio, and went to Titusville to examine the interesting geological phenomena presented by the newly-opened oil wells. In passing down the valley of Oil Creek I noticed that the surface of the ground was pitted in a peculiar way; it was in places completely occupied by shallow depressions, ten to fifteen feet across and from one to three feet in depth. At first I thought they must have been produced by a wind-fall, in which the trees were all up-rooted, but I was familiar with the character of the depression made by the overturning of a large forest tree, and knew that the pit thus formed was oval, with a ridge on one side and none on the other. These pits were, however, quite symmetrical and were a puzzle to me. While I was talking with Mr. Brewer or Mr. Watson about them and asking questions to which I got no satisfactory answers, a man standing near told me if I would go with him to his well one hundred yards away the mystery would be solved. I did so, and found that he had begun the excavation of a well in one of these pits, and had sunk through the superficial material some twenty-five

MST-001 TUNNELS, MINES

feet to the rock where he was to begin drilling. In sinking his pit he followed down an old well, cribbed up with timber, and in it stood a primitive ladder, such as was so often found in the old copper mines of Lake Superior; a tree of moderate size, with many branches, had been felled and the limbs cut off a few inches from the trunk, thus forming a series of steps by which one could ascend or descend. The cribbing of the ancient well was rudely done with sticks six to eight inches in diameter, either split from a larger trunk or lengths cut from a smaller one. The sticks had been cut by a very dull instrument, undoubtedly a stone hatchet.

The method of gathering the oil practiced by the ancient inhabitants was evidently that followed in the Caspian region up to the time when the American method of drilling and pumping was introduced, viz.: a pit was sunk in the earth, and the oil skimmed from the water.

What use was made of the oil we can only conjecture, possibly it was employed only medicinally, as the oil from the spring at Cuba, New York, was used by the Indians in that region; possibly for burning, as petroleum has been used from time immemorial in Persia, India and China. The large number of pits sunk in the valley of Oil Creek indicate, however, that the quantity taken out was large and that the oil served some important purpose among the ancient people. The pits described above were located in a dense hemlock forest in which many of the trees were three feet and more in diameter.

At Enneskillen, Canada, the oil was collected much as on Oil Creek, that is by sinking wells in the superficial clay. At the time of my visit to Enneskillen a pit six by twelve feet had recently been sunk to a depth of about fifty feet, and one corner of this pit was cut in an ancient one that had been filled up with rubbish, leaves, twigs, etc.; at the depth of thirty-seven feet from the surface a pair of deer's antlers had been taken out from this pit, showing conclusively that it had once been opened to that depth. Over this old well, as well as upon depressions which marked the sites of others, full-sized trees were growing, proving that the pits had been abandoned and filled many hundred years before.

At Mecca and Grafton, Ohio, I found a few depressions in the surface that seemed to me quite like those on Oil Creek, and I have no doubt they were ancient oil wells, but the quantity of oil which came to the surface in these localities was small and therefore the wells were few.

Who the people were who worked these oil wells I will not pretend to say; doubtless they were some members of the great American family of nations, but I can not at all agree with those who would regard them the same as our modern nomadic Indian. I have been much among our Indians, having visited about forty tribes, and I have been from boyhood studying the works of the so-called Mound-builders, and I find indications of strongly marked differences between them. The Mound-builders were doubtless not one, but many tribes, and they were but little way advanced on the road to civilization; still they differed from the present Indian in this, that they were far more sedentary, agricultural and industrious.

The modern Indians of New York, Ohio, Kentucky, Indiana, etc., had their fields of corn and pumpkins when the white man appeared, but they were essentially the children of the forest, and the clearings they made and cultivated were utterly insignificant as compared with the great breadth of forest growth. The modern Indians never built any such works as those of Marietta, Newark and Circleville and were not found working the copper mines, the oil wells or lead veins when they were first observed by the white man. On the other hand we may say that the characteristic works of the Mound-builders had been abandoned a thousand years or more before the white man set foot in the Mississippi valley. This we know because their walls and mounds, copper mines and oil wells are not only covered with a generation of trees which had attained their maximum size, but the roots of these trees had overgrown the trunks of a preceding generation, which grew and died before them. How many such generations of forest trees have

succeeded each other since the fields and towns and fortifications were deserted, we have no means of knowing, but we have positive evidence of two.

From the facts which have come under my observation I am convinced that the modern Indians of the states I have mentioned are not the descendants of those who have left these records behind them, but that they are invaders and usurpers who, like the barbarian hordes that overran and nearly effaced the civilization of the shores of the Mediterranean, came from the north and dispossessed a more sedentary, peaceful and industrious people or peoples that had long occupied the best portion of the Mississippi Valley. That the Mandans, Natches, and perhaps other tribes may be the descendants of the Mound-builders, I can very well believe, but that the Iroquois and Algonquins are their modern representatives will, I think, not be credited by any one who has studied the ancient works and has by personal observation made himself familiar with the Indian of to-day.

MST-002 COPPER MINES WORKED BY THE MOUND BUILDERS

Lewis, T. H.; American Antiquarian, 11:293-296, 1889.

Those who paid attention to North American antiquities a generation ago were much interested when they learned that certain ancient people had systematically mined for copper in the Lake Superior region, along the metalliferous ridges running parallel to the lake and back from it several miles. The proof of this fact was in the existence of numerous pits which showed, by the material taken from them and deposited outside and from the debris remaining within, together with the numerous stone hammers and other relics and fragments of copper found in and near them, that human beings had once toiled there as miners, laboriously and for a long time. Three centers of their activity were demonstrated: First, along the middle range of trap for nearly twenty miles, extending across the Ontonagon river, about twelve miles from the lake; second, near the extremity of Keweenaw Point, from Eagle Harbor to range 28, along the base of the trap range, for a distance of twelve miles; and, third, at a point on Isle Royale, fifty miles away across the lake.

It was to the report of the United States geologists, Messrs. Foster and Whitney, "On the Copper Lands of Lake Superior Land District, Michigan," 1850, that the antiquarian world was first indebted for this important information. Chapter V of the book on "Ancient Mining" gives a concise statement of how and when (1847-8) these pits were first discovered, and indicates the principal localities then known and the kind of relics found. Besides all this, there was the suggestion that the mysterious people, too, might have built mounds---witness these three paragraphs:

"Traces of tumuli, constructed in the form of mathematical figures, have been observed, but not sufficiently explored to determine absolutely whether they be the work of art, and, if so, for what purposes they were intended."

"In the northeast quarter of section 16, township 50, range 39, near a small stream, there is a mound which has the appearance of having been the work of art. Mr. Hill, from whose notes much of the above information has been derived, states that from the want of tools he was unable to penetrate it, to determine whether it was stratified or not. It is about ten feet high, in the form of a square, the sides of which are fifteen feet in length, flat on the top, and slope regularly to the base."

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"There is another tumulus on the right bank of the Ontanagon river, six miles from its mouth, forty feet high, and nearly circular, which has been supposed to be artificial, but has not been explored with a view to determine the point."

Since the time of this report the ancient mines of Lake Superior have received much attention at the hands of competent men, who have published the results of their observations, but curiously enough no one of them mentioned the two mounds just described.

About the middle of last June I made a trip to the Ontanagon region in order to examine these mounds, as well as to look at the mining pits, and thinking that some of the readers of *The American Antiquarian* might like to know what facts were ascertained and conclusions arrived at, this paper has been written.

The square mound described and illustrated in Foster and Whitney's report stood about forty rods west of the post office at Rockland and about two miles east of the Ontanagon river (on N. W. N. E. 16, 50, 39), near the edge of a deep ravine, on nearly level ground, and undoubtedly it was artificial. The excavations and long years of cultivation have so defaced it that, at the present time, the casual observer could not locate it without assistance. Several of the older citizens remember that about thirty years ago there was "considerable excitement" in that vicinity in regard to the works of the Mound-builders and regarding this particular mound more especially. Several parties did more or less excavating in it, and whilst the statements as regards the contents are somewhat conflicting, yet they agree that human bones were found at the bottom, near the level of the surrounding soil. The finding of the human bones, and the position and shape of the mound, indicate that it was artificially constructed, and leave no room for doubt.

The other mound, located some five miles above the village of Ontanagon, also on the east side of the Ontanagon river, and which has generally been considered to be artificial by the citizens of that region, is unquestionably of natural origin, it being an isolated portion of an adjoining plateau, which is about one hundred yards distant to the east. The north end is some thirty feet in height above the flood plain on which it rests, and if isolated would be nearly triangular in shape at the base, but extending to the northward there is a large irregular ridge, the whole being best described by calling it a "hog-back," the formation of which is owing entirely to the action of water. The base of this "hog-back" is surrounded in high water and the southwest side is being cut away, showing the clayey formation to be the same in every respect as that of the adjoining plateau.

The ancient mining pits, however, are the most attractive and interesting features of this region, and there is a wide field for future investigation. While at Rockland, I explored the copper range for several miles, and found such pits to be very numerous, so much so that it requires a visit to this region to realize their numbers and extent. At some of the mines there is scarcely a trace left where formerly the pits were numerous, at others only the larger ones have been "cleaned out". At one of the latter (the Caledonia mine) where the debris had been dumped in a heap, I noticed a few hammers protruding, and in less than an hour, by using a sharp stick, I exposed 132 grooved hammers, ranging in size from a hen's egg to twelve or fifteen pounds in weight, only a few of which were unbroken, and also a broken stone ax and several large hand hammers.

The ancient miners must have had dwelling places which were occupied for at least three or four months during the summer season, and perhaps they may have used the same site for several summers in succession. After a few trips to the range they would become familiar with the surrounding country and its natural resources, and it would be reasonable to presume that some of the more daring and hardy might remain during the winter. In either case, however, it is patent that some vestiges of their old camps or townsites, as the case might be, should be exposed to view as the country became settled up in modern times. By general inquiry among the farmers and others in the vicinity of Rockland, it appears that

when the country was first settled, chipped implements were not uncommon, they being found on the cultivated land along the streams, and also around and within the ancient pits. Copper implements and pieces of pottery were also met with occasionally. In early times the Iron River Indians had a village occupying both sides of the Ontanagon river at its mouth. These locations with their two graveyards are well-known points, being within the village limits. Occasionally chipped implements are found here that are supposed to have belonged to the former Indian occupants. But aside from these, there are other finds made that would indicate that the ancient miners had settlements in this vicinity. Extending east along the coast for nearly two miles from the mouth of the river, I found quartz chips, fragments of grooved stone hammers, and hand hammers (ungrooved), and an occasional fragment of pottery, of which there were three varieties, viz: first, that composed of broken stone and clay; second, composed of sand and clay; and, third, of shell and clay; also, a stone hammer that was evidently undergoing the process of manufacture when it was lost or abandoned, the groove only being started on one side. In nearly all directions to the south and west of Ontanagon, finds of various sorts have been reported, such as arrow-heads, pipes, and an occasional copper implement. Although this is a fine farming district, the settlements extend only a few miles beyond the village, so that the field for surface finds is limited, but undoubtedly many things of archaeological value have been passed over unnoticed.

A point of special inquiry among old miners, managers, explorers and prospectors, who were familiar with the copper range, was to ascertain the extent of the territory covered by the ancient mines and pits. From these different sources I ascertained that the pits extend along the whole range from the extremity of Keweenaw Point to and beyond the northwestern end of Gogebic Lake, a distance of fully 120 miles, and they are not confined to the "central range" alone, but are found on the ranges both to the north and to the south. It may be further stated that ancient pits are found along the copper range in northern Wisconsin and also in the region northwest of Lake Superior, both in Minnesota and on the Canadian side of the International boundary line.

Who the ancient miners were, or whence they came, may never be fully ascertained. They may indeed have been Aztecs, but, for my part, I have good reason to believe that they were the Mound-builders of Wisconsin, and that their center of power and population was located in the southern part of that State. In modern times the products of our mines become scattered over a wide area of territory, this being accomplished by our superior facilities for transportation. In pre-historic times the facilities and mode of transportation must necessarily have been slow and laborious, and the product of these mines would naturally be found more abundant where people dwelt who owned and worked them. I do not care to treat of their probable routes of travel, but in the "once upon a time" when these old Mound-builders of the Northwest were in all their glory---such as it may have been---perhaps the streams were more favorable for navigation than they now are, as the volume of water may have been much greater than at present. This, however, is only a suggestion, and one not absolutely necessary to prove that the ancients took their copper, etc., southwards in boats.

The copper implements met with within the limits of Wisconsin probably exceed in numbers those found in all the other States combined, and in the effigy mound region (southern Wisconsin *par excellence*) they seem to be the most numerous, and they have even been found in the effigies themselves. Outside of Wisconsin copper implements have been discovered in nearly all the other States east of the Rocky Mountains, but those in which they have been most frequently found are, Minnesota, Michigan, Ohio, Iowa and Illinois. In this connection it may seem a little curious that in all the States named there are also effigy mounds, unless, possibly, Michigan be an exception.

MST-003 TUNNELS, MINES

Perhaps the most interesting feature of these mines is their extensiveness and the immense quantity of copper that must have been mined and transported somewhere.

MST-003 [ANCIENT LAKE SUPERIOR COPPER MINES]

Anonymous; Nature, 45:39-40, November 12, 1891.

A peninsula called Keweenaw Point, jutting into Lake Superior from the southern shore towards the north-east, is famous as the centre of a vast copper-mining industry. Last year the mines produced no less than 105,586,000 pounds of refined copper, and it is estimated that during next year production will be increased by at least 20 per cent. Mr. E. B. Hinsdale, who contributes to the latest Bulletin of the American Geographical Society an article on the subject, has much that is interesting to say about the numerous prehistoric mines which have been found in this region. These ancient mines---judging from their extent---must have been worked for centuries. Who the workers were, no one can tell. They seem to have known nothing of the smelting of copper, for there are no traces of molten copper. What they sought were pieces that could be fashioned by cold hammering into useful articles and ornaments. They understood the use of fire in softening the rocks to enable them to break away the rock from the masses of copper. They could not drill, but used the stone hammer freely. More than ten cart-loads of stone hammers were found in the neighbourhood of the Minnesota mine. In one place the excavation was about 50 feet deep, and at the bottom were found timbers forming a scaffolding, and a large sheet of copper was discovered there. In another place, in one of the old pits, was found a mass of copper weighing 46 tons. At another point the excavation was 26 feet deep. In another opening, at the depth of 18 feet, a mass of copper weighing over 6 tons was found, raised about 5 feet from its native bed by the ancients, and secured on oaken props. Every projecting point had been taken off, so that the exposed surface was smooth. Whoever the workers may have been, many centuries must have passed since their mines were abandoned. Their trenches and openings have been filled up, or nearly so. Monstrous trees have grown over their work and fallen to decay, other generations of trees springing up. When the mines were rediscovered, decayed trunks of large trees were lying over the works, while a heavy growth of live timber stood on the ground.

MST-004 VERTICAL SHAFTS IN THE CHALK IN KENT

C., H. M.; Nature, 21:13, November 6, 1879.

In the current number of Good Words there is a pleasant, gossiping paper by the Rev. J. G. Wood, giving an account of the curious well-like shafts found in the chalk about Erith. They are 40 feet to 100 feet in depth. Mr. Wood states that the sides show traces of having been wrought with picks made of deer antlers. He appears to accept the theory of local archaeologists that the shafts were executed in "prehistoric" times, in the quest for flints for weapons or for some less

obvious purpose.

Under any circumstances I should be loth to dispute the view of so competent an authority, and in this instance I have no local knowledge to guide me; but I should be grateful if some of your readers would satisfy me on the following point:--Is there any instance of similar excavations which have been conclusively proved to be the work of savages ancient or modern? I know of none within my own personal experience.

Burrows on the "adit" or "gallery" principle, i. e., more or less horizontal, can be carried surprisingly far, so long as the roof does not fall in. We see this in the abodes of certain quadrupeds. But, to carry down a vertical shaft a few feet in diameter to a depth of 40 feet to 100 feet from the surface, even in a soil as favourable as chalk, appears to me to involve recourse to mechanical appliances not yet observed in use among primitive races. If I am wrong in this matter, the mode of excavation pursued by these rude shaft-sinkers certainly affords interesting matter for study.

MST-005 VERTICAL SHAFTS IN THE CHALK IN KENT

Spurrell, F. C.; Nature, 21:66-67, November 20, 1879.

The deep caves in the chalk in Kent while preserving a general form in a limited area, present certain differences amongst themselves, which enable us to trace something of their history as to time and object.

Those now most easily examined are the latest and best constructed. Though they are not dug at the present day here, there are many old ones that have been worked for chalk. These are distinguished by their irregular shapes and very wide shafts.

But there are fine examples now open of which North Kent has many having these general characters---a deep shaft, penetrating the soils (Woolwich pebble beds, Thanet sands and gravels) above the chalk, then the chalk itself from 2 to 5 feet, and widening out into a cave in the latter, mostly without effort at burrowing laterally, and when doing so keeping the shaft in the middle and the general shape of the cave as it were one area, with a due regard for the permanence of the roof. Some had pillars for this purpose left in the chalk, and there is one with four of them which are elegant in form and rounded. This cave being an excellent example of the kind, may be more particularly described. The shaft is 3 feet 3 inches in diameter (a common average), and passing through sand reaches the chalk at 51 feet; then penetrating it 2 feet widens out into an area of 49 x 38 feet, the sides cut into bays. Two pillars are left, one on each side of the shaft, and in continuation of it, still 3 feet apart, and there are two other pillars in the eastern part. The western part having no pillars has fallen in, and there is a large mound of sand and rubbish in the centre---but the height of the cave is 20 feet, perhaps 22 feet.

In this case the access to the chamber is perfect; the shaft is provided with foot-holes from 6 inches to 20 inches (occasionally) in lateral depth, these pass from the surface to the bottom of the central pillars at about 18 inches apart and opposite to each other, and it was easy a few years ago to descend and ascend without assistance, unless perhaps with that of a stick across the mouth of the shaft. Some of the shafts have foot-holes only to the point where they widen out below, when recourse was had to a pole or rope, of course.

MST-005 TUNNELS, MINES

Most of the caves are simpler than this, and the commonest form is a mere beehive sort of widening.

All these open caves appear to have been dug with iron picks.

At Greenhithe one has been lately found containing a large quantity of Roman British pottery, but it was dug with metal implements, probably of iron.

There are two caves at Crayford within 3 feet 3 inches of each other; they are exposed in the side of a chalk-pit connected with the brick-fields. One of them measured, from the surface to the chalk, about 18 feet; thence to the floor, 17 feet 6 inches. The floor was of flints, about 6 inches thick, which had been taken up at one part and piled in a heap on the other side of the cave; about a quarter of the area, an irregular oval of 18 feet diameter, had been so treated. From this floor rose an obtuse cone of sandy clay 6 feet high, washed in very slowly and evenly by the rain. In the cone were found flint flakes, and one worked scraper with a rough core, from which flakes had been chipped, but no pottery. Above this, coarser soil and lumps of chalk, with several sorts of broken pottery, very coarse, black, spongy pot, scarcely baked, containing a large quantity of crushed shells not calcined, and a few pieces of pot made with coarsely-pounded chalk---all these either without ornament or only finger-nail marked; then finer pot of Roman moulds, and fine black ware, with a Samian plate. All were accompanied by large quantities of the bones of domestic and food animals for about a foot, then coarse earth and bones to the surface.

From about the period of the Roman deposit until now we know the value, and it would not be excessive to date the commencement of the deposit of mud and the abandonment of the cave perhaps at half that period earlier.

On the walls of this cave there are no marks of the implement by which it was excavated, and the conclusion is that the blocks were prised out.

The cave adjoining this fell in early and was soon obliterated.

Before knowing of these caves flint flakes and two "pot boilers" were found on the surface.

Clusters of these pits are either huddled into smaller areas sometimes or are spread out into lines, and they are frequent in spots which, from the supply of water, must have been thickly wooded, and so difficult of access, or from the bleakness of the situation unlikely to be noticed.

There is a cluster at Bexley of thirty-five in about three and a half acres, and another of forty-four.

Some pits which are mostly filled up now, in the woods, are part of a system and are connected by banks and ditches, and the same banks with earthworks which are of a late stone age, and also with clusters of hut circles, and there is great probability that they served two uses---retreat and storage, and as pitfalls, as to the last with an ingenious contrivance in one instance for driving animals down a deep covered way, either past a pit or, by an arrangement of a simple barrier, shunting them into it for the use of the camp.

SUBJECT INDEX

Proper names are so profuse in the quoted sources that a thorough index of them would overwhelm the book; therefore, only the most important proper names, such as Stonehenge, are indexed here. Place names are included, but authors and sources are indexed separately immediately following this subject index. Place names are inclined to be highly variable. For this reason, they are categorized first by continent/ocean and then by country or some other reasonable subdivision. An Arizona entry, for example, will be found under North America/United States/AZ.

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