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MADSTONES AND THEIR MAGIC.¹

FOR centuries many accounts have been current regarding the virtues, real or imaginary, of certain bodies known as snake stones and madstones, which are asserted to have the power of absorbing poisons from wounds. The literature of two hundred years ago contains references to these substances; and even now some persons have a lingering belief in their efficacy. The subject is a curious one, and a brief account of it may be of interest, particularly of the origin and identification of one of these peculiar bodies.

Jean Baptiste Tavernier, the great oriental traveller of the seventh century, in his "Travels in India" (see Dr. Valentine Ball's translation in two volumes, London and New York, 1889, pp. lxx. 429; xix. 496) says: "I will finally make mention of the snake stone, which is nearly of the size of a double doubloon (a Spanish gold coin), some of them tending to an oval shape, being thick in the middle and becoming thin toward the edges. The Indians say that it grows on the heads of certain snakes, but I should rather believe that it is the priests of the idolaters who make them think so, and that this stone is a composition which is made of certain drugs. Whatever it may be, it has an excellent virtue in extracting all the poison when one has been bitten by a poisonous animal. If the part bitten is not punctured, it is necessary to make an incision so that the blood may flow; and when the stone has been applied to it, it does not fall off until it has extracted all the venom, which is drawn to it. In order to clean it it is steeped in woman's milk, or, in default of it, in that of a cow; and after having been steeped for ten or twelve hours, the milk, which has absorbed all the venom, assumes the color of madder. One day when I dined with the Archbishop of Goa, he took me into his museum, where he had many curiosities. Among other things he showed me one of these stones, and, in telling me of its properties, assured me that it was but three days since he had made a trial of it, after which he presented it to me. As he traversed a marsh on the island of Salsette, upon

¹ This article also appeared in the New York Sun.

which Goa is situated, on his way to a house in the country, one of his palanquin bearers, who was almost naked, was bitten by a serpent, and was at once cured by this stone. I have bought many of them, and it is that which makes me think that they make them. You employ two methods to ascertain if the snake stone is good and that there is no fraud. The first is by placing the stone in the mouth, for then, if it is good, it leaps and attaches itself immediately to the palate. The other is to place it in a glassful of water, and immediately, if it is genuine, the water begins to boil."

Thevenot says, in his "Voyages," p. 94, that snake stones were made of the ashes of the root of a certain plant, mixed with a particular kind of clay. Some snake stones appear to have been made of charred bone (see, for an exhaustive account of this subject, Yule-Burnell, "Anglo-Indian Glossary"). The belief in their efficacy is still very general in India; by some they are supposed to be found in the head of the adjutant bird (see "Jungle Life in India," p. 83).

Francisco Redi describes, in his "Experimenta" (Amsterdam, 1685, pp. 4 to 8), the extraordinary healing power attributed to stones obtained from the heads of certain serpents, called by the French "cobras de capello," found throughout Hindostan and Farther India. These stones are claimed to be an infallible remedy for the bites and stings of all kinds of venomous reptiles or animals, and likewise for wounds made by poisoned arrows, etc. He repeats the usual tales of their adhering powerfully when applied to the bite or wound, and clinging to it like a cupping-glass until they had absorbed all the poison, when they would fall off spontaneously, leaving the man or animal sound and free. Then follows the account of steeping the stones in milk to remove the poison, the milk assuming a color between yellow and green. These wonderful stones and the narrations concerning them had been brought to Italy by Catholic missionaries, who seem to have entire faith in their powers; so that Redi says they offered to prove the accounts by any number of experiments, such as would satisfy the most incredulous, and prove to medical men that Galen was correct when he wrote (chapter xiv. book I.) that certain medicines attract poison as the magnet does iron. For this purpose a search for vipers, etc., was recommended; but, owing to the season being later and colder than usual, none could at that time be obtained, as they had not emerged from their winter quarters. An experiment was therefore substituted, after much consultation among the learned men of the Academy of Pisa, whereby oil of tobacco was introduced into the leg of a rooster. This was regarded as one of the most fatal of such substances, and was administered by impregnating a thread with it to the width of four fingers and drawing it through the punctured wound. One of the monks forthwith applied the stone, which behaved in the regular manner described. The bird did not recover, but it survived eight hours, to the admiration of the monks and other spectators of the experiment.

Redi states that he himself possessed some of these stones, and also Vincent Sandrinus, one of the most learned herbalists of Pisa. Redi describes them as "always lenticular in form, varying somewhat in size, but in general about as large as a farthing, more or less. In color some are black like Lydian stone, tinged at times with a reddish lustre others white, others black, with an ashy hue on one side or both," etc.

Up to the present time no one has apparently identified what Tavernier referred to in speaking of snake stone. I however, occurred to the writer, after receiving a quant

of tabasheer from Dr. F. H. Mallet of the Geological Survey of India, who obtained it at the bazaar of the Calcutta Fair in November of 1888, that the Indian snake stone is evidently tabasheer. Tabasheer is a variety of opal that is found in the joints of certain species of bamboo in Hindostan, Burmah, and South America; it is originally a juice, which by evaporation changes into a mucilaginous state, then becomes a solid substance. It ranges from translucent to opaque in color. I found it either white or bluish-white by reflected light, and pale yellow or slight sherry red by transmitted light. Upon fracture it breaks into irregular pieces like starch. As in Tavernier's account of its clinging to the palate and causing water to boil when immersed, it actually has the property of strongly adhering to the tongue, and when put into water emits rapid streams of minute bubbles of air. It has a strong siliceous odor, but after absorbing an equal bulk of water becomes transparent like a Colorado hydrophane described by the writer several years ago before the New York Academy of Sciences.

Although tabasheer is mentioned in nearly all the textbooks, very little of it has reached the United States. It is highly interesting, since we have here an organic product scarcely to be distinguished from a similar opal-like body found by Mr. Arnold Hague in the geysers of the Yellowstone Park. Both tabasheer and the hydrophane were probably what was called "Oculus Beli," "Oculus Mundi," and "Lapis mutabilis" by Thomas Nicol, Robert Boyle, and other writers of the seventeenth century, and "Weltauge" by the Germans.

The great capacity of this substance for absorbing a fluid would undoubtedly render it as efficacious for the purpose of absorbing poison as any other known stone, providing the wound is open enough; and its internal use to-day as a medicine is possibly also due to this property.

Tabasheer, as known among mineralogists, is a corruption of the word tabixir, a name which was used even in the time of Avicenna, the Grand Vizier and body surgeon of the Sultan of Persia in the tenth century. It played a very important part in medicine during the middle ages. As to its origin, Sir David Brewster¹ says that tabasheer is only formed in diseased or injured bamboo joints or stalks.

Guibourt² differs from Brewster, inasmuch as he attributes the different rates of growth to the fact that when there is a superabundance of sap the tabasheer is formed from the residuum. More recently, Henry Cecil³ says, "In the onrush of tropical growth in the young shoot, nature, after flooring the knot, has poured in, as it were, sap and silica sufficient for a normal length and width of stem to the knot next above it. But by some check to the impulse, or by irregularity of conditions, the portion of stem thus provided for is shorter or narrower than intended, and the unused silica is left behind as a sediment, compacted by the drying residuum sap."

This latter view is sustained by Dr. Ernst Huth in his elaborate description of this substance, entitled "Der Tabixir in seiner Bedeutung für die Botanik, Mineralogie, und Physik; X. Sammlung Naturwissenschaftlicher Vorträge, herausgegeben von Dr. Ernst Huth, Berlin, 1887."

In this article Dr. Huth discusses the name, history, origin, and reputed virtues of this substance with much fullness. In regard to its use in medicine during the middle

ages, he quotes a remarkable list of applications to the ills that flesh is heir to.

Here it is cited as a remedy for affections of the eyes, the chest, and of the stomach, for coughs, fevers, and biliary complaints, and especially for melancholia arising from solitude, dread of the past, and fears for the future. Other writers speak of its use in bilious fevers and dysentery, internal and external heat, and a variety of injuries and maladies.

The writer has examined a large number of so-called madstones, and they have all proved to be an aluminous shale or other absorptive substance. But tabasheer possesses absorptive properties to a greater degree than any other mineral substance that I have examined, and it is strange that it has never been mentioned as being used as an antidote. It may be confidentially recommended to the credence of any person who may desire to believe in a madstone.

GEORGE FREDERICK KUNZ.

THE PLANT-BEARING DEPOSITS OF THE AMERICAN TRIAS.¹

The plant-bearing deposits of the American Trias are, so far as known, confined to two general regions, viz., a series of troughs in the piedmont region of the Atlantic slope extending from Massachusetts to North Carolina, and a great basin or area in the territories of New Mexico and Arizona. The character and structural relations of these rocks have been fully discussed by numerous writers. It is proposed in this paper to examine the evidence of the fossil plants as to their geological position. This evidence may be considered from two points of view; first, as to the relative position of the several basins, areas, or plant-bearing portions; and, second, as to the general relations of the flora as a whole to other floras which resemble it sufficiently to admit of comparison.

In looking at the subject from the first of these two points of view, or that of the American distribution, it is convenient to divide the general terrane into five geographical areas corresponding nearly with so many geological basins, viz., first, that of the Connecticut valley; second, the area that extends with little interruption from the Hudson River to near Charlottesville, Virginia; third, the Richmond coalfield; fourth, the North Carolina coalfield; and, fifth, the western area, which is not as yet sufficiently known to admit of subdivision.

The fossil plants have nearly all been found in the Connecticut valley, the Richmond coalfield, the North Carolina coalfield, and about the copper mines of New Mexico; a few came from New Jersey, Pennsylvania, and Maryland, while only silicified trunks have thus far been discovered in Arizona. All the material that has been found has been carefully studied and as accurately determined as its nature will permit. The greatest abundance of vegetable remains occurs in the Richmond and North Carolina coalfields.

A careful comparison of all the forms shows that out of a total of a hundred and nineteen species eighty-five are confined to some one of the areas above enumerated, leaving only thirty-four that occur in two or more of them. Tables of the distribution of species with full analysis of their relations and significance are given in the paper. As a general result, it is found that none of the basins except that of the

¹ Edinburgh Philos. Journal, No. 1, p. 147; Philos. Trans., cix., p. 283; and "The Natural History and Properties of Tabasheer," 1828; Edinburgh Journal, viii., p. 288.

² Jour. de Pharmacies, xxvii., pp. 81, 161, 252; and Phil. Mag., x., p. 229.

³ Nature, xxxv., p. 437.

¹ Read by title, by Lester F. Ward, before Section E of the American Association for the Advancement of Science, at Washington, D.C., Aug. 21, 1891; and in full before the Geological Society of America, at the same place, Aug. 24, 1891.