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TAVERNIER'S TRAVELS IN INDIA.

Travels in India of Jean Baptiste Tavernier, Baron of Aubonne. Translated from the original French Edition of 1676, &c., by V. Ball, LL.D., F.R.S., F.G.S., &c. In Two Volumes. (London: Macmillan and Co., 1889.)

JEAN BAPTISTE TAVERNIER was a Sindbad of the seventeenth century. To an insatiable love of travel, which prompted him even in his boyhood to rove through the greater part of Europe, and in his mature life to accomplish no less than six voyages to Persia, India, and the still more remote East, he united the faculties of a shrewd and successful trader. By his traffic in jewels and other costly commodities of small bulk, he turned his wanderings to profitable account, and amassed a fortune which enabled him to purchase the Barony of Aubonne, and to enjoy the dignified retirement of a wealthy old age. But, like a true traveller, he remained active-minded and active-bodied to the last. At the age of 79, attracted by the offer of the Elector of Brandenburg to conduct an embassy to India, he set forth on a circuitous journey through Europe, and, disposing of his estate and *château* of Aubonne, he embarked on renewed mercantile ventures. The few remaining years of his life were passed, for the most part, in journeying to and fro in Europe, and he died while so occupied. The place of his death has long been doubtful, and it has only recently been discovered, on the authority of a letter from the Swedish Resident at Moscow, that the indefatigable traveller drew his last breath at Smolensk, in February 1689, when on his journey to the ancient Russian capital.

Despite some inaccuracies and inconsistencies, due mainly to the incompetent editing of the original work, Tavernier's account of his travels has long been appealed to by Indian historians as a recognized authority—the testimony of an eye-witness to the condition of India under the later great Mogul emperors. At the time of his visits, the Mogul Empire was in the zenith of its power and splendour. On the occasion of his first journey to India, he found Shah Jehan, "the most magnificent prince that ever appeared in India," peaceably seated on the Imperial *masnad*; and throughout his dominions, though these were less extensive than in the time of his successor Aurungzebe, a degree of good administration and general prosperity surpassing that attained under any previous or subsequent emperor. He quitted India for the last time only about two months after the death of Shah Jehan, then deposed and imprisoned, when Aurungzebe was setting out on that career of conquest and oppression that in the following century brought about the wreck of the Mogul Empire, and exposed its rich cities and provinces to be wasted and despoiled by Maráthá hordes and Afghan invaders.

At a Court gathered around the famous peacock throne, where emperor and nobles vied with each other in the acquisition of costly jewels, an expert such as Tavernier was received as a welcome visitor; and in pursuit of his calling he travelled without hindrance through the length

and breadth of India, visiting the European settlements of Surat, Goa, Madras, and Kásimbazár, the independent Court of Golconda (Hyderabad), and certain of the diamond-mines that were then actively worked both in Southern and Northern India. His work is a medley of historical memoranda, incidents of travel, itineraries, and details of his commercial dealings, put together without much system, but nevertheless highly instructive, and apparently far more trustworthy than was conceded to him by most of his contemporaries; altogether furnishing a fund of information respecting the state of India in the middle of the seventeenth century.

The latest English translation of Tavernier's travels appeared more than two centuries ago, and as Mr. Ball remarks, owing to the translator's misconception of the author's meaning, through want of local knowledge, and to serious abridgment, it gives a very inadequate idea of the true merits of the original work. Mr. Ball's own long experience of India, and his familiarity with its geography and the varied phases of native life, would alone have enabled him to correct most of the errors of his predecessors; and the deficiencies as a philological and historical critic which he modestly urges as having determined him, for a time, to abstain from attempting a new translation, have been made good by the invaluable assistance afforded by the late Sir Henry Yule, under whose advice he eventually undertook the work. The result is the two handsome volumes now before us, in which for the first time the old traveller's experiences are presented to English readers, elucidated by the results of modern research, and in a form which very greatly enhances their value for all purposes of future reference. Some few inconsistencies remain, and are duly pointed out in the footnotes, but they are such as relate to matters of detail, occasional confusion of dates or persons, and the like; and they do not appreciably detract from the general trustworthiness of the narration.

With the political and historical data of Tavernier's work it is hardly our province to deal in this place. Most of his facts relating to the Court of Delhi were probably furnished to him by his cotemporary and sometime fellow-traveller Bernier, and all that is important in them has been long rendered familiar to English readers in the lucid pages of Elphinstone. Neither need we dwell on his descriptions of native customs or the manner of life of those European exiles of various nationalities who were then, as pioneers, exploiting the riches of the East, with no small display of mutual jealousy and animosity, and indulgence in practices sometimes hardly less barbarous than those of the indigenous population amid which they dwelt. The social condition of the Indian people in Tavernier's day was essentially the same as when, more than a century and a half later, the British Empire having been raised and consolidated on the ruins left by Maráthás and Patháns, a new era of peace and civilization was inaugurated by Lord Bentinck, and the suppression of thuggi, dacoity, sati, and other barbarous rites of the Hindu religion, preceded the establishment of schools and Universities, and the opening up of the wilds of India by systems of roads and railways. The social regeneration of India, such as it is, has been almost exclusively the work of the last seventy years, and even now it has hardly penetrated far below the surface.

It was the information given by the traveller on the diamond-mines worked in his day, that first drew Mr. Ball's attention to the subject of Tavernier's travels. The mines visited and described by him have long been abandoned, and even their very sites forgotten. With free labour, and at its present enhanced rates, diamond-working is no longer so remunerative as under the despotic governments of the seventeenth century, and it is within the recollection of the present writer that the working of one of the most productive mines of the former Golconda State was let on behalf of the British Government at the modest rental of 100 rupees. Tavernier gives it to be understood, indeed, that only four mines were worked, all of which he visited; but Mr. Ball tells us there is ample reason for believing that they were far more numerous than he had any conception of; and in an appendix he gives a full list of all the Indian localities at which diamonds have been obtained as far as is known, together with the geographical co-ordinates of all such as he has succeeded in identifying. Owing to the vagaries of phonetic spelling, and the ignorance of Indian geography on the part of many who have dealt with this subject, this identification has been far from easy. As amusing examples of the way in which localities have been confused by some previous writers, Mr. Ball tells us that "one author gives Pegu as a diamond-mine in Southern India; in the Mount Catti of another we have a reference to the Gháts of Southern India"; and he adds: "For some time I was unable to identify a certain Mr. Cullinger, who was quoted by one writer, in connection with diamonds. Will it be believed that this *gentleman* ultimately proved on investigation to be the *fort* of Kálinjar?"—a well-known historical fortress in Bundelkhand.

Indian diamonds are found exclusively in rocks of the Vindhyan formation or in the gravels of rivers that drain these rocks. The formation consists of sandstones, limestones, and other sedimentary rocks, certainly not more recent than the Lower Palæozoic age, but being unfossiliferous, their precise age cannot be determined. In Southern India the diamonds occur only in the Bánaganpili sandstone, at the base of the lower subdivision of the Vindhyan series, or in gravels derived from that bed. This is described by the authors of the "Manual of the Geology of India" as usually from 10 to 20 feet thick, consisting of gravelly, coarse sandstone, often earthy, and containing numerous beds of small pebbles. The diamonds are found in some of the more clayey and pebbly layers, and in the opinion of Dr. W. King, the present Director of the Indian Geological Survey, they are innate in the rock. This view does not, however, appear to commend itself to the authors of the manual. In Northern India, at Panna, in Bundelkhand, the diamond bed is in the upper division of the Vindhyan series; but it is considered not improbable that here also the original *nidus* of the diamonds was, as in Southern India, a bed of the lower subdivision, pebbles of which occur in the diamond bed, and are extracted and broken up in the search for the gem.

As is well known, Tavernier examined, and in his book described and figured, the famous Great Mogul diamond, then in the possession of the Emperor Aurungzebe; and he has been often cited as a principal witness by those

who have discussed the question of the history of the Koh-i-noor. To this subject Mr. Ball devotes a long note in the appendix, arriving at conclusions which differ from those of Prof. N. S. Maskelyne, and indeed of most previous writers, with the exception of James Forbes, Major-General Sleeman, and Mr. Tennant. The argument is somewhat complex, and hardly admits of abstraction, and we must therefore refer those who are interested in the subject to the text of Mr. Ball's note. It will suffice here to indicate the main issues. They are concerned with the identification *inter se* of the three diamonds known respectively as the Mogul diamond, Baber's diamond, and the Koh-i-noor. The first of these, described and figured by Tavernier, is the largest diamond on record, and is stated to have weighed originally, before cutting, 900 *ratis* (an Indian weight still in use, but the value of which has varied greatly at different times and under different circumstances). When Tavernier saw it, it had been reduced by unskilful cutting to about two-fifths of its former size, and weighed only 379½ *ratis*, which Mr. Ball computes to be equivalent to 268 English carats. Baber's diamond, of which Tavernier makes no mention, but which is equally historic, Mr. Ball thinks was probably retained by the imprisoned Shah Jehan, and acquired by Aurungzebe only after Shah Jehan's death. The weight of this stone is computed by Mr. Ball, from the statements of Baber and Ferishta, to have been 186 English carats. The weight of the Koh-i-noor when first brought to England was exactly the same as that computed for Baber's diamond, or, accurately, 186·06 carats. Now Prof. Maskelyne, General Cunningham, and several other writers regard these three stones as identical, and the former suggests that Tavernier's estimate of the weight of the Great Mogul diamond in carats (probably Florentine) was erroneous, and due to his having adopted a mistaken value for the *rati*. This view Mr. Ball is unable to accept. Nevertheless he considers it probable that the Koh-i-noor is the remnant of the Mogul diamond, from which portions have been removed while it was in the possession of the unfortunate grandson of Nadir Shah, or some other of those through whose hands it passed before it was acquired by Runjeet Singh; and that Baber's diamond was a distinct stone, now in the possession of the Shah of Persia, and known as the Dariya-i-noor (sea of lustre), the weight of which is also 186 carats.

Mr. Ball's careful criticism of the available evidence, and his clear setting forth of the several steps of his argument, give weight to the conclusion at which he finally arrives, that will doubtless be acknowledged even by those who differ from him. But as regards the identity of the Koh-i-noor and the Mogul diamond, there remains one objection which, as it appears to us, Mr. Ball has hardly adequately disposed of. If Tavernier's figure, as reproduced by Mr. Ball, represents at all faithfully the general form and especially the height of the Mogul diamond, it is difficult to see how a comparatively flat stone like the Koh-i-noor could have been obtained from it without a much greater reduction of its weight than the 82 carats which are all that his data admit of. The lateral dimensions of the two stones accord fairly enough, so that any reduction of Tavernier's figured stone, to bring it down to the required size, could be

effected only by diminishing its height; in which case it would hardly correspond to his description of its form as that of an egg cut in two. The question can only be fairly tested by the weighing of a model constructed as nearly as possible in accordance with Tavernier's figure, and of such lateral dimensions as to be capable of including the Koh-i-noor. It may be that such a model, of the specific gravity of the diamond, would be found much to exceed Tavernier's reported weight of the stone, in which case the importance of his figure as an item of evidence, would be greatly invalidated.

Whatever may be the final outcome of this controversy, Mr. Ball has done a good service to literature and science in re-translating Tavernier's work, in its careful editing, and in throwing light on much that has hitherto remained obscure. The result will certainly be that which he has anticipated, the vindication of Tavernier's claim "to be regarded as a veracious and original author."

H. F. B.

OUR BOOK SHELF.

Star Land. By Sir Robert S. Ball, LL.D., F.R.S. (London: Cassell and Co., 1889.)

THE author of this work is now so well known as a popular expounder of astronomical subjects that it is quite sufficient praise of his new book to say that it fully sustains his reputation. The book is described as "talks with young people about the wonders of the heavens," being founded chiefly on notes taken at his courses of juvenile lectures at the Royal Institution. Astronomy gives plenty of scope for the exercise of the imagination, and Dr. Ball takes full advantage of this. The book bounds with anecdotes and homely illustrations, calculated to impress the facts on the memory as well as to excite wonder at them. The startling figures dealt with in astronomy are, as usual, converted into railway train notation, and otherwise illustrated. One new illustration of the distances of the stars is that it would take all the Lancashire cotton factories 400 years to spin a thread long enough to reach the nearest star at the present rate of production of about 155,000,000 miles per day. The irregularities in the motion of Encke's comet are explained in an interesting dialogue between the "offending comet" and the astronomer, in which the comet explains that his delay was due to the fact that Mercury was "meddlesome."

The only disappointing parts of the book are those which deal with astronomical physics. One point not sufficiently insisted upon is the now generally acknowledged meteoritic constitution of comets; a connection is certainly suggested, but that comets are now supposed to be simply dense swarms of meteorites is not stated at all. Nebulæ, again, are described as "masses of glowing gas," notwithstanding the recent researches on the subject. The theory that meteorites are the products of ancient terrestrial volcanoes is also still adopted by Dr. Ball, without any consideration of the objections to such a view.

The book is well illustrated, and will undoubtedly awaken an interest in the subject in all intelligent readers.

The Magic Lantern: its Construction and Use. By a Fellow of the Chemical Society. (London: Perken, Son, and Rayment.)

THE third edition of this little book has been issued, and will be exceedingly useful to those who work with the lantern. Descriptions are given of the various lights used in lanterns, from the oil lamp to the electric arc; the methods of making simple slides are entered

into, and a few experiments, illustrative of elementary scientific principles, are well included. The work is thoroughly practical; none of the little details so necessary to beginners have been omitted, whilst many of the hints it contains may be of service to all who use this optical instrument, whether it be for lecture purposes or for recreation only.

LETTERS TO THE EDITOR.

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Acquired Characters and Congenital Variation.

I do not see that the Duke of Argyll's last letter in any way strengthens his position. The questions at issue with regard to evolution are now, I believe, thoroughly understood by biologists. Nothing, in my opinion, can solve them in the direction the Duke desires but the evidence of fact. And that, I can only repeat, is precisely what is not forthcoming. I am equally of opinion that the discussion has been worn threadbare. I should not myself have interfered in it, had it not seemed desirable to show that the motives attributed by the Duke to those who accept Darwinian principles were destitute of foundation.

This part of his position the Duke does not attempt to defend. As to the rest he merely restates what he has said before. His remarks fall under two heads, and I shall content myself with the briefest possible comment upon these.

(1) *Acquired Characters.*—The Duke gives what I presume he intends as a logical proof of the theorem that acquired characters are inherited. It may, I think, be formally expressed as follows:—

"It is always possible to assert" that acquired characters are developed latent congenital characters.

It is admitted that congenital characters are inherited.

∴ Acquired characters are inherited.

It will be observed in the first place that this is a mere *a priori* argument. And next that, while it is not denied by Darwinians that the organism is a complex of congenital tendencies, limitations, and possibilities, this is entirely beside the question. From Lamarck to Darwin, Weismann, and Lankester, the meaning of "acquired characters" has been clearly defined. They are those changes of hypertrophy, extension, thickening, and the like, which are obviously due to the direct physical action of the environment on the body of the individual organism. It was these changes which Lamarck asserted were transmitted to the offspring; and it is this transmission which it is now maintained needs demonstration as a fact.

Let me give another illustration. I read the other day in the newspapers that the police of Paris have carried out an extremely interesting investigation. They have carefully ascertained the recognizable changes in the normal human organism produced by the prolonged pursuit of any particular occupation. The object was to obtain data for the identification of unknown dead bodies. The changes proved more numerous and characteristic than could have been supposed. They supplied, in fact, diagnostic marks by which the occupation of the individual could be accurately inferred. It seems to me impossible to have a more admirable case of the direct action of external conditions. I ask, is there any reason to suppose that these acquired characters would be transmitted?

This appears to me an extremely plain issue, as it is certainly an extremely important one. There is not the least reluctance on the part of Darwinians to face it squarely. But the Duke appears to me to deliberately evade it.

(2) *Prophetic Germs.*—It seems to me that we are somewhat at cross-purposes. The Duke admits that I have correctly quoted him as saying: "All organs do actually pass through rudimentary stages in which actual use is impossible." When Prof. Lankester challenged the Duke to produce a single instance, he guarded himself by the remark: "The stages here alluded to are—if I understand correctly—ancestral stages, not stages in the embryological development of the individual." The Duke has never repudiated, as far as I am aware, that limitation of his meaning, if it be a limitation. And as he has