

that is more likely to further such a hazardous and dangerous object. In vain did Dr. Thorne, one of the English delegates, urge at the Conference the iniquity and danger of this recommendation. The French delegates leading the majority turned a deaf ear to any reasonable suggestion; they seem to have learned no lesson from the misery that lazarettos, fumigations, and all other measures of land quarantine, without stopping the introduction and spread of cholera, have in the past inflicted on their country.

If we ask ourselves, What new facts, what new experiences have in the last cholera epidemic in 1884 been gained in order to justify these recommendations of the majority of the Conference? we have to answer—None; and those that have become known point in the opposite direction. The recommendation as to five to ten days' quarantine off Suez for ships coming direct from India seems to imply that the late outbreak of cholera in Egypt owed its origin to importation from India. This view has during 1883-84 been stated and re-stated by French writers with their usual self-confidence, but not a tittle of evidence has been brought forward to support it. Moreover there exists a good deal of evidence showing that that outbreak, which, as is well known, commenced in Damietta, owed its origin to importation from an altogether different direction—viz., overland by pilgrims from Mecca. As Prof. Lewis, another delegate from England, has urged at the Conference, no English ship coming from India has ever been known to have imported cholera into Egypt and Europe; and, considering the enormous number of vessels arriving from Indian ports in Egypt, the Mediterranean countries and Europe, it is certainly a very remarkable fact that importation, if it happened in this manner, should not be of common occurrence.

The real danger from cholera for Egypt, Turkey, and Europe does not lie at Suez and the Suez Canal, but at Mecca and the countries about the Caspian Sea, this being the route in which cholera has hitherto travelled—viz., from Mecca, Mesopotamia, and Persia, into the Red Sea coast, Egypt, Syria, the Levant, Turkey, and Russia—and therefore these are the portals, if any, which the European Powers ought to guard. As England has urged in the past, and as it has also urged on this occasion, every country may, and has a right to protect itself as it thinks best. France and Spain may make their own maritime quarantine as rigorous, their land quarantine as vexatious as they choose; but that these countries should dictate measures to others, which past experience has proved to be fallacious and futile to achieve the end they aim at, is as iniquitous as it is against common sense.

Cholera in Europe being dependent on importation from the East, it is quite clear that absolute prevention of such importation would theoretically be the best safeguard; but then the question arises, and it is one that has been repeatedly asked—viz., can this be practically achieved? To stop unconditionally every and all communication with an infected locality involves, apart from the great practical difficulties in carrying it out, such enormous hardships, material loss and misery, that the remedy would entail greater misfortunes than the evil it tries to cure, even granting, for the sake of argument, that it is capable of so doing.

Prof. von Pettenkofer in his various writings on the

subject of quarantine has fully and clearly stated the case, and their perusal would have materially enlightened many of the members of the late Conference. They would also find in those writings what they might have found already in the protocols of the former conferences (in Constantinople and Vienna), viz. that one of the *chief* and *first duties* of the State in order to prevent and check the spread of cholera is a *proper attention to general sanitation*. Make your military cordons as strict as you please, stop and impede all traffic by sea and land as much as you like, fumigate your railway travellers and mails as carefully and rigorously as possible, you will not hereby succeed in stopping all communication with an infected country. On the other hand, give up all those silly and harassing limitations, but keep a good look-out for infected ships coming to any of your ports, detain the infected persons in a specially-fitted hospital, disinfect the ship and articles, but allow the rest of the passengers and crew to depart, keeping their names and addresses, and notify their arrival to the sanitary authorities of the place they are bound to. Further than this, see that your dwellings, your water and air are in sanitary respects looked after, and that filth is properly disposed of, and you will hereby have done what is compatible with all past and present experience in order to check the entrance and dissemination of cholera. It is admitted on all hands that general insanitary conditions of dwellings, water, and air are the most powerful allies of cholera; without them, cholera is as unable to spread as typhoid fever.

The principles just mentioned are practically those on which the sanitary authorities in this country have been acting in the past, and on which they are acting in the present. The danger to this country from importation of cholera from Spain is greater than perhaps to any other, seeing the vast maritime communications existing between this country and the east and south coast of Spain; but there can be little doubt that, if cholera should unfortunately be imported, it can never assume those gigantic proportions that it has assumed in France, Italy, and that it is now assuming in Spain.

If one reads of the unspeakably filthy conditions prevailing in Spain, and reads at the same time of the silly and arbitrary proceedings of the authorities in carrying out quarantine, one is reminded of the General who, in trying to keep out a powerful enemy is putting up on the frontier a few dummy soldiers and toy guns, but who has omitted to provide the interior of the country with a real army and guns. The result is, of course, clear: the enemy cannot be prevented from entering, and, having entered, cannot be kept from overrunning and devastating the country.

A NATURALIST'S WANDERINGS IN THE EASTERN ARCHIPELAGO

A Naturalist's Wanderings in the Eastern Archipelago, a Narrative of Travel and Exploration from 1878 to 1883. By Henry O. Forbes, F.R.G.S. With numerous Illustrations. (London: Sampson Low, Marston, Searle, and Rivington, 1885.)

MR. FORBES' Wanderings in the far East extended over about four and a half years, during which time he visited the Keeling Islands, Java, Sumatra,

Amboyna, Timor Laut, Buru, and Timor. In Java, Sumatra, Buru, and Timor he made extensive inland journeys through districts rarely or never before visited by European naturalists; and as he everywhere collected assiduously and observed intelligently, the record of his travels is exceedingly interesting. His special studies were botanical and ethnological, and in these departments he has added much to our stores of knowledge. His observations on the manners and customs, the myths and superstitions of the various tribes among whom he resided or travelled will be of great value to anthropologists, owing to the wide range of his observations and the time and trouble he devoted to the inquiry. In zoology he did not collect largely, and indeed it was simply impossible for him to do so, since the continuous labour and attention needed to form a well-preserved herbarium in the damp equatorial climate and while almost constantly moving about, leave the traveller but little leisure to devote to other departments of natural history. To collect effectually in any wild tropical country, the naturalist should settle himself for at least six months at a time in a good central position from which short excursions in various directions can be made; and if these headquarters are well chosen it is possible to obtain an almost perpetual "fine season," and thus greatly increase both his collecting power and his personal enjoyment.

Mr. Forbes appears to have had rather more than his fair share of accidents to his collections, and in every case what was lost was of especial interest. His insect collection from the Keeling Islands was destroyed on the way back to Java, and we thus lose the opportunity of comparing the list with that made by Mr. Darwin more than forty years before. In Timor Laut a large part of his herbarium was destroyed by fire, while a smaller collection made in the interior of Buru was actually left behind for want of porters to carry it. The Timor Laut collection is especially to be regretted, as it was obtained with great difficulty in perhaps the least known island of the whole archipelago, while it is probable that many years will elapse before any other naturalist will venture to explore so remote and inhospitable a country.

Mr. Forbes' residence for three weeks in the Keeling Islands enabled him to note what changes had occurred since Darwin's visit nearly half a century earlier. These are very slight, and seem incompatible with the theory that any subsidence has taken place, because the inner margin of some of the islands next the lagoon are sometimes half a mile distant from the outer edge, and the greatest cyclones do not carry the coral *débris* nearly so far. It is now generally admitted that the celebrated "subsidence theory" of the formation of atolls and barrier reefs is unsound as a general explanation of the facts; yet it so fully and plausibly explained all the details of coral structure known at the time, as to command universal acceptance and unbounded admiration. We have here a remarkable instance of the danger of founding a general explanation of widespread phenomena on an assumed basis, for the fact of long-continued subsidence, which was the very foundation of the whole theory, was in most cases quite incapable of proof. It is also now apparent that the theory was to some extent inconsistent with the views as to oceanic islands which Darwin himself originated and which are now generally admitted to

be sound. His great argument, that no single oceanic island possessed ancient stratified rocks or contained a single indigenous mammal, was equally an argument against the view that the widespread coral archipelagoes of the Pacific and Indian Oceans were due to the subsidence of co-extensive tracts of land, since it is almost impossible that all the higher points of these submerged lands, spread over nearly half the surface of the globe, should be without exception of volcanic origin.

Crabs of two or three species were the most abundant terrestrial inhabitants of the Keeling Islands living in narrow cork-screw burrows, which are so numerous that one hundred and twenty of their holes were counted in an area only two feet square. Around these holes little mounds are formed, and the crabs carry into their burrows twigs of trees, pieces of seaweeds, seeds, &c., thus fulfilling in many ways the functions of earthworms in this newly-formed land. Their numbers are enormous, and Mr. Forbes thus describes the curious optical effect produced by them:—

"On placing the foot on the region occupied by them, one perceives an undulation of the surface followed, over a circular area, by a surprising change of the pure white ground into a warm pink colour, which for the moment the stranger puts down to some affection of his eyes from the reflection of the light. He soon perceives that this movement is caused by the simultaneous stampede of the dense crowd of the peopled shore into their dwellings, just within the door of which they halt, with the larger of their two pincer-claws, which is of a rich pink colour, effectually barring the entrance except where one watchful stalked eye is thrust out to take an inquiring look if the alarm is real. As one advances the pink areas again change into white, as the Crustaceans withdraw into their subterranean fastnesses. On traversing a broad field occupied by these crabs, the constant undulations and change of colours produce a curious dazzling effect upon the eyes."

During his long residence in the mountains of Java, Mr. Forbes made many interesting observations on the fertilisation of orchids. He was surprised at the large number of these plants which, though often possessing the combined attractions of showy flowers and fragrant odours, yet never or rarely produce seed-capsules. In one case, for example, out of 360 flowers examined till they withered or dropped off, only six produced capsules. Again, he finds a considerable number of species with showy flowers which are yet specially adapted for self-fertilisation and never seem to be visited by insects. The most extreme and marvellous example of this phenomenon is found in a plant related to *Chrysoglossum*, which fertilises itself without ever opening its flowers at all. Mr. Forbes observed these plants in the forest as well as in numerous specimens grown in a garden, and all were fertilised in the same way; and he adds:—"In opening the locked-up petals, I found the labellum beautifully marked with lines of purple, carmine, and orange, and the column also; but no insect eye could ever be fascinated or allured by its painted whorls."

These observations are of extreme interest, and they certainly prove, as Mr. Forbes remarks, that the rule "that the flowers of orchids are fertilised by the pollen of their flowers," is by no means so universal as has been supposed. Yet the phenomenon does not seem so extraordinary if we look upon it as one of the normal phases

in the developmental life-history of species. The overwhelming amount of evidence which has now been obtained of adaptations for cross-fertilisation, not in orchids only, but throughout the whole series of flowering plants, and the almost constant association of conspicuous form, colour, and odour with adaptations for insect fertilisation, force us to the conclusion that in almost all the cases adduced by Mr. Forbes we have species which were once adapted for insect-fertilisation. But in the terrific struggle for existence ever going on in tropical regions, insects are subject perhaps more than any other group of organisms to excessive fluctuations of numbers, sometimes culminating in the complete extermination of species; because they are equally liable to severe injury by physical and organic causes—by adverse seasons which destroy them in some of their earlier stages, or by the excessive attacks of insectivorous animals in both their larval and perfect states. It must therefore often happen that certain species of insects almost disappear in districts where they are usually abundant, and if any particular plant has had its flowers so highly specialised as to be adapted for fertilisation by one of these insects only, it must become extinct unless it occasionally produces varieties which are capable of self-fertilisation. The species of orchids in which a very small percentage of flowers produce seed capsules are evidently those in which the special insects adapted to fertilise them have become either temporarily or permanently scarce, and if that scarcity goes on increasing one of three things must happen—either the flower must become modified so as to be fertilised by some more abundant insect, or it must become capable of self-fertilisation, or it must become extinct. No doubt all these three cases occur, but it is of the second alone that we can obtain any knowledge, because we there find, as in our own bee-orchis, the special attractions of conspicuous form and colour which have yet ceased to be of service to the species. But no naturalist can doubt that these attractions were once serviceable; and we are thus led to conclude that all such instances are forms of functional degeneration which under changed conditions of the environment have afforded the only means of preserving the species.

Mr. Forbes's record of his thirteen months of travel in Sumatra are perhaps the most interesting portions of his book. He here met with some of the most marvellous productions of the vegetable kingdom—strange parasitical Rafflesiaceæ, an eccentric fig which ran underground and there produced its fruit, just showing their tops above the surface, and the giant arum (*Amorphophallus titanum*), some of which were seventeen feet high and with tubers six feet six inches in circumference. In the same forest huge earth-worms raised tubes of mud four and a half inches in circumference and eight inches high; and were so numerous as to render the whole surface of the ground as rough and hummocky as that of a newly-ploughed field. Here too, as well as in Java, he found a wonderful case of mimicry in a spider which deceived him even a second time; and he here obtained the rare *Ornithoptera brookeana*, perhaps the most chastely beautiful of all butterflies. Grand mountains, active volcanoes, glorious forest-scenery, strange antique monoliths, and many interesting races of men, combine to render Sumatra one of the finest hunting-grounds yet left for the naturalist, while

over the greater part of it there are facilities for travel or for residence rarely to be found in so little known a country.

In his later and more adventurous explorations of Timor Laut and Timor, Mr. Forbes was accompanied by his wife, a lady who seems to have endured all the annoyances, privations, and dangers of such a journey with truly heroic fortitude. Although these islands are far less known to naturalists than almost any other part of the Archipelago, they seem comparatively poor in a natural-history point of view. A considerable proportion of the birds and butterflies of Timor Laut were new species, but the collections were scanty, and there is, no doubt, much still to be done there if a collector could freely explore the country and not be confined, as was Mr. Forbes, to a limited tract owing to tribal warfare. One of the interesting discoveries here was another example of mimicry among birds, in which a new species of oriole mimics a new honey-sucker, just as do corresponding species in Ceram, Buru, Gilolo, and Timor. A most interesting case of protective colouration was also observed in the white-headed fruit-pigeon of Timor (*Ptilopus cinctus*). These birds sat motionless during the heat of the day in numbers on well-exposed branches, yet Mr. Forbes states that it was with the greatest difficulty that either he or his sharp-eyed native servant could detect them, even in trees where they knew they were sitting. The strongly-contrasted white and dark colours of this species are such that any person looking at a specimen in a museum might take it as an example of a defenceless bird with very conspicuous plumage, and might ask triumphantly how our theory of protective colouration can be applied here. Yet it turns out that these strongly-marked colours so exactly harmonise with the colours of the branches of the trees on which it sits, exposed to the glare of the tropical sun, as to be completely protective; and we thus have another illustration of the impossibility of forming any correct judgment on this question unless we are able to observe each species in its native country and among the exact surroundings to which it has become adapted.

The hasty journey through the interior of Timor, among strange scenery and strange people, is full of interest. Most of the mountain tops, where alone a rich and interesting vegetation was to be found, were strictly tabooed, and it was often only by stratagem that specimens were collected; while the difficulties of travel in a country absolutely without roads and consisting almost wholly of an endless series of rugged mountains and deep valleys were exceptionally great.

The book is on the whole very well written, and will give the reader an excellent idea of some of the less known parts of the Malay Archipelago. The weakest part of it are the illustrations, which, though numerous, appear to be for the most part reproductions of rough sketches by some unsatisfactory process of photo-zincography. For this the author was probably not responsible, but his readers will regret that the strange and beautiful scenery he has so graphically described is not more effectively presented to the eye. The portraits of many of the natives are, however, very well done, while several good maps and a full index greatly add to the value of the book as a useful work of reference.

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