

so much energy and talent at Naples by Dohrn; for it is only in such institutions—which supply, as it seems to me, a real want—that it can be possible to carry on a series of observations through successive years, which is indispensable for clearing up biological questions. Meanwhile let us be thankful that we have that of Dohrn, and a few others recently established, here in Europe. I cannot omit to record my satisfaction that Dohrn has decided henceforth to publish a special journal of his own Transactions, for I am convinced that the Institute itself, as well as zoologists at a distance, who desire information about it, will find it advantageous. The complaint that it constitutes a new scientific journal seems to me ill founded, for such an objection is never raised against a new book, and the work begun and continued in such an institute appears to me to constitute a whole, quite as coherent as the different chapters of a book, or indeed of many monographs, and often of much greater value.

CHAPTER VIII.

Note 106, page 259. According to Wichmann the rocks of the Kokeal formation contained the following fossils:—

Tridacna, Strombus, Mactra, Cyprina, Madrepora, Serpula, Lucina, Tellina, Venus, Spondylus, Fistulana, Balanus.

He regards the eruptive rocks as of tertiary or post-tertiary date.

Note 107, page 275. It would be highly advantageous now to criticise the Theory of Subsidence not merely in its application to a particular instance, as I have done, but in its universal bearings, so as to come to some conclusion as to whether my theory of currents, *sit venis verbis*, deserves, or does not deserve, general preference. This, however, is not the place for such a discussion. I will only observe that I believe that, in fact, my theory presents fewer difficulties than the Theory of Subsidence, and may therefore be regarded as more in accordance with nature. On the other hand, I readily concede that sometimes—as, for instance, in the Andaman Islands—an atoll may be formed during a period of subsidence, and yet it may not be exclusively the result of the subsidence. Still, under the assumption that absolutely no influence of the nature above indicated could have formed atolls among the Andamans, this could only have been possible if the subsidence had throughout been slower than the growth of the coral. This appears to be sometimes the case; for the Andamans are said to be sinking at the rate of a foot in a century, while Le Conte gives the maximum growth

of a coral as one foot in three and a half years, and another observation, in Port Darwin, gives one foot in twelve years. On the other hand, however, there are other islands which prove that the upward growth of corals is certainly never so rapid, and is often remarkably slow. In the Sandwich Islands—which, according to Dana, are sinking—all the corals live at several fathoms below the level of the water, and the case is the same in the Galapagos and the Gulf of Panama. Here, by assuming a subsidence, the growth upwards is less rapid than the rate of subsidence, and it must be even slower, much slower, if we assume an upheaval as going on in these islands. Hence I regard it as quite possible that under certain circumstances a subsidence may be combined with the formation of atolls, and even that it may once have been the sole cause of their formation; but I cannot admit that subsidence is alone sufficient to explain all the conditions and relations of coral-reefs, or even of predominant importance.

The following letter from Mr. Charles Darwin to the author refers to the subject under consideration:—

* October 2, 1879.

* My dear Professor Semper,—I thank you for your extremely kind letter of the 19th and for the proof-sheets. I believe that I understand all, excepting one or two sentences where my imperfect knowledge of German has interfered. This is my sole excuse for the mistake which I made in the second edition of my Coral-book. Your account of the Pelew Islands is a fine addition to our knowledge on coral reefs. I have very little to say on the subject: even if I had formerly read your account and seen your maps, but had known nothing of the proofs of recent elevation, and of your belief that the islands have not since subsided, I have no doubt that I should have considered them as formed during subsidence. But I should have been much troubled in my mind by the sea not being so deep as it usually is round atolls, and by the reef on one side sloping so gradually beneath the sea; for this latter fact, as far as my memory serves me, is a very unusual and almost unparalleled case. I always foresaw that a bank at the proper depth beneath the surface would give rise to a reef which could not be distinguished from an atoll formed during subsidence. I must still adhere to my opinion that the atolls and barrier-reefs in the middle of the Pacific and Indian Oceans indicate subsidence; but I fully agree with you that such cases as that of the Pelew Islands, if of at all frequent occurrence, would make my general conclusions of very little value. Future observers must decide between us. It will be a strange fact if there has not been subsidence of the bed of the great oceans, and if this has not affected the forms of the coral reefs.

* Yours very sincerely,

* CHARLES DARWIN.*