

the diatomaceous growth from the area of deposition while these intrusive layers were being formed.

That the comparison of recent and fossil or semi-fossil species is very useful as a means of elucidating structural peculiarities cannot be doubted, yet the determination of species is a matter of great difficulty. Thus although two given forms may be readily seen to belong to the same genus, the points of difference between them may be merely *varietal* and not *specific*, hence it becomes necessary to give careful consideration to the real significance of these points. To those who hold that all organic forms are but modifications or evolutions of a monad or primitive cell, the existence of species is enigmatical and such differential features are of but secondary moment; while, on the other hand, to those who regard the slightest deviation from a typical form as sufficient justification for the creation of species, these characters become of great value. In any case, however, although it is often impossible to decide whether two closely allied organisms differ in a varietal or specific manner, the omission to record the existence of distinct structures, which tend to make the history of the given type more complete, is unjustifiable. For this reason the indication of every notable form will frequently be made, but modifications will very often be treated as varietal, and new species will never be founded save on the presence of two or more interesting differences existing side by side. Where these are established, or new varieties recorded, the arguments that lead to such a course will always be given.

With regard to the *geographical* and *bathymetrical* distribution of Diatoms, no definite results can yet be laid down on account of the very limited condition of our knowledge of marine forms. As to the former, however, the desirability of registering the locality from which every organism has been obtained as a means of facilitating future work is apparent. The bathymetrical range is a question of even greater difficulty, as only *living* species, and the depth at which they are found, can be taken into account. It may here be noted that the advantages arising from a careful record of the depth from which crustacea, corals, madrepores, &c., are obtained, are very great, as frustules recognised to be living by the presence of the endochrome are often found adhering to their surfaces, and thus facts may often be gathered that go to aid in the determination of the limits in depth of vegetable life.

The importance of prosecuting investigations in this direction is so great that a means of conducting experiments was suggested by me in March 1871.<sup>1</sup> I had repeatedly observed that, after exposing a vessel of water covered with a glass plate to the light for some weeks, small Diatoms and other unicellular Algæ appeared in it, and the same result was obtained whether the water were fresh or marine. As this growth could only have been due to germs pre-existing in the water, since carefully prepared artificial sea-water led to entirely negative conclusions, it is very probable that if, with a suitable apparatus, sea-water could be drawn from various depths, for example, at intervals of

<sup>1</sup> Esame microscopico e note critiche su un campione di fango Atlantico ottenuto nella spedizione del "Porcupine" nell'anno 1869, *Atti. Accad. Pontif. d. nuov. Lincei*, vol. xxiv. pp. 16-29, 1871.