

ON THE NATURE AND ORIGIN OF THE SPECIES OF TERRESTRIAL MOLLUSCA
IN THE ISLAND OF JAMAICA. By Prof. C. B. ADAMS.

Notwithstanding the difficulty of exploration in tropical regions, the Island of Jamaica presents remarkable facilities for the investigation of subjects which are connected with the geographical distribution of species. In the great number of typical forms of the terrestrial shells, and in the restriction of most of them, severally, to very narrow limits, we find the facts even more numerous than those which are expanded on the continent of North America over the whole temperate zone.

1. *On the Nature of the Species.* The first conclusion is this: that in many groups the species are distinguishable by types only, and not by well defined limits. This proposition was illustrated by a figure, in which species were represented by circles, many of which were in contact, and whose areas were sprinkled irregularly with dots, representing varieties. One central dot represented the type of the species. Some larger dots represented types of a value intermediate between that of species and ordinary varieties. The amount of difference between the types was represented by their distances. On the boundaries of the species, we find varieties which closely resemble their neighbors in the adjacent species, while their affinities with the central types of both species are so nearly balanced, that it is not really a matter of much consequence on which side of them the imaginary boundary line of the species is drawn. An exact representation of these relations would require the three dimensions of space. On a plane surface we have only an approximation to the truth. With the boundary lines, we represent the species as described in books; without them, we see the species as they exist in nature.

If all the examples of this kind should be enumerated, very few species would remain isolated. Of such, some might be united by further discoveries; while others might remain isolated, since it is a part of the general plan of organic nature that the spaces between the groups shall be unequal, so that some species, some genera, some families, &c., shall stand quite alone.

The principle is not peculiar to the terrestrial mollusca of Jamaica. The *Naiadæ* and the *Melanidæ* of the United States, which have been so thoroughly studied by Mr. Lea, of Philadelphia, are exactly in the same case, but the facts are expanded over wider geographical limits. The same is true of the snails and fresh water shells of Europe, of many

groups of marine mollusca, of fishes, of birds, and even of animals. The special investigation of varieties is rapidly filling up the gaps which were once supposed to exist between species. Not dissimilar is the case of the human species, which graduate into each other in such a manner that the fact is often used as an argument for confounding all the races in one species. Yet it is admitted that the differences between the human races are much greater than between many distinct species of animals.

Our conclusion is briefly expressed in the proposition, that species are of the same nature as genera; that is, are to be founded on types, whether or not an impassable vacuum can be found between the types. The second inference on the nature of the species and higher groups, is this, that the natural types are not susceptible of being wholly comprehended in a few successive ranks, in each of which all the types shall be of exactly equal value; but that there is an indefinite series of types within types, which are inequidistant. If in one group, as that of *Helix sinuata* and the kindred species, it is practicable to establish several species of a given value, in another, as that of *Cylindrella Maugeri*, it is impossible to find species of the same value. We must either make numerous species of less value, or regard the group as one species of greater value. The same doctrine is illustrated also by the comparison of the genus *Helix*, in which the number of distinct subtypes is very great, with *Succinea*, in which subtypes are indistinguishable.

There is no mathematical or physical reason why the generic form of *Succinea* should not have been repeated with a great diversity of subtypes. Yet it is so slightly modified in the species, that Dr. Pfeiffer has grouped them geographically. On the contrary, *Helix* contains nearly one hundred types, of all values intermediate between a generic and a specific value.

In the same manner numerous other genera, families, and orders in all departments of organic nature, may be compared, and the same result obtained.

Since the subtypes of species are distributed with great regard to locality, it is obvious that much of the perplexity which results from the graduation of species into each other, is avoided by those travelers who take but a few specimens from distant localities and by those collectors who are satisfied with a single well-characterized specimen of each species. Such collections are valuable as exhibiting types; but they very imperfectly represent the relations of types: as a small group of human figures,

of which one should be an Apollo, another a Congo negro, with two or three other as well characterized specimens, of distinct races, would very inadequately illustrate the natural history of mankind. It is obvious, also, that a difference of opinion between any two naturalists on the question, whether a given species is a good species, does not necessarily indicate a want of discrimination in the observers. It rather indicates that the type in question is a little above or below the rank into which it is attempted to force it. What shall we say now of the logical notion of *infimæ species*, which would both hypothetically characterize a species by unity of origin, and require us to find an impassable gulf between those species which are most closely allied. Such a doctrine only shows how the world would have been constructed, if the philosophers had made it. We will venture to affirm that the facility of discovering such species will be inversely as the knowledge of the facts.

2. *Our second topic is the Origin of the Species.* The common notion of *infimæ species* settles the question of unity or plurality of origin by definition! The facts conduce to the inference, that the existing species were introduced by the creation of many individuals, which were modelled according to certain types, that were mostly but not wholly local, and which differed from each other unequally, as do the existing varieties. The proof of this proposition is found in the geographical distribution of the varieties. In the great majority of species, the varieties are so distributed, that the space which is occupied by one of them coincides with that of other two or more. Now, if the circumstances of locality had produced the local types by modifications of one original type of the species, then all the varieties which inhabit a locality should have been affected. The geographical coincidence of one variety with several local varieties is inconsistent with any other theory than that of an original constitutional peculiarity of character in each variety. This inference is confirmed by the occasional intermingling in one locality of varieties, which differ from each other as much as those which occupy distinct regions. The same general mode of distribution holds in the case of entire species. Some are very local, and others, more widely distributed, occupy the ground of several local species. We have then indistinct varieties, distinct varieties, doubtful species, good species, and groups of species, and all the intermediate types, distributed in the same manner. Now, the theory of unity of origin requires us to believe that all the types which are below the value of a species are the effects of locality; and although specific types of exactly equal value in all groups do not exist, yet that the types

which are exactly of a specific value were created in one centre in a single stock, but that those types which are more comprehensive than species had a plural origin of exactly as many stocks as they contain good species! and that species of doubtful value would not be doubtful, if we looked at nature through the doctrine of the logical infimæ species.

NOTICE OF A REVERSED CYCLOSTOMA.

In the extensive genus *Cyclostoma*, only one reversed specimen, so far as we can learn, has hitherto been known to Conchologists. It belongs to the small European species *C. scalarinam villa*, and is in the collection of Dr. L. Pfeiffer.

Among the multitude of shells of the *Cyclostomidæ*, which have been accumulating for ages in Jamaica, I was unable to find one reversed specimen. Recently, however, the Rev. F. R. Holland has sent me from Jamaica a reversed specimen of *C. Tayanum*. The shell has attained nearly its full size, being 0.7 inch long, but wants the reflected lip of maturity. This species is one of the most abundant in the island.

Prof. AGASSIZ remarked upon this paper, that the question of the origin and nature of species was one of the greatest importance, as it necessarily involved the question of the unity of the human race, for man zoologically speaking is an animal, and the same arguments which apply to animals in this respect apply equally well to him: it is because it involves this question that naturalists have been placed in an awkward position, and charged with unfairness, and venturing on domains which do not rightly belong to them. I will not here enter upon a discussion of this matter, but in behalf of those men will make one remark, which is, that all our labors are in the animal kingdom, and that here is our legitimate domain, and that by keeping here all will come out well in the end. See what has been done in behalf of Natural Theology by being the ministers and interpreters of the works of the Creator, and in what does He speak so clearly as in His works, and yet we are constantly disturbed by the calumniations of those whose short-sightedness and ill-judgment does not enable them to see that all our labors tend to the propagation of their most vital points and doctrines; and it is for this reason that we are persecuted most by those who ought to be our strongest friends.