

EVOLUTION OF SPECIES.

The principle of the Evolution of Species is a subject which is, at the present time, attracting so great a share of the attention of naturalists, as well as of the general thinking public, that it is necessary here to allude to such investigations as have been made with reference to it in an especial manner upon the objects of our study. The question to be solved appears to me to be this:—Do the variations which exist, *in a state of Nature*, amongst the various individuals of recognized species warrant the conclusion that the species themselves are only modifications of other precedent species, which may themselves be ultimately referred back to some supposed primeval type? This field of enquiry is far too vast to be more than glanced at in an Address like the present, but so far as my own observations—for now more than half a century, over the most extensive of all the tribes of Nature—extend, I cannot come to any other conclusion than that the variations alluded to above never extend beyond the genuine limits of the species. I had hoped that long before this time Mr. Darwin would have published his promised work on the modifications of species in a state of Nature, and it must be evident that this will be the true *crux* of his system. To affirm that the discovery of a new species, either fossil or recent, which is found to be intermediate in certain portions of its structure between already known and distinct forms, is a clear proof that the newly discovered species is a descendant from one and a progenitor of the other of such known forms, appears to me to be fallacious. No entomologist, I venture to affirm, has come to the conclusion that *Carabus Cychrocephalus*, although the intervening link between *Carabus* and *Cychrus*, is a descendant from *Carabus* and a progenitor of *Cychrus*, or *vice versâ*. On the other hand, a naturalist who believes in a grand and harmonious “*Systema Naturæ*,” whether that be, as Linneus suggested, in the likeness of a “*mappa geographica*” or otherwise, has equal or even greater right to assume that these newly-discovered species are only so many hitherto unknown intervening links in the great scheme of the creation. “*Osculant groups*” and “*connecting links*” are terms well known to zoologists before the publication of the ‘*Origin of Species*,’ with a definite meaning quite distinct

from the idea that they formed the genetic connection between the great groups which they serve to connect.*

A memoir on the "Ontogenie" and "Philogenie" of insects, by Dr. Paul Meyer, is published in the tenth volume, or vol. 3 of the new series, of the 'Zeitschrift für Naturwissenschaft' of Jena, 2nd Heft.

A very valuable contribution to the knowledge of the earliest stages of many of the higher Crustacea is to be found in 'Untersuchungen zur Erforschung der Genealogischen Grundlage des Crustaceen Systems—Ein Beitrag zur Descendenzlehre,' pp. 124, folio, Wien, 1876, with nineteen plates and twenty-five woodcuts, by Carl Claus. In this work the author gives the most careful descriptions and figures of the larvæ or zoea states of numerous species of Palæmonidæ, Squillidæ, Nebalia, Sergestes, Palinurus, Scyllarus, Pagurus, Porcellana, Maia, Inachus, &c., with additional descriptions and details of the Copepoda, Cirripedia,

* In the course of his introductory lecture to the Natural History Class in the University of Edinburgh at the commencement of last November Term, Professor Sir Wyville Thomson made reference to the evolution hypothesis. He said that the great stumbling block, from the natural history side of the question, in the way of our at once accepting the evolution hypothesis, was that any such passage from one species to anything but that, was entirely outside our experience. The horse evidently had been the horse since the earliest hieroglyphs were engraved on Assyrian monuments and tombs; and the same held for all living creatures. There was not a shadow of evidence of one species having past into another during the period of human record or tradition. Nor was this all: we had, in the fossil remains contained in the rocks, a sculptured record of the inhabitants of this world, running back incalculably further than the earliest chisel mark inscribed by man—incalculably further than man's existence on this planet; and although we found from that record that thousands of species had passed away, and thousands had appeared, in no single case had we yet found the series of transitional forms imperceptibly gliding into one another and uniting two clearly distinct species by a continuous bridge, which could be cited as an undoubted instance of the origin of a species. Profound mystery still involved the birth of the new specific forms. Mr. Darwin's magnificent theory of "natural selection" and the "survival of the fittest," had undoubtedly shaken the veil by pointing out a path by which it was conceivable that such an end might be attained; but it had by no means raised it, for every new instance which he produced and developed with such eloquence and skill, of the marvellous changes which animals underwent under varying conditions, somehow always appeared to emphasize the fact that, however far variations might be carried, the limit of specific identity was in our experience never overpassed. Still, even if we never found out the precise mode in which one species gave rise to another, there could, he believed, be no further hesitation in accepting generally a hypothesis of evolution, and in regarding our present living races as the ultimate twigs of a great genealogical tree whose gradually coalescing branches we could trace downward, if our information were complete, to the dawn of geological time.

Ostracoda, Phyllopoda, and Urphyllopoda, terminating with the Trilobites, Merostomidæ, and Xiphosura, &c., endeavouring to deduce from the forms of the larvæ the comparative development or descent of the higher Crustacea from the lower. The forms of some of these preparatory states are certainly amongst the most *bizarre* of the Annulose sub-kingdom. The book is dedicated to Charles Darwin.

A remarkable memoir by W. J. Schmankeuitch on *Artemia salina* and *Mülhausenii*, and on the genus *Branchipus*, is published in Von Siebold and Kolliker's 'Zeitschrift' (Bd. xxv., Suppl., noticed in 'Nature,' June 8, 1876), in which the author asserts that he had observed that *Artemia salina*, found in a salt lake near Odessa, had gradually undergone a change in the form of the extremity of its post-abdomen, according to the degree of saltiness of the water; the bifurcation of this part of the body gradually diminishing, as well as the number of its terminal setæ, until the tail became rounded at its extremity, with only a slight central notch, agreeing in this respect and also in the then smaller size of the animal, with *Artemia Mülhausenii* of Fischer (Bull. Mosc. t. 7). The opposite experiment also showed that even in a few weeks the latter species became altered in the direction of *A. salina*, which last species, by the still greater dilution of the salt water, is asserted to have been transformed in the third generation into a *Branchipus* agreeing with the latter in the post-abdomen having one more segment. Hence it is assumed that the direct influence of changed conditions of life may in the course of a few generations transform one species, or even one genus, into another, and this in both directions. This statement, however, appears to me to require much further investigation than appears to have been bestowed upon it. We know, in fact, from the researches of Vaughan Thompson (Zool. Researches, No. 5, pl. 2, fig. 9), that the extremity of the post-abdomen of the nearly perfect *Artemia salina* is rounded with a slight central notch, and without any spines, and that the differences between the terminal appendages of *Artemia salina* and *Branchipus*, as well as their mouth-organs, ignored by our author, are very great, whereas there is not the slightest difference between the extremity of the body of *A. salina* and that of its supposed passage to *Branchipus* as figured by Schmankeuitch, beyond the division of the long terminal segment of *Artemia* into two apparent

segments in the supposed transitional individuals. Can it be possible that *Artemia Mülhausenii* may be an imperfectly retarded condition of *A. salina*, similar to the imperfect state of the great majority of individuals of *Lygæus brevipennis*, or *Velia rivulorum*? I attach but little weight to the parthenogenetic observations in this memoir, as we know perfectly from various English Lepidoptera that parthenogenesis affords no test of specific distinction.

In 'Nature' for December 28, 1876, appears an article "On the Relation between Flowers and Insects," translated from the 'Bienen Zeitung,' the author of which assumes that the capacity for gathering honey either for the sustenance of the insect or its progeny is to be regarded as the test of the evolutionary process employed in the development of these insects; the author remarking that "the habit possessed by our honey-bee of feeding itself from flowers, and its corresponding faculty of deciding amongst different species and divining the situation of the honey, is, in the first instance, derived from the common parents of all the Hymenoptera. It probably even comes from such remote ancestors as the leaf-cutting wasp (*sic*),* from thence passes to the gall-flies, the Ichneumons, and the hunting wasps, from which latter it goes to the allied species of ants and bees." This extraordinary series of assumptions is founded upon a set of tables showing the number of visits paid to flowers in which the honey is apparent, partially apparent, concealed but easily reached by a short or by a long proboscis or not reachable, or which are only furnished with pollen, commencing with *Tenthredo* and ending with "*Bombus apis*" (*sic*). Even supposing these various tables were correct, I feel called on to insist that they would afford no proof at all that a bee is a more fully developed creature than a *Tenthredo*, or that a bee which makes waxen hexagonal cells furnished with honey has been developed out of a wasp which makes paper hexagonal cells furnished with animal food; or that a *Bombus* which makes individual egg-shaped waxen cells provisioned with honey must be regarded as the forerunner of the hexagonal cell-making honey-bee.

A memoir of considerable extent on the markings of caterpillars at different stages of their growth (that is, after successive changes of the skin) appears as the chief article in the second

* Throughout the article the leaf-cutting Hymenoptera are ignorantly miscalled leaf-cutting wasps.

volume of Dr. August Weismann's 'Studien zur Descendenz Theorie,' Leipzig, 1876, large 8vo, with five coloured plates; the first division of the memoir being entitled "Ontogenese und Morphologie der Sphingiden-Zeichnung," and the second division "Ueber den Phyletischen parallelismus bei metamorphischen arten." The first four plates illustrate the variations in the colours and marks of the larvæ of the Sphingidæ, and the fifth those of *Saturnia Carpini*, one or more segments of the body in different specimens and varieties being represented: 225 pages of small print are occupied in the discussion of this subject, to which, as appears to me, far too much importance has been attached.

Every fact, however, bearing on this curious question deserves to be carefully investigated, even if it extend no further than the darker or lighter colour of certain broods of insects. In this country *Lycæna Artaxerxes* offers a curious instance of this subject.

It is, moreover, well known that in certain localities, especially in the northern parts of England and Scotland, certain pale-coloured moths assume a darker coloration, and thus, as we learn from an article on "Melanism," by Mr. Edwin Birchall, F.L.S. (*Entom. M. Mag.*, November, 1876, p. 131), near Leeds, *Aplecta nebulosa* and *Xylophasia polyodon* are often perfectly black, and the "black pepper" (*Biston betularia*, var.) is well known, although, as described by the late R. S. Edleston in 'Newman's Entomologist' (ii. p. 150) sixteen years previously, it was almost unknown near Manchester. The dark variety had, however, so much increased subsequently that he considered the original pale type of the species would soon be extinct in the locality. Mr. Birchall speculates (*sensu* Darwiniano) on the causes of the melanism, and gives a list of the species of moths of which melanic varieties occur in the northern and western parts of the British Islands. The subject has been, however, carried much further by Dr. F. Buchanan White (*Ent. M. Mag.*, December, 1876) by whom the 430 (or thereabouts) species of Macro-Lepidoptera inhabiting Scotland are subjected to an analysis in this point of view; the majority appearing not to exhibit any decided variation. Certain species, however, offer variation in any locality. The remaining species are thus divided:—

A. Melanochroic species.

1. Melanochroic races (amongst which it is remarkable that the extreme northern form of *Aplecta occulta* is pale).

2. Species frequently Melanochroic, but often not so.

B. Leucochroic species.

1. Species of which all or a majority of the individuals are paler than in the South.

2. Species frequently paler, but not invariably so.

Like Mr. Birchall, Dr. White believes that "natural selection" is the chief cause of this variation, although meteorological influences may have led to the first production of the melanochroism.

The permanently dimorphic condition of various insects has been long known. *Vanessa prorsa* and *levana*, *Lycæna amyntula* and *polysperchon*, and *Anthocharis belia* and *ausonia*, have been satisfactorily determined to be respectively the summer and winter forms of three species. Dr. Weismann entered into and extended this subject amongst the *Pierides* in his 'Studien zur descendenz Theorie' (vol. i.), and we have recently received an account of a series of experiments on *Papilio Ajax* and its supposed allied species, *Walshii*, *Marcellus*, and *Telamonides*, by Mr. W. H. Edwards, which appears to confirm Dr. Weismann's views that the cold of winter modifies the broods produced in the autumn, developing markings which have been regarded as characteristic of distinct species.

A curious instance of the modification of specific characters in a species occurring in an American locust—*Tragocephala Virginiana*, *Fabr.*, (*Gryllus*, *v.*) *viridifasciatus*, *De Geer*, and *Locusta infusca*, *Harris*—is given by Mr. S. H. Scudder (*Proc. Boston Soc.* xvii. p. 481), in which, in addition to permanent variations of colour in the specimens from New England, Texas, and Florida, variations are tabulated in the antennæ, fastigium of the vertex, pale spots in the tegmina of the males, and cloudiness of the wings.

A memoir with figures on the "mimicry" exhibited by the species of the genus *Leptalis* as compared with other *Pieridæ*, by Fritz Müller, appears in the 'Jenaische Zeitschrift für Naturwissenschaft,' 10th Band, neue folge, 3rd Band., Heft 1, 1876.

GEOGRAPHICAL DISTRIBUTION.

The geographical distribution of insects is a subject which is attracting increased attention, and to which additional interest is attached since the publication of Mr. A. R. Wallace's work, 'The Geographical Distribution of Animals, with a Study of the

Relations of Living and Extinct Faunas as elucidating the Past Changes of the Earth's Surface,' two vols., 8vo, London, 1876.

The distribution of the earth into primary geographical regions, proposed by Mr. Selater, has been partially adopted—(1) the Palæarctic, comprising the whole of Europe, North Africa, and the whole of Asia, except the Indian and Siamese Peninsulas; (2) the Nearctic Region, comprising the whole of North America, except Mexico and the Nicaraguan Isthmus; (3) the Neotropical Region, or the whole of South America, and with Mexico and the Isthmus of Nicaragua; (4) the Ethiopic, or the whole of Africa (except the northern part) and Arabia; (5) the Oriental Region, comprising India, Burmah, Siam, Sumatra, Java, Borneo, and the adjacent islands; and (6) the Australian Region, comprising New Holland, New Zealand, and the other islands east of Borneo.

The causes regulating the geographical distribution of animals, fossil and recent, are discussed, and the animals characteristic of each of these regions are rapidly passed under review, the greater part of the second volume being occupied by a systematic sketch of the chief families of land animals in their geographical relations. In this part of the work insects occupy only thirty-four pages, being devoted to the distribution of the genera of Diurnal Lepidoptera (comprising nearly 8000 species), and a few of the families of beetles.

The Distribution of Insects in New Hampshire (forming a chapter from the first volume of the Report upon the Geology of that State), by S. H. Scudder, affords much material for study. Probably no State in the Union presents so striking a variety in animal life as New Hampshire, its northern and southern portions belonging to distinct Continental forms, part resembling the productions of Labrador and Greenhill, whilst at a difference of only sixty miles animals flourish characteristic of sub-tropical climates. A considerable portion of the memoir is occupied with the distribution of the different species of butterflies, and a portion with the different Orthoptera, the habits of the species of this order being given in great detail, together with the musical notes of each species.

The butterflies and Orthoptera collected by Mr. Dawson along the boundary line between British America and the United States, have also been described by Mr. Scudder.

A few notes on the insects of Kerguelen's Land, by H. N. Moseley, M.A., naturalist to H.M.S. 'Challenger,' are published in the 'Journal of the Linnean Society' (Zool. vol. xii. p. 578).

FOSSIL ENTOMOLOGY.

In the 'Memoirs of the American Association for the Advancement of Science' (vol. i.), a very elaborate treatise is published by Mr. S. H. Scudder on fossil Lepidopterous insects, nine species of which are described and figured in detail, and various additional fossils are described which have been regarded as Lepidopterous, including the *Palæontina oolitica*, which, from a careful examination of the original specimen and its cast in the Jermyn Street Museum, he has determined not to belong to the Lepidoptera, but most probably to the Cicadæ. Mr. Scudder has also published a short notice on the fossil Orthoptera of the Rocky Mountain Tertiaries; also on the fossil Coleoptera of the same stratum (of which he describes thirty-one species). Also the description of the fossil abdomen of a larva dragonfly from the Carboniferous Slate from Cape Breton; and also the descriptions of several fossil species of Thripsidæ from the North American Tertiaries, including two new genera, *Lithadothrips* and *Palæothrips*. Also a note on the fossil insects of Cape Breton (Proc. Boston Soc. N. H., vol. xviii. p. 113).

In the 'Memoirs of the Boston Society of Natural History' (vol. ii., part 2, No. 3), Mr. S. H. Scudder has also published an article on the carboniferous myriapods preserved in the Sigillarian stumps of Nova Scotia.

Notices of a fossil species of scorpion in the British coal-measures, also of some new macrurous Crustacea from the Kimmeridge-clay and from Boulogne-sur-Mer, and of a new fossil crab from New Zealand have been communicated to the Geological Society of London by Mr. H. Woodward, who has also described an extremely interesting fossil insect from the coal-measures of Scotland in the Quart. Journ. Geol. Soc. Lond. 1876 (vol. xxxii., p. 60, pl. ix.), belonging, as it would appear, to the family Mantidæ, under the name of *Lothomantis carbonarius*, and which agrees, in the remarkable development of the prothoracic lobes, with the African *Blepharis domina*, and which also seems to have a near relationship with the singular fossil named *Eugereon Boeckingii*, by Dr. Anton Dohrn. Mr. Woodward has added a list of all