

fauna of Siberia, its uniformity and conformity to the European fauna, on the meaning to be given to the species, on their variability and on the multiplicity of false ones published, on the complexity of their respective geographical areas, on their extinction and replacement by others, &c., are deserving of the careful study of all naturalists. L. v. Schrenck's Mollusca of the Amur-land or Manchuria (reviewed in the "Zoological Record," iv. p. 504) is equally to be recommended for the manner in which the specific relations, the variability, affinities, and geographical distribution of Manchurian Mollusca are treated. The publications of the first meeting of the Association of Russian Naturalists include a review of the Crustacea of the Black Sea by V. Czerniavski, an account of the Annulata Chætopoda of the Bay of Sebastopol by N. Bobretzki, and a paper on the zoology of the Lake of Onega and its neighbourhood by K. Kessler, including a review of the fishes, Crustacea, and Annulata of the Lake of Onega, and of the Mollusca collected in and about the Lakes Onega and Ladoga, and a list of the butterflies of the Government of Olonetz. The historical and scientific memoirs published by the University of Kazan, of which several volumes have recently reached us, include a systematic enumeration and description of the birds of Orenburg (329 species), with detailed notes of their habits, &c., by the late Prof. E. A. Eversmann, edited after his death by M. N. Bogdanoff, forming an 8vo volume of 600 pages in the Russian language.

There is not in Russia at the present moment sufficient encouragement on the part of the public to induce the publication of independent biological works beyond a few popular handbooks; but the Imperial Academy of Petersburg has, on the other hand, been exceedingly liberal in the assistance it affords, and active in its issue of Transactions with excellent illustrations, as well as of its bulletin of proceedings. The volumes recently received include J. F. Brandt's "Symbolæ Sirenologicæ" and researches on the genus *Hyrax* (reviewed in "Zoological Record," v. p. 3, and vi. p. 5), A. Strauch's Synopsis of Viperidæ, with full details of their geographical distribution, E. Metschnikoff's studies on the development of Echinoderms and Nemertines, and N. Miklucho-Maclay's Memoir on Sponges of the N. Pacific and Arctic Oceans, with remarks on their extreme variability inducing the multiplication of false species. In botany, Bunge's Monograph of the Old-World species of *Astragalus* is the result of many years labour and careful investigation. The eight sub-genera and 104 sections into which this extensive genus is divided appear to be very satisfactory; but the species (971) are probably very much too numerous, and we miss that comparison with American forms which, considering the very numerous cases of identity or close affinity, is essential for the due appreciation of the N. Asiatic species. Bunge has also published a monograph of the *Heliotropia* of the Mediterranean-Oriental region in the Bulletin of the Society of Naturalists of Moscow, which continues its annual volumes. The parts recently received continue several of the botanical enumerations already noticed, together with various smaller entomological papers.

(To be Continued)

GEOLOGY

On the Supposed Legs of the Trilobite, *Asaphus platycephalus**

AT the request of Mr. E. Billings, of Montreal, I have recently examined the specimen of *Asaphus platycephalus* belonging to the Canadian Geological Museum, which has been supposed to show remains of legs. Mr. Billings, while he has suspected the organs to be legs so far as to publish on the subject,† has done so with reserve, saying, in his paper, "that the first and all-important point to be decided, is whether or not the forms exhibited on its under side were truly what they appeared to be, locomotive organs." On account of his doubts, the specimen was submitted by him during the past year to the Geological Society of London; and for the same reason, notwithstanding the corroboration there received, he offered to place the specimen in my hands for examination and report.

Besides giving the specimen an examination myself, I have submitted it also to Mr. A. E. Verrill, Prof. of Zoology in

* From the American *Journal of Science and Arts*, Vol. 1, May, 1871.

† Q. J. Geol. Soc., No. 104, p. 470, 1870, with a plate giving a full-sized view of the under surface of the trilobite, a species that was over four inches in length.

Yale College, who is well versed in the Invertebrates, and to Mr. S. I. Smith, assistant in the same department, and excellent in crustaceology and entomology. We have separately and together considered the character of the specimen, and while we have reached the same conclusion, we are to be regarded as independent judges. Our opinion has been submitted to Mr. Billings, and by his request it is here published.

The conclusion to which we have come is that the organs are not legs, but the semi-calcified arches in the membrane of the ventral surface to which the foliaceous appendages or legs were attached. Just such arches exist in the ventral surface of the abdomen of the *Macrura*, and to them the abdominal appendages are articulated.

This conclusion is sustained by the observation that in one part of the venter three consecutive parallel arches are distinctly connected by the intervening outer membrane of the venter, showing that the arches were plainly in the membrane, as only a calcified portion of it, and were not members moving free above it. This being the fact, it seems to set at rest the question as to the legs. We would add, however, that there is good reason for believing the supposed legs to have been such arches in their continuing of nearly uniform width almost or quite to the lateral margin of the animal; and in the additional fact, that although curving forward in their course toward the margin, the successive arches are about equidistant or parallel, a regularity of position not to be looked for in free-moving legs. The curve in these arches, although it implies a forward ventral extension on either side of the leg-bearing segments of the body, does not appear to afford any good reason for doubting the above conclusion. It is probable that the two prominences on each arch nearest the median line of the body, which are rather marked, were points of muscular attachment for the foliaceous appendage it supported.

With the exception of these arches, the under surface of the venter must have been delicately membranous, like that of the abdomen of a lobster or other macruran. Unless the under surface were in the main fleshy, trilobites could not have rolled into a ball.

JAMES D. DANA

SCIENTIFIC SERIALS

Annales de Chimie et de Physique. The whole of the last part of the "Annales" is occupied by M. Berthelot's *Méthode universelle pour réduire et saturer d'hydrogène les composés organiques*, which is a résumé of the elaborate and exhaustive researches on the action of hydriodic acid on organic substances in which he has been engaged for the last three or four years. Most of the results have been already published from time to time in the *Bulletin de la Société Chimique de Paris*, and this classical research is now completed by the publication of the details of the methods of analysis and the thermochemical considerations involved. The author has found that any organic compound can be transformed into a saturated hydro-carbon, having, in general, the same number of atoms of carbon as the original substance, by heating it for a sufficient length of time to a temperature of 275°C., with a large excess of an aqueous solution of hydriodic acid of the specific gravity of 2.0. The proportion of the acid is varied according to the nature of the substance submitted to its action, twenty or thirty parts being sufficient to reduce an alcohol of the fatty series, whilst a member of the aromatic series and such substances as bitumen, wood charcoal, and coal, require, at least, one hundred times their weight; the large excess of acid serving the purpose of dissolving the iodine set free during the reaction, thus preventing its destructive action on the organic compound, and also in allowing the quantity of hydriodic acid necessary for the reduction of the substance, to be withdrawn from the solution without reducing its strength so far that the reaction ceases. One of the most remarkable results exhibited in the application of this method is that of the direct transformation of benzene into the saturated hydrocarbon, hexylene hydride, $C_6H_6 + 8HI = C_6H_{14} + 8I$, affording, as it does, an instance of a direct passage from the aromatic to the fatty series. When other members of the phenyl series are treated with hydriodic acid, the ultimate product is the same; but there is an intermediate step in the reaction, resulting in the formation of benzene, which, by the continued action of the acid, is transformed into the corresponding saturated hydrocarbon. The fifth and last part of the paper is

of great interest from a theoretical point of view, since it comprises the results of the author's experiments on bitumen, wood charcoal, and coal. The former of these substances, under the influence of hydriodic acid, yields hexylene hydride, the saturated hydrocarbon corresponding to benzene, from which it may be inferred that bitumen is a derivative of benzene, produced by condensation and loss of hydrogen. Charcoal and coal, when treated according to M. Berthelot's method, are transformed into a mixture of various saturated hydrocarbons, identical with those found in petroleum oil. In fact *the coal is changed into petroleum oil.*

THE most important paper in the first three numbers of vol. xiii. of the *Atti della Società Italiana di Scienze Naturali* (April and November 1870, and January 1871), is a continuation of Prof. Delpino's article on "Dichogamy in the Vegetable Kingdom." In this paper the author passes in review the various modes in which the impregnation of plants is effected, with especial reference to the provisions for the impregnation of one plant by the fecundating organs of another.—M. A. Curò publishes a note on parthenogenesis among the Lepidoptera.—M. F. Sordelli contributes a note on the anatomy of the genus *Acme*, and on some of the hard parts of *Cacilianella acicula*, illustrated with a plate; and further an anatomy of *Limax Doria*, Bourg., also illustrated, and including a tabular arrangement of the species of the genus *Limax*, for the elucidation of the characters of two new species, which the author describes under the names of *L. punctulatus* and *L. Bettonii*.—The Secretary of the Society, Dr. C. Marinoni, notices some remains of *Ursus spelæus* from the Cave of Adelsberg.—M. G. Bellucci gives an account of some evidences of prehistoric man in the territory of Terni.—M. L. Ricca communicates some observations on dichogamy in plants made by him upon the Alps of Val Camonica in 1870; and also a systematic catalogue of the vascular plants growing spontaneously in the olive-zone of the valleys of Diana, Marina, and Cervo, with indications of the special conditions of growth, times of flowering of each species, and occasional remarks upon their characters.—At p. 130 is the description of a supposed hybrid *Orchis*, *O. coriophoro-laxiflora*.—From M. C. Bellotti we have some observations on the disease of flaccidity, which destroys so many silkworms (*moris-flats*) in France and Italy; and from Dr. Taramelli a memoir, illustrated with an elaborate coloured plate, on the ancient glaciers of the Drave, Save, and Isonzo.

SOCIETIES AND ACADEMIES

LONDON

Geological Society, June 7.—Mr. Joseph Prestwich, F.R.S., president, in the chair. Messrs. Henry Collinson and Thomas Milnes Favell were elected Fellows, and Dr. J. J. Kaup, of Darmstadt, was elected a foreign member of the society. The following communications were read:—1. "On the persistence of *Caryophyllia cylindracea* Reuss, a Cretaceous Coral, in the Coral-fauna of the Deep Sea." By Prof. P. Martin Duncan, F.R.S. The author first referred to the synonyms and geological distribution of *Caryophyllia cylindracea*, Reuss, which has hitherto been regarded as peculiar to the White Chalk, and as necessarily an extinct form, inasmuch as it belonged to a group possessing only four cycles of septa in six systems, one of the systems being generally incomplete. The distribution of the *Caryophyllia* of this group in the Gault and the Upper Chalk, the Miocene, and the Pliocene, was noticed, and also that of the species with the incomplete cycle. The falsity of this generalisation was shown to be proved by the results of deep-sea dredging off the Havannah, under Count Pourtales, and off the Iberian peninsula under Dr. Carpenter and Mr. Gwyn Jeffreys. The former dredged up *Caryophyllia formosa* with four complete cycles, and the latter obtained, from depths between 690 and 1090 fathoms, a group of forms with four complete and incomplete cycles. This group had a Cretaceous facies; one of the forms could not be differentiated from *Caryophyllia cylindracea*, Reuss; and as a species of the genus *Bathycyathus* was found at the same time, this facies was rendered more striking. The representation of the extinct genera *Trochomilia*, *Parasmilia*, *Synhelix*, and *Diblasus*, by the recent *Amphihelix*, *Paracyathi*, and *Caryophyllia* was noticed, and it was considered that as the Cretaceous forms thrived under the same external conditions, some of them only being persistent, there must be some law

which determines the life-duration of species like that which restricts the years of the individual. It was shown that deep-sea conditions must have prevailed within the limits of the diffusion of the ova of coral polyps somewhere on the Atlantic area ever since the Cretaceous period. Mr. Gwyn Jeffreys remembered that at the spot where the coral in question was dredged up the sea-bottom was extremely uneven, varying as much as fifty fathoms within a quarter of a mile. It was also not more than forty miles from land. The species of mollusca dredged up were extremely remarkable, and many were totally different from what he had previously seen. They were, however, living or recent; none of them were Eocene or Miocene, much less Cretaceous, like *Terebratula caput-serpentis*. He quoted from Mr. Davidson other instances of the persistence of forms, especially of the genus *Lingula* from the Silurian formation. The persistence of this species of coral, as well as that of Foraminifera, from the Cretaceous to the present time, was therefore not unique, and other cases of survival from even earlier times might eventually be recognised. Dr. Carpenter, after commenting on the reductions that extended knowledge enabled naturalists to make in the number of presumed species, could not accept the mere identification of species as of the highest importance in connecting the Cretaceous fauna with that of our own day. The identity of genera was, in his opinion, of far more importance. He instanced *Echinothuria* and *Rhizocrinus* as preserving types identically the same as those of a remote period, and as illustrating the continuity of the deep-sea fauna from Cretaceous times. The chemical and organic constitution of the deep-sea bottom of the present day was also singularly analogous to that of the Chalk sea. The low temperature at the bottom of the deep sea, even in equatorial regions, was now becoming universally recognised, and this temperature must have had an important bearing on the animal life at the sea-bottom. Prof. Ramsay thought that there was some misapprehension abroad as to the views held by geologists as to continuity of conditions. They had, however, always insisted on there having been an average amount of sea and land during all time; and the fact of sea having occupied what is now the middle of the Atlantic since Cretaceous time would create no surprise among them. If, however, the bed of the Atlantic were raised, though probably many Cretaceous genera, and even species, might be found, there would on the whole be a very marked difference between these Atlantic beds and those of the Chalk. Mr. Seeley had already, in 1862, put forward views which had now been fully borne out by recent investigation. His conviction was that, from the genera having persisted for so long a time, the genera found in any formation afforded no safe guide as to its age, unless there were evidence of their having since those formations become extinct. Mr. Etheridge maintained that the species in different formations were sufficiently distinct, though the genera might be the same. Recent dredgings had not brought to light any of the characteristic molluscan forms of the Cretaceous time; and it would be of great importance to compare the results of future operations with the old Cretaceous deep-sea fauna. Prof. Rupert Jones, with reference to the supposed sudden extinction of chambered Cephalopods, remarked that Cretaceous forms had already been discovered in Tertiary beds in North America, and also that cold currents could not have destroyed them, seeing that icebergs came down to the latitude of Croydon in the Chalk sea.—2. "Note on an *Ichthyosaurus* (*I. enthekiodon*) from Kimmeridge Bay, Dorset." By J. W. Hulke, F.R.S. In this paper the author described the skeleton of an *Ichthyosaurus* from Kimmeridge Bay, agreeing in the characters of the teeth with the form for which he formerly proposed the establishment of the genus *Enthekiodon*. The specimen includes the skull, a large portion of the vertebral column, numerous ribs, the bones of the breast-girdle, and some limb-bones. The first forty-five vertebral centra have a double costal tubercle. The coracoids have an unusual form, being more elongated in the axial than in the transverse direction, and this elongation is chiefly in advance of the glenoid cavity. The articular end of the scapula is very broad. The paddles are excessively reduced in size, the anterior being larger than the posterior, as evidenced by the comparative size of the proximal bones. The species, which the author proposed to name *I. enthekiodon*, most nearly resembles the Liassic *I. tenuirostris*. The length of the preserved portion of the skeleton is about 10ft., the femur measures only 2in., and the humerus 2.7in.—3. "Note on a Fragment of a Teleosaurian Snout from Kimmeridge Bay, Dorset." By J. W. Hulke, F.R.S. In this