

separately considered, enables us to discover the description of teeth to which they have belonged; so also reciprocally we may determine the form of the other bones from the teeth. Thus, commencing our investigation by a careful survey of any one bone by itself, a person who is sufficiently master of the laws of organic structure, may, as it were, reconstruct the whole animal to which that bone had belonged."

We know to-day that unknown extinct animals cannot be restored from a single tooth or claw, unless they are very similar to forms already known. Had Cuvier himself applied his methods to many forms from the early tertiary or older formations, he would have failed. If, for instance, he had had before him the disconnected fragments of an eocene tilodont, he would undoubtedly have referred a molar tooth to one of his pachyderms; an incisor tooth to a rodent; and a claw bone to a carnivore. The tooth of a hesperornis would have given him no possible hint of the rest of the skeleton, nor its swimming feet the slightest clue to the ostrich-like sternum or skull. And yet, the earnest belief in his own methods led Cuvier to some of his most important discoveries.

Jean Lamarck (1744-1829), the philosopher and naturalist, a colleague of Cuvier, was a learned botanist before he became a zoologist. His researches on the invertebrate fossils of the Paris Basin, although less striking, were not less important than those of Cuvier on the vertebrates; while the conclusions he derived from them form the basis of modern biology. Lamarck's method of investigation was the same, essentially, as that used by Cuvier, namely: a direct comparison of fossils with living forms. In this way, he soon ascertained that the fossil shells imbedded in the strata beneath Paris were, many of them, extinct species, and those of different strata differed from each other. His first memoir on this subject appeared in 1802,¹ and, with his later works, effected a revolution in conchology. His "System of Invertebrate Animals" appeared the year before, and his famous "Philosophie zoologique," in 1809. In these two works, Lamarck first announced the principles of evolution. In the first volume of his "Natural History of Invertebrate Animals,"² he gave his theory in detail; and to-day one can only read with astonishment his far-reaching anticipations of modern science. These views were strongly supported by Geoffroy Saint Hilaire, but bitterly opposed by Cuvier; and their great contest on this subject is well known.

In looking back from this point of view, the philosophical breadth of Lamarck's conclusions, in comparison with those of Cuvier, is clearly evident. The invertebrates on which Lamarck worked offered less striking evidence of change than the various animals investigated by Cuvier; yet they lead Lamarck directly to evolution, while Cuvier ignored what was before him on this point, and rejected the proof offered by others. Both pursued the same methods, and had an abundance of material on which to work, yet the facts observed induced Cuvier to believe in catastrophes; and Lamarck, in the uniform course of nature. Cuvier declared species to be permanent; Lamarck, that they were descended from others. Both men stand in the first rank in science; but Lamarck was the prophetic genius, half a century in advance of his time.

(To be continued.)

FRENCH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE French Association for the Progress of Science has taken a bold step and decided that its session for 1881 will take place in Algiers. To avoid the numerous inconveniences of the strong heat which prevails all over Algeria in the month of August, it has been decided that the meeting should be held in April, during the Easter recess.

This happy result of the deliberations must be attributed to the personal exertions of M. Albert Grévy, the brother of the President of the French Republic, who holds the post of Civil Governor-General of Algeria.

It is supposed that the new scientific establishment whose formation has been decreed this year, will be formally inaugurated on this occasion, and a scientific movement of some importance will take place in the colony.

The *Akhbar* announced a few days back that a geographical society is being organised in Algiers.

¹ "Mémoire sur les Fossiles des Environs de Paris," 1802-6.

² "Histoire naturelle des Animaux sans Vertèbres," 7 vols. Paris, 1835-1822. Second Edition. 11 vols. 1835-1845.

In the meantime a number of representatives headed by Algerian senators and deputies will make a tour of exploration during the month of October. They will start at the end of September, as we announced some weeks ago. They will witness an agricultural and horticultural exhibition, which is to be held at Bone, for the whole of Algeria and Tunisia, and which will be held in Algiers in 1881.

The most successful lecture this year at Montpellier, was organised by the Languedocian Society of Geography. MM. Soleillet, Brau de Saint Pol Lias, Director of the Sumatra Exploring Company, and other explorers or intending explorers, appeared before the public on that occasion. M. Rabaut, the President of the Society of Geography of Marseilles, and the commercial agent for the Sultan of Zanzibar, gave most interesting details of the several explorations at present going on in that part of the Dark Continent.

The lecture on the progress of electricity was given by M. Denayrouze, of Jablochhoff candle notoriety. The speaker tried to show that Jamin's candle ought to be superior to the light which is spreading so largely in Paris and in London.

Another lecture was delivered by M. Barral, Perpetual Secretary of the National Society of Agriculture, on the necessity of using Rhone water for irrigation. There is, however, a variety of opinion on this subject, commercial people being really opposed to the irrigation scheme for the reason that it would diminish the quantity of water necessary for navigation, especially as it is intended to submerge vines in order to save them from phylloxera, the plague of the country.

A very interesting display took place in the Polygon, of the destroying power of modern methods of warfare, as practised by French engineers of the 2nd Regiment, which is garrisoned in Montpellier. It cannot be said that science is alien to the use of dynamite and electric sparks for such purposes, but it is the first time that warfare has been considered as being really within the limits of a scientific association.

Two of the most interesting excursions were devoted to agriculture—one to the experimental grounds established by M. Marey, one of the most active correspondents of the Academy of Sciences, with a view to destroy phylloxera, and the other to the School of Agriculture directed by M. Camille Saint Pierre. This school, established with the help of the General Council only a few years back, has already reached a high point of prosperity. Its reputation is so high in the Mediterranean regions that the Greek Government is sending there a number of pupils at its own expense.

The Sericultural Station has been placed under the direction of M. Maillot, a pupil of M. Pasteur at the Normal School of Paris, who has already instructed ninety-two persons in the difficult art of observing silkworms' eggs with microscopes.

At the Viticultural Station American vines, insecticide, and all the proposed means of destroying phylloxera are being studied.

All the pupils of the Normal School for public teachers, are attending a course of lectures in that establishment, so that the teachers of the young Hérault peasants will have a scientific knowledge of new methods proposed for scientific agriculture of the region.

SCIENTIFIC SERIALS

American Journal of Science and Arts, August.—This number opens with the first portion of a paper by Mr. Upham, on terminal moraines of the North American ice-sheet.—Prof. Kimball describes experiments with regard to the effects of magnetisation on the tenacity of iron and on the flexure of a soft iron bar. *Inter alia*, he proves that a soft iron bar has its tenacity increased about nine-tenths of 1 per cent. by magnetising it to saturation.—Prof. Hilgard calls attention to some points in connection with the loess of the Mississippi valley, which seems to render the Æolian hypothesis untenable regarding that and similar deposits elsewhere; the hypothesis, viz., that the true loess is always a subaerial deposit, formed in a dry central region, and that it owes its structure to the formative influence of a steppe vegetation.—Dr. Cutter describes his method of micro-photography with Tolles's $\frac{1}{8}$ -inch objective.—Prof. Peirce demonstrates the value of M. Faye's proposal of a method of swinging pendulums for the determination of gravity, and Mr. Hodges offers some considerations on the size of molecules, arising out of the conversion of water into steam, and the combining effect of platinum on hydrogen and oxygen.—Among other topics treated are the geology of Virginia, the discovery of a new group of carboni-

ferous rocks in South-Eastern Ohio, and the Laramie group of Southern Colorado and Northern New Mexico.

Journal of the Franklin Institute, August.—The following may here be noted:—Committee Report on the Fairbank's testing machine.—A new method of constructing index plates for gear cutters, by Prof. Sweet.—A new genus in telephones, by Prof. Dolbear.—On the use of determining slag densities in smelting, by Mr. MacFarlane.

Bulletin de l'Académie Royale des Sciences (de Belgique), No. 6, 1879.—Besides the paper of M. Montigny on the colour in scintillation of stars (elsewhere noticed), we note here an account of a new method, by M. Bruylants, for preparing hydriodic and hydrobromic acids, viz., adding iodine and bromine to the terpene contained abundantly in balsam of copaiba, and then detaching them under the influence of heat in the state of the corresponding acids.—The physiology of the muscles and nerves of the lobster is elucidated by MM. Fredericq and Vandeveldé, who show that the only difference from superior animals is in the velocity of the nervous influence, this being, in the lobster, only 6 metres per second. Further, it is diminished considerably in the termination of the motor-nerves.—Mr. Macleod communicates a histological paper on the Harder gland in the domestic duck; and M. Schleicher writes on the living cartilaginous cell, the protoplasm of which he finds to consist of two different substances, one nearly liquid and homogeneous, the other, solid elements endowed with contractility (the nucleus is similarly formed).—M. Dubois describes some new birds.

No. 7.—M. Montigny here brings forward evidence that the principal star γ of Andromedes is subject to changes of colour, which are very probably periodic.—M. Plateau finds, in two notes by Brewster, confirmation of his views on the nature of irradiation.—A paper by MM. Masquelin and Swaen treats of the first phases of development of the maternal placenta in the rabbit, and M. Folie writes on some theorems relative to surfaces of superior order.

Journal de Physique, August.—On the temperature of the polar extremities of carbons producing the electric light, by M. Rossotti.—On Ampère's formula, by M. Jamin.—Researches on the compressibility of gases, by M. Cailletet.—M. Faber's speaking machine, by M. Gariel.

Reale Istituto Lombardo di Scienze e Lettere, Rendiconti, vol. xii. fasc. xiv.—On the problem of subdivision of the electric light, by Prof. Ferrini.—Observations of Swift's comet at the Observatory of Brera, by Prof. Schiaparelli.—Study on some crania of Araucanians and Pampas in the National Museum of Anthropology of Florence, by Dr. Riccardi.—Results of observations on the diurnal period of magnetic declination during 1872-77, at the observatory of Brera in Milan, by Dr. Rajna.—On the Mascart electrometer, by Dr. Maggi and S. Ascoli.—Experiments on the capillarity of water, by Dr. Poloni.

Fasc. xv.—On the transformation of the 11th order of elliptic functions, by S. Klein.—On special corpuscles (psorosperms) of man, by Dr. Grassi.—On the application of the dynamometer in operations of lithotrity, by Prof. Scarenzio.—Meteorological observations at the Observatory of Brera, in Milan, in 1878, by S. Frisiani.—Contributions to a study of the lias fauna of Lombardy, by Dr. Parona.

The *Fahrbuch der k.k. geologischen Reichsanstalt* (Vienna, ii., April to June) contains an elaborate treatise by C. M. Paul and Dr. E. Tietze, entitled "New Studies on the Sandstone-zone of the Carpathian Mountains." The remainder of the part is taken up by a petrographical study on the granite of Predazzo, by A. Sigmund, followed by some geological and petrographical notes on the older eruptive and stratified rocks of the Middle and Eastern Alps, by Dr. Guido Stache and Conrad von John. The latter paper is the second communication these gentlemen have made on the subject, and treats specially of the Cevedale district as the distribution district of older dioritic porphyrites. It is accompanied by four well-drawn plates.—The *Abhandlungen* of the same Society (vol. xii. Heft 1) contain the first part of an excellent treatise by R. Hoernes and M. Auinger on the Gasteropoda of the marine deposits of the first and second miocene Mediterranean stages in the Austro-Hungarian Empire. The species here described belong all to the genus *Comus*, and are well reproduced on six magnificent plates. Thus we have illustrations of *Chelyconus*, *Rhizoconus*, *Lithoconus*, *Dendroconus*, *Liptoconus*, and *Stephanoconus*, representing some fifty-two different varieties.

SOCIETIES AND ACADEMIES

LONDON

Entomological Society, September 3.—J. Jenner Weir, F.L.S., F.Z.S., treasurer, in the chair.—Mr. Philip B. Mason exhibited specimens of *Harpalus oblongiusculus*, Dej., taken at Portland, and also, on behalf of Mr. Gameys, specimens of *Euplectus ambiguus*, Reich., found in flood refuse at Repton.—Miss E. A. Ormerod read "Notes on the Prevention of Caneborers."—Mr. Jenner Weir exhibited a pair, male and female, of *Cicada montana*, Scop., taken at the New Forest, Hampshire.—M. Ch. Oberthur communicated the following paper: "Observations sur les Lépidoptères des Îles Sangir et Descriptions de quelques Espèces nouvelles."

PARIS

Academy of Sciences, September 8.—M. Daubrée in the chair.—The following papers were read:—On the mean value of numerical coefficients in a skew determinant of order infinitely great, by Prof. Sylvester.—Pathological predisposition and immunity; influence of origin or of race on the aptitude of animals of ovine species to contract splenic disease, by M. Chauveau. Algerian sheep seem to enjoy immunity from this disorder. M. Chauveau selected nine from different lots of authentic origin in the Lyons market (to which large numbers are imported). Notwithstanding repeated inoculation (three and five times), none of them showed multiplication of the *Bacillus anthracis*, characteristic of the disease. On the other hand, French sheep and rabbits all succumbed after the first inoculation. M. Chauveau urges the importance of this question of special immunity.—The President expressed the lively satisfaction of the Academy at M. Nordenskjöld's return.—On the causes of reinvasion of phylloxerised vines, by M. de Laffitte.—On the same subject, by M. Cauvy.—On the compounds of hydracids with ammonia, by M. Maumené. Some observations on the rôle of insects during the flowering of *Arum crinitum*, Ait., by M. Schnetzler. Of the flies attracted by the fetid odour of this *Arum*, those most pressed to lay, deposit their eggs at the bottom of the spathe; then, prevented escaping by the viscous hairs at the entrance, they die. Others, less pressed to lay, are attracted by the glandular hairs on the spadix, which lead them, like the degrees of a scale, to the stamens. There, walking on the anthers, they liberate the pollen, and remounting the spadix in the direction of the hairs, they fly off to lay their eggs in another spathe, at the bottom of which they deposit on the stigmata the pollen brought from the stamens of another individual; then, imprisoned in their turn, they die. The purple red hairs covering a good deal of the interior surface of the spathe probably contain an acid which, like that exuding from the hairs of *Drosera*, may contribute to transformation of the azotised matters of insects into matters absorbable by the spathe.

GÖTTINGEN

Royal Academy of Sciences, May 3.—On sums of the greatest wholes in arithmetical series, by Herr Zeller.—On the galvanic resistance of gas-carbon, by Herr Auerbach.

June 4.—New relations between the class numbers of the quadratic form of negative determinants, by Herr Gierster.

June 14.—On endogenous formation of normal lateral shoots in the genera *Rytiphloea*, *Vidalia*, and *Amansia*, by Herr Falkenberg.

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