

spoke strongly against the theory. The investigation of the electrolytic tension of decomposition of the ammonium salts with a mercury cathode, by Coehn and Dannenberg (*Zeitschrift für anorganische Chemie*, 25, 430), has given results perfectly analogous to those obtained with salts of the alkali metals, a result only explicable on the assumption of the ammonium theory. Experiments carried out under varying conditions to ascertain the possibility of reducing the heavy metals from their solutions, show that the negative results previously obtained are due to the great instability of the ammonium amalgam. By preparing the amalgam electrolytically at low temperatures (0° C.), when it appears to be much more stable and does not exhibit, to any great extent, the spongy appearance peculiar to the amalgam prepared under ordinary conditions, and allowing it to act on cold solutions of copper, cadmium and zinc salts, the formation of the corresponding heavy metal amalgams is easily observed. In the case of the copper, it might be possible to explain the reduction by attributing it to the nascent hydrogen generated in the decomposition of the ammonium amalgam; but this explanation is not possible in the case of the cadmium and zinc salts.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*) from India, presented by Mr. R. F. Wilson; a Polecat (*Mustela putorius*), British, presented by Mr. Hett; three Painted Snipe (*Rhynchaea capensis*) from India, presented by the Hon. Walter Rothschild, M.P.; a Tawny Owl (*Syrnium aluco*), European, presented by Mr. F. Medcalf; a Deville's Tamarin (*Midas devillii*) from Peru, a — Conure (*Conurus ocularis*), an Orange-winged Amazon (*Chrysotis amazonica*), a Brazilian Tortoise (*Testudo tabulata*) from South America, three Japanese Pheasants (*Phasianus versicolor*) from Japan, two Pennant's Parrakeets (*Platyercus elegans*), a King Parrot (*Aprosmictus cyanopygus*) from Australia, deposited.

OUR ASTRONOMICAL COLUMN.

ORIGIN OF TERRESTRIAL MAGNETISM.—The *Observatory* for January contains a translation by Prof. L. A. Bauer, of the U.S. Geodetic Service, of an article in *Ciel et Terre*, December 16, 1900, containing the results obtained by Dr. Schmidt from an important harmonic analysis of the permanent magnetic field of the earth. This work has been practically an amplification of Gauss' "Théorie générale du magnétisme terrestre."

In Schmidt's analysis he does not assume the existence of an interior potential function governing the entire magnetic force; but adjusting separately each of the three rectangular components, obtains three expressions in place of the one determined by Gauss; moreover, the computations have been carried to the terms of sixth order instead of the fourth. He concludes that the magnetic force of the earth consists of three parts:—

(1) *The greatest part*, attributed to causes situated in the terrestrial crust, and having a potential.

(2) *The smallest part* (about one-fortieth the whole), due to causes exterior to the crust, and also possessing a potential.

(3) A part, somewhat greater than (2), not represented by a potential, and therefore indicating the existence of vertical terrestrial electric currents.

Dr. Schmidt has also made careful examinations of the records of magnetic storms. In that of February 28, 1896, which was observed at fifteen observatories, and lasted from 6-7 o'clock, he finds that the directions of disturbance vary considerably, at times converging to a point, at others radiating from a point; while at certain periods of comparative calm the lines of force were practically parallel, suggesting a distant centre of force. Taking these facts in consideration with the vertical component disturbances, he concludes that the causes producing terrestrial magnetic storms are for the most part exterior to the surface of the earth.

OPPOSITION OF MARS IN 1888.—Signor G. V. Schiaparelli has recently published a sixth volume of observations of Mars, containing the discussion of his determinations on the topo-

graphy and constitution of the planet during the opposition of 1888, made with the 18-inch Merz refractor at the Milan Observatory. After preliminary notes of instrumental details and tables showing varying size of the disc, atmospheric quality, &c., about eighty pages are devoted to the detailed description of the aspects of the many markings recognised during the period, very many comparisons with the work of other observers being included; the remainder of the volume is occupied with the discussion of observations bearing on the constitution of the surface, giving detailed measures and descriptions of the varying polar caps, and a comparative analysis of the gemination of the principal "canali." Reproductions of drawings of the surface markings on successive dates are included, and two polar charts showing the whole of the observed phenomena in their relative longitudes.

DOUBLE STAR MEASURES.—In the *Astronomische Nachrichten* (Bd. 154, No. 3679) Mr. J. Comas Sola gives a series of measures of seventy-five double stars observed at Barcelona.

SCIENTIFIC DEVELOPMENTS OF BIOLOGY AND MEDICINE.

AN interesting monograph is just to hand in the shape of a lecture, delivered by Dr. Oscar Hertwig upon the occasion of the congress of German naturalists at Aix la Chapelle (Aachen). The subject is the development of biology in the nineteenth century. Many interesting points, forming landmarks in the progress of biological science, are discussed by the lecturer. The microscope, from the inestimable service it has rendered to morphology, must rank high in the discoveries of the century. Before morphological method had been enriched by it, the cellular hypothesis, which is the foundation stone of all biology, was impossible. Dr. Hertwig accentuates the fact that progress consists, not only in adding facts to our treasury of knowledge, but also in stamping out error, and that some of the biological energy of the nineteenth century has been consumed in annihilating the doctrine of spontaneous generation; it was, indeed, only Pasteur's researches that established irrefutably the dictum *Omne vivum e vivo*, and much later still did the corollary of this, namely *Omnis cellula e cellula*, firmly plant itself upon biology, never to be uprooted.

A further factor of transcendental importance in the progress of biology during the nineteenth century was the birth and growth of the study of embryology. Its chief result was the theory of evolution and the accompanying doctrines of natural selection and the survival of the fittest. The lecturer enters fully into the literature of this subject, which has moved the biological world perhaps more than any preceding one. The concluding part of the discourse is devoted to the progress made in that department of biology which we know as physiology. The attempt in this direction during the latter part of the century has been to reduce, by means of physico-chemical technique, biological phenomena to physico-chemical law. This attempt, although it has given us an enormous insight into the processes of life and has enabled us to formulate laws of the highest abstract and utilitarian value, has been, in its absolute sense, unsuccessful. It is doubtful if chemical and physical law can ever explain fully the phenomena of life, and while physiological chemistry and physics have destroyed the old vitalism, we are, to some extent, compelled to take refuge in a new one. From the practical standpoint, great progress has been made in the development of pharmacology and experimental pathology. The former, going hand in hand, as it ever must, with the practical treatment of disease, has not only thrown light upon many problems of pathology and physiology, but has greatly increased the possibilities of therapeutics, and given distinct hope for the future in this direction. Under experimental pathology serum therapy is included, and the immense field for research this has opened up.

An address delivered by Dr. Naunyn, of Strassburg, at the same congress, is of considerable interest. He chose for his subject the development of medicine, hygiene and bacteriology during the nineteenth century. To show the condition of medical thought at the beginning of the century, he quotes from the work of Prof. Kieser, of Jena, in 1812. At that time the exanthemata were regarded as necessary stages in the growth of mankind, and as essential to his perfect development, just as the pupa stage is essential to the butterfly. The scientific development of medicine, according to Prof. Naunyn, took its first real