increased pressure at the organ pipe brings out the strong octave c'''.

Stability of vibration. Vibrational hysteresis.—Finally, the peculiar phenomenon observed in connection with the stability of vibration deserves special mention. A König resonator mounted on a graduated slide, x, is convenient for the purpose. If the mouth of this apparatus is approached slowly from a large distance, x, to within 2.2 cm. of the lip, c'' is strongly resounded. On passing these limits, d'' breaks forth almost suddenly. With this d'' sounding from the combined system, withdraw the resonator slowly again; d'' will be retained until x has increased to 2.8 cm., about. Hence, within 6 mm. of approach, the note is either c'' or d'', depending upon whether the position has been reached from large or from small values of x, within the limits given. See figure. With a carefully regulated slow influx, 9 or even 10 mm. of range were attained with a sharp clicklike breakdown at each end. The change from c'' to d'' is usually more sudden, that from d'' to c'' more gradual, perhaps, but the *hysteresis-like* character of the phenomenon is unmistakable. As I have recently been studying hysteresis* from different points of view (cf. forthcoming paper in the *Physical Review*, on temporary set), the present purely vibrational case of it is to me strikingly interesting.

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THE FIFTH INTERNATIONAL ZOOLOGICAL CONGRESS.

THE Fifth International Zoological Congress held its sessions in Berlin from August 12 to August 16, under the gracious protection of His Highness the Crown Prince of Germany and the presidency of Professor K. Möbius, and, so far as concerns the attendance, was the most successful of all that have so far been held. Most of the countries of Europe were well represented, delegates were present from Canada, Brazil, Mexico and the United States, the total number of those present being considerably over six hundred. The members in attendance from the United States were: Professors E. B. Wilson, of Columbia University, and Patten, of Dartmouth College; Dr. Stejneger, of the Smithsonian Institution; Dr. C. W. Stiles, of the National Museum; Mr. W. A. Murrell, of Cornell University; Mr. J. Hunter, of St. Louis, and Professor J. Playfair McMurrich, of the University of Michigan. Owing to the large number of papers to be presented, seven sections were established, namely, general zoology, experimental zoology, vertebrata (biology and systematic), vertebrates (anatomy and embryology), evertebrata (exclusive of arthropoda), arthropoda and nomenclature; and while such a separation of subjects was undoubtedly necessary and the grouping as satisfactory as might be, it made it impossible to attend the reading of many of the papers in which one might be interested.

The papers read were very varied in character, some being on special subjects, some, indeed, altogether too special for such a meeting, and others on the more general problems of zoology. If a single subject is to be selected as that which awakened the greatest interest, the new or rather the rekindled struggle between vitalism and mechanism must be the one chosen. Driesch, who has precipitated the renewal of the struggle, presented his views to a well-attended meeting of the section of experimental zoology, upholding, in a forcible and clearly stated argument, the vitalistic side of the question, while, in the discussion which followed, Ziegler, Roux and Rhumbler took the opposite side, maintaining that it is too early yet to admit the existence of vitalism or to postulate an active purpose-

* *American Journal of Science*, XI., 1901, p. 97.

fulness for the vital processes. That we cannot explain certain phenomena exhibited by living organisms on the mechanical or better the physical, hypothesis does not necessarily require the postulation of a vital force; it may rather be due to our ignorance of the physico-chemical and mechanical factors at work, and the progress of modern investigation has steadily tended towards the elucidation of more and more of the vital phenomena as chemico-physical or mechanical processes. In one of the general sessions of the Congress the same problem was the topic of a lecture by Bütschli, of Heidelberg, whose work on the structure of protoplasm necessarily inclines him towards the mechanical side. The problem, of course, cannot as yet be settled, but the opinion of the majority who took part in the discussion seemed to be in favor of the physical theory, holding that the neo-vitalists had not demonstrated the existence of a special life force or a necessity for such a force.

One of the most interesting and instructive of the lectures before the entire Congress was that given by Professor Poulton, of Oxford, on 'Mimicry and Natural Selection.' His thesis was the defense of Darwin's theory of mimicry, and in a clear and convincing manner he showed that many of the peculiarities exhibited by mimicking animals can be explained plausibly and satisfactorily on no other hypothesis. His lecture was illustrated by lantern slides, photographed in colors, showing numerous cases of mimicry in insects collected, with a special view to the study of this question, in Mashonaland, South Africa. Other lectures in the general sessions were given by Professor Grassi of Rome on 'The Malaria Problem from the Zoological Standpoint'; Professor Delage, of Paris, on 'The Theories of Fertilization'; Professor Forel, of Morges, on 'The Psychic Peculiarities of Ants'; Professor Branco, of Berlin, on 'The Fossil Remains of Man,' the last named making the rather startling suggestion that *Pithecanthropus* may have been neither man nor ape nor yet a connecting link between the two, but a cross between pliocene man and an ape!

Of the papers read before the various sections there were but few which call for special notice. One of the most important was the announcement by Professor Patten that he had been able to detect the existence of a series of three-jointed appendages in specimens of *Cephalaspis* preserved in the British Museum, a fact which, taken along with the structure of the shell and the arrangement of organs which may be identified with median and lateral eyes, seems to indicate a close affinity of these supposed fishes with the merostomatous crustacea. In the section for vertebrate anatomy and embryology, Hubrecht presented the results of his studies of the development of *Tarsius*, which seem to explain the significance of the belly-stalk of the higher mammals, and Kopsch demonstrated by interesting experiments upon the blastoderm of the chick that Balfour's view that the primitive streak lay entirely posterior to the body of the embryo required considerable modification. Papers were also presented by Schauinsland on the development of the skull of *Hatteria* and of *Callorhynchus* and by Mitrophanow in the early development of the ostrich.

In the section for experimental zoology in addition to the paper by Driesch already mentioned, Herbst contributed an interesting communication on the influence of the nervous system on regenerated parts, having found that the regeneration of the eye-stalk of a crab resulted in the formation of an antennule, provided the optic ganglion had been destroyed by the operation. Other interesting papers presented to this section were by Spemann, of Würzburg, on the formation of double embryos by constricting

the eggs of *Triton* in the two-celled stage, his method permitting of different degrees of constriction and of constriction in different planes, as well as a thorough study of the resulting abnormalities; and by E. B. Wilson, who gave the results of his studies on the cytological changes in the eggs of *Toxopneustes* developing parthenogenetically by the Loeb method.

In the section for systematic zoology of the vertebrates one of the most interesting exhibits was that by Sclater of the skull and a portion of the skin of the newly discovered *Okapia*, a giraffine animal closely related to the extinct *Helladotherium* and obtained in the Urganda district by Sir Harry Johnston. The papers and demonstrations in the section for invertebrata were numerous, and it is impossible to refer to more than a few of them. Most noteworthy was perhaps a magnificent collection of Hexactinellid sponges obtained from the Japanese seas and exhibited by Professor Iijima, of Tokyo, while other papers of interest were by McBride on the development of *Echinus esculentus*, Apathy on the visual cells of the Herudinea (both these with demonstrations), Hoyle on intrapallial luminous organs in the Cephalopoda and Simroth on the digestive canal of the Mollusca. The section on nomenclature devoted a considerable portion of its time to a consideration of the report of the commission proposed at the last Congress and appointed a committee to codify the rules as they now exist.

The arrangements for the meeting were admirably carried out. Through the courtesy of the president of the Reichstag the sessions of the Congress were held in the Reichstag building and everything was done to make the meeting enjoyable in every way. The death of the Empress Frederick naturally cast a gloom over the city and entailed considerable alterations in the program of excursions and festivities which had been planned by the committee, but withal they were fully successful in their efforts to make the meeting both intellectually and socially enjoyable for all those in attendance.

The next Congress will be held in Berne, Switzerland, in 1904, and Professor Studer, of Basel, was unanimously chosen as president-elect.

J. P. McM.

SCIENTIFIC BOOKS.

Annals of the Astrophysical Observatory of the Smithsonian Institution. Vol. I. By S. P. LANGLEY, Director, aided by C. G. ABBOT. Washington, Government Printing Office.

During the ten years of its existence the Smithsonian Astrophysical Observatory has been almost entirely devoted to the prosecution of a single research—a continuation of one begun some years ago by Professor Langley at Allegheny—namely, the production of a map of the absorption lines in the infra-red solar spectrum which would be in some measure comparable as regards completeness and precision with those of the visible region produced photographically with the aid of the grating. Besides this main research—and carried out largely since its completion—several subsidiary researches have been undertaken, one of which, to be mentioned later, is of particular importance.

If we represent the solar radiation by an energy curve, in the usual manner, in which ordinates are proportional to radiant energy, and abscissæ to wave-lengths, the selective absorption of the solar and terrestrial atmospheres will be indicated by depressions in the curve, whose depth and width will show the intensity of the absorption and the extent of the spectral region affected by it. In the visible region, of course, the absorption will be indicated by a great number of more or less sharp, close-packed depressions, corresponding to the great number of visible 'lines.' It has been found that, besides broad regions of general absorption previously noted by Langley and others, the infra-red spectrum is also affected by similarly sharp selective absorption, producing 'lines,' and as has been said, this main research is devoted to the mapping of