Mr. T. Whitelegge, who has charge of the marine invertebrata in the museum, has conducted a number of experiments to test the value of formol as a preservative. The results have proved highly satisfactory, more especially in regard to delicate marine organisms; they show that a 2½ per cent. solution is sufficient to preserve many delicate organisms, and that for most others a 5 per cent. solution is ample.

A LIST of books in which botanical book-hunters will be especially interested, is the "Bibliographie Botanique," just issued by Messrs. J. B. Baillière et Fils, Paris. The books and brochures in this catalogue are classified geographically.

A BRIEF account of the excursion to the Isle of Man, after the recent meeting of the British Association, was given in NATURE of the 8th inst., by Prof. W. A. Herdman. It may interest some of our readers to know that a complete descriptive report of this supplementary meeting of archæologists, geologists, zoologists, and botanists, occupying no less than fourteen columns, appears in the *Isle of Man Times* of October 3.

WE have received the Report of the Botanical Survey of India for the year 1895-96, by the Director, Dr. G. King. The Botanical Surveys of Northern India and of the Bombay Presidency have been steadily progressing; while that of Southern India has been temporarily interrupted by the death of its Director, Mr. M. A. Lawson. Work has also been done in Assam and in Burma.

IN connection with this Survey, Dr. D. D. Cunningham and Mr. D. Prain have published a very interesting "Note on Indian Wheat-rusts," containing a great deal of valuable information respecting the diseases known as "rust," which attack the wheat and barley crops in different parts of India, and which appear to belong to four different species of the genus of parasitic fungi *Puccinia*, and their connection with a fungus which attacks *Launea asplenifolia*, a very common weed among cultivated crops, belonging to the Compositæ.

MESSRS. WILLIAM WESLEY AND SON have prepared and issued a new "Natural History and Scientific Book Circular" (No. 126), containing titles and prices of nearly two thousand works on the Invertebrates. The catalogue comprises descriptions of handbooks and other general works, a classified list of works on the Invertebrates from Protozoa to Mollusca, arranged according to Claus' "Text-book of Zoology;" and a section on economic entomology. This intelligent arrangement of the titles makes the catalogue a useful index to zoological literature.

THE renowned *Zeitschrift für physikalische Chemie* has now a friendly rival in the *Journal of Physical Chemistry*, edited by Profs. Wilder D. Bancroft and Joseph E. Trevor, and published at Cornell University. The first number of the new journal contains articles on "Irreversible Cells," "Chemistry and its Laws," and "Ternary Mixtures," reviews of books, and critical digests of papers bearing upon different phases of physical chemistry. The journal thus follows much the same lines as its admirable German prototype, and we anticipate that it will play a similar important part in the development of the rich domain where the realms of physics and chemistry overlap. The publication will be issued every month except July, August, and September. The London agents are Messrs. Gay and Bird.

A FRESH light has been thrown on the constitution of the nitro-paraffins by the researches of Prof. Hantzsch, of Würzburg, which are recounted in a recent number of the *Berichte*. At one time it was thought that the presence of the nitro-group in the methane molecule imparted an acid function to one of the hydrogen atoms, and that in the formation of a salt this atom was replaced by the metal, which thus became directly combined with the carbon atom, the formula of sodium nitro-methane being written $CH_2Na.NO_2$. The researches of Nef and others have, however, shown that most probably the free nitro-paraffins have a different constitution from their salts, and that in the latter the metal is not directly combined with carbon, but with oxygen. Prof. Hantszch's discovery shows that this view is almost certainly correct. He has found that certain aromatic derivatives of the nitro-paraffins actually exist in two distinct forms, one of which, the normal compound, is an indifferent substance incapable of forming salts, and has the formula $R.CH_2.NO_2$; whilst the other, the iso-compound, has the formula $R.HC\overset{O}{\diagdown\!\diagup}N.OH$, and acts in all respects as an acid. When, for example, a solution of the sodium salt of bromo-phenylnitromethane is acidified with hydrochloric acid, the iso-compound is precipitated as a crystalline mass, which melts at 90°. When this is preserved, however, either alone or in solution, it rapidly undergoes a molecular change, and after twelve hours melts at 60°, and has all the properties of the normal compound, which can itself be directly obtained from the solution of the sodium salt by decomposition with a weak acid, such as carbonic acid. The normal compound does not react with ferric chloride, is much less soluble than its isomeride, and in aqueous solution is a non-electrolyte; whereas the iso-compound is a stronger acid than acetic acid, and gives a characteristic colouration with ferric chloride, a further proof that it contains the hydroxyl-group. The normal compound is at once converted by alkalis into the iso-derivative, which then immediately dissolves, forming the corresponding salt.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*, ♂) from India, presented by Dr. Allen M. Cleghorn; two Tigers (*Felis tigris*, ♀ ♀, juv.) from India, presented by H.H. the Gaekwar of Baroda; a Wild Cat (*Felis catus*), a Common Genet (*Genetta vulgaris*), two Avocets (*Recurvirostra avocetta*), two Eyed Lizards (*Lacerta ocellatus*), seven Green Lizards (*Lacerta viridis*), European, three Prairie Marmots (*Cynomys ludovicianus*), a Cat Bird (*Galeoscoptes carolinensis*) from North America, a Sulphury Tyrant (*Pitangus sulphuratus*) from South America, a Grey Coly Shrike (*Hypocolius ampelinus*) from Scinde, two Greater Black-backed Gulls (*Larus marinus*), a Herring Gull (*Larus argentatus*), a Black-headed Gull (*Larus ridibundus*), British, presented by the Lord Lilford; two Grey Francolins (*Francolinus ponticerianus*) from India, presented by Lieut.-Colonel D. K. Robertson; a Loggerhead Turtle (*Thalossochelys caouana*) from Spain, presented by Miss A. Steer; five Spotted Salamanders (*Salamandra maculosa*), European, presented by Miss Minks; a Yellow-cheeked Lemur (*Lemur xanthomystax*) from Madagascar, a Moorish Tortoise (*Testudo mauritanica*) from North Africa, deposited; two Nylghaies (*Boselaphus tragocamelus*, ♂ ♀) from India, received in exchange.

OUR ASTRONOMICAL COLUMN.

TELEGRAMS ABOUT COMETS.—At the meeting of the Telegramm-Commission at Bamberg on September 18 last, it was decided to make an alteration in the scheme of cypher that has been in use up to the present time. It has now been settled that the *date of observation* and the *brightness* of the object shall be included in a group of five figures, and allowed for in the "control" figures, which are always added as a check.

To prevent mistakes the following example is added—

"Comet Witt D.A. 09120 October 13000 Berlin, Urania. 02554, 07630, 35946, 35957, 04207."

This reads when deciphered—

"New Comet Witt 1896 D.A. 9 October, 13h. mean time Berlin, Urania. Apparent R.A. = 25° 54′. Apparent N.P.D. 76° 30′. Daily movement −14′, −3′. Magnitude 12m."

In cases where it is impossible to give the magnitudes, the three last figures will be written as three zeros.

This alteration will come into use on the first of next month (November) in all telegrams from the "Centralstelle" in Kiel.

COMETS PERRINE (1895 IV.) AND PERRINE-LAMP (1896).—A most interesting description of these two comets, obtained from eye observations and photographs, is given by Joseph and Jean Fric, in a communication presented on April 24 of this year to the Cisare Františka-Josefa (5th year, No. 26). Up to the time of the perihelion passage of Comet Perrine, the observations made during this period were published in the *Bulletin* of the same Academy (No. 8), the last observation dating from December 9. The path of the comet at and since the time of its perihelion passage, is here indicated in the chart accompanying this communication. In the cliché taken on February 15 of this year, the tail of this comet appears in the form of a thin line, with a position angle of 120°, being turned towards the sun. This latter exceptional fact has been verified on two negatives taken on February 20 and 21, both of which were made under the best atmospheric conditions. The description of the original clichés that were taken on February 15, shows us that this comet presented a very dim line directed towards the sun, and of 1° in length. The nucleus was nearly of fifth magnitude, and resembled a star. This cliché is further interesting from the fact that it shows the first trace of the new comet Perrine-Lamp. On February 20 the tail presented a fan-like form, being somewhat more dense at the position angle 120°. Its breadth was 15′ at its centre, and its length 1½°. The position of the tail was abnormal, being turned towards the sun. By April 21 its length had increased to 2°. On March 15 only the nucleus was visible, and by the 20th a photograph showed only a feeble trace of it. The clichés which show the appearance of the Perrine-Lamp comet are also full of interest. A striking feature of these photographs is the bifurcation of the tail, exhibited on the cliché made on February 22 and March 3, and its spontaneous development on February 21 and 22. The direction of the tail, in its relation to the sun, was normal. The communication contains, besides the chart referred to above, reproductions of the several clichés mentioned in the pamphlet.

THE CANALS OF MARS.—First Schiaparelli and then Lowell have both shown us that the Martian surface is a network of canals. The number of canals, as the latter observer informs us, is really far more numerous than has yet been recorded, but these are less in size, and only flash out clearly under the very best and exceptional conditions of seeing. As one would expect, the greater the number of canals, the greater becomes the difficulty in identifying them. In fact, unless one has first-class conditions for observation, and also considerable experience, it is rather rash to suggest the discovery of new canals. Mr. Brenner seems, however, to be certain of his powers of identification, and describes some of his observations in the *Bulletin de la Société Astronomique de France* (October). Without diagrams it is unsatisfactory to try to describe the positions of these suspected new canals, but a reference to Mr. Lowell's chart seems to indicate that these may be cases of not exact identification. Mr. Brenner makes it very difficult for readers of his notes, as he inserts woodcuts of the surface markings, numbered most carefully, these numbers having no reference at all to the text. For instance, referring to one of the drawings he says: "One sees the following canals: (1) Steropes, (2) Glaucus, (3) Phlegethon, (4) Cérannius, &c."

As these are the only numbers used in the text, it is natural to suppose them to refer to the illustrations; this, however, is far from the case, hence the delusion.

An interesting point is touched upon by Prof. V. Cerulli, concerning the conspicuousness of the canals Ulysses and Sitacus. These canals are not charted by Schiaparelli, but were discovered by Lowell two years ago Prof. Cerulli asks the question, How is it that they have been previously not seen, considering that the former is now as prominent as Sirenius and Araxes, both in the chart of Schiaparelli, and that the latter surpasses in distinctness the Euphrates and Phison? They are not simply canals that were observed in 1894 for the first time, but they are canals which till then had no existence. Mr. Lowell also remarked a peculiarity in this respect. Referring to the canals not on Schiaparelli's chart (Lowell, "Mars," p. 148) he says: "The most peculiar case, however, is the relative conspicuousness of the Ulysses."

THE HUXLEY LECTURE.—RECENT ADVANCES IN SCIENCE, AND THEIR BEARING ON MEDICINE AND SURGERY.[1]

II.

NOW let me turn to another theme suggested by what has happened in science and in the profession since the days of Huxley's studentship, and that is the complexity of the bearings of any one discovery, of any one advance, as well on science itself as on the applications of science.

In the garment of science, with which man is wrapping himself round, or rather is being wrapped round, the several threads are woven into an intricate web. As the loom which is weaving that ever-spreading garment takes in new warp and new woof, such threads only of each are taken in as can be fitly joined to those which have come in before, each thread as it is twisted in becomes a hold for other threads to be caught up later on. No single observation, no single experiment stands alone by itself, nor can its worth be rightly judged by itself alone. The mistaken philanthropists who have put restrictions, and would put more on physiological investigations, betray that ignorance of the ways of science, which seems to be a necessary condition of their attitude, when they ask us to state in a sentence the direct application to the good of man of each experiment on a living animal. In the doors of science, each the opening as often of a path as of a chamber, it is not, as such folk seem to think, that each bobbin pulls only one latch. Every experiment, every observation has, besides its immediate result, effects which, in proportion to its value, spread away on all sides into even distant parts of knowledge. The good of the experiment by itself is soon merged in the general good of scientific inquiry. The science of physiology, and by implication the art of medicine, is built up in part on experiments on living animals; in part only, but that part is so woven into all the rest that any attempt to draw it out would lead to a collapse of the whole.

It is because each experiment or observation is thus a thread caught up in a close-set web, that its value depends not alone on the mere result of the experiment or observation itself, but also, and even more so, on the time at which, and on the circumstances and relations under which it is made. This truth the real worker in science has borne in upon him again and again; it is this which leads him to that humility which has ever been the outward token of the fruitful labourer. He feels that it is not so much himself working for science as science working through him.

Let me attempt to illustrate this by dwelling on some two or three single observations in physiology, made almost at the time, or very soon after the time at which Huxley was a student. It will, I think, be seen that each of them has reached a long way in its bearing on the science of physiology and on the art of medicine, that the full effect of each has been dependent both on what went before and on what has happened since, and though they were all made, so to speak, long ago, some of their fruits were brought in as it were yesterday, and their full fruition is perhaps not yet accomplished.

I will first invite your attention to a single experiment, for, though repeated on various animals, we may call it a single experiment, which in the fall of the year 1845 Ernest Heinrich Weber, then Professor of Anatomy at Leipzig, and his brother Eduard Friedrich, reported to an assembly of Italian scientific men in Naples, and of which they subsequently published an account in Müller's *Archiv* in 1846. Making use of the recently introduced rotating electro-magnetic apparatus (the physical discovery begetting the physiological one), they found that powerful stimulation of the vagus nerves had the unexpected result of stopping the heart from beating.

This single experiment, which I may quote by the way as a typical experiment on a living animal—for it is impossible to imagine how the discovery of this action of the vagus on the heart could have been made otherwise than by an experiment on a living animal—this single experiment has made itself felt far and wide throughout almost the whole of physiology.

In the first place, it has made us understand in a way impossible before the experiment, how through the intervention of the nervous system, the work of the heart is tempered to meet the strain of varying circumstances. As I said a little while back, only a few years before even eminent observers were

[1] Delivered at Charing Cross Medical School, on October 5, by Prof. Michael Foster, Sec.R.S. (Continued from p. 583.)