

other hand, some bars were broken at points where the apparatus indicated a flaw, but where the metal proved to be perfectly sound; so that the apparatus is not yet quite trustworthy.

M. JULES RICHARD has recently discovered in the two lakes of the Bois de Boulogne, Paris, numerous specimens of hitherto unknown Crustaceans. Among the strangest "finds" of this zoologist is that of a new species of the Copepod genus *Bradya*, the *B. edwardsi*. This species is a blind one, and is the only species of the genus hitherto found in fresh water. *B. typica* was discovered in a fjord near Christiania, another one was found off the Scilly group, and *B. limicola* lives in brackish waters at Ocean Springs (Mississippi). Facts go to show that this fresh-water species is of subterranean origin, as it comes, or seems to come, from the water of the artesian well at Passy, which is sent to the Bois de Boulogne lakes. Both of these lakes are swarming with a large variety of Entomostraca.

WE learn from the quarterly statement of the Palestine Exploration Fund that the famous "Siloam inscription" has been cut out of its place in the rock tunnel and carried away. It was broken in removal, and the fragments are reported to have been sold to a Greek of Jerusalem. On receiving this intelligence, the Executive Committee of the Fund forwarded to Hamdi Bey a resolution expressing their regret, and the hope that immediate steps would be taken to secure the fragments. Fortunately an accurate copy of this inscription had been made, and published by the Fund. The occurrence, as the Committee claim, shows how valuable the work done by the Fund has been in preserving records of monuments which are in daily danger of being destroyed.

THE Committee of the Palestine Exploration Fund are about to issue "Fauna and Flora of Sinai, Petra, and the Wady 'Arabah," by Mr. H. Chichester Hart.

THE third volume of the "Educational Annual" has been issued. The work has been carefully revised, and the statistics have been brought down to date from the public records.

M. ROUZAUD, of the Montpellier Faculty of Sciences, has issued a handsome volume recording the principal incidents connected with the celebration of the 600th anniversary of the Montpellier University last June.

THE new number of the Journal of the North China Branch of the Royal Asiatic Society will, according to a recent announcement of the Secretary, open with a valuable paper, the result of many years' research and of much study by a ripe scholar, Dr. Bretschneider. It is styled "Botany of the Chinese Classics," and is, in fact, a continuation of the studies condensed in a paper by the same author, which appeared, under the title "Botanicum Sincicum," in the Journal some ten years ago. The manuscript has arrived safely from St. Petersburg, and is in the printers' hands. The paper will have the benefit of revision and annotation by Dr. Faber, a high authority on botanical subjects; and thus it will doubtless serve as an extremely valuable work of reference. Dr. Bretschneider is at work on another paper—which, however, it is feared, will not be ready for some years—on Chinese medicines.

A NEW series of well-crystallizing salts of iridium-ammonium have been prepared by Dr. Palmaer in the laboratory of the University of Upsala, and are described by him in the latest number of the *Berichte*. They are pentammonium salts corresponding to the well-known *purpureo* compounds of cobalt, chromium, and rhodium. The chloride, $\text{Ir}(\text{NH}_3)_5\text{Cl}_3$, is readily obtained by the action of ammonia upon the tri- and tetrachlorides of iridium. It crystallizes in beautiful rhombic pyramids, completely isomorphous with the *purpureo* cobalt and rhodium chlorides. Usually the crystals possess a deep ruby-red colour, but this is found to be due to a trace of iridium-ammonium

chloride, and by other modes of preparation crystals may be obtained which are merely pale yellow in colour. It is interesting that only two of the three chlorine atoms are removable by means of strong sulphuric acid or silver nitrate, the third chlorine atom, as in case of the cobalt and rhodium salts, being much more tenaciously held. The product of the action of sulphuric acid is consequently the salt $\text{Ir}(\text{NH}_3)_5\text{ClSO}_4$, which crystallizes in bright yellow monoclinic crystals, possessing extraordinarily large double refraction. When the solution of this salt is mixed with solutions of barium bromide and iodide respectively, rhombic crystals of the salts $\text{Ir}(\text{NH}_3)_5\text{ClBr}_2$ and $\text{Ir}(\text{NH}_3)_5\text{ClI}_2$ separate out; these crystals are strictly isomorphous with those of the original trichloride, and the angles are very nearly identical. The tribromide, $\text{Ir}(\text{NH}_3)_5\text{Br}_3$, was obtained from the trichloride by boiling the latter with soda, and afterwards treating in the cold with concentrated hydrobromic acid which precipitated a roseo-bromide; the filtered roseo-bromide was found to be readily soluble in dilute hydrobromic acid, and the solution yielded the pentammonium tribromide on gently warming in the form of yellow crystals, also isomorphous with the trichloride. The salt $\text{Ir}(\text{NH}_3)_5\text{BrSO}_4$ was also prepared, sulphuric acid being incapable of removing the third atom of bromine, which, like the third atom of chlorine, is evidently combined in an unusually stable manner. In addition to the preparation of these salts, the hydrate, $\text{Ir}(\text{NH}_3)_5\text{ClOH}$, has also been obtained as a strongly alkaline solution, which absorbs carbon dioxide, and is capable of expelling ammonia gas from sal-ammoniac.

THE additions to the Zoological Society's Gardens during the past week include a Ring-tailed Coati (*Nasua rufia*) from South America, presented by Mr. E. Hopkinson; two Large Hill-Mynahs (*Gracula intermedia*) from Northern India, deposited; a Red Lory (*Eos rubra*) from Moluccas, purchased.

OUR ASTRONOMICAL COLUMN.

STARS HAVING PECULIAR SPECTRA.—In two communications to *Astronomische Nachrichten*, No. 3011, Prof. Pickering adds the following to his list of stars having peculiar spectra:—

Designation of star.	R.A. 1900.	Decl. 1900.	Mag.	Description of spectrum.
	h. m.	° ' "		
D.M. + 54° 43'	1 53.0	+ 54 20	9.0	III. Type. Bright hydrogen lines.
	1 55.1	+ 56 15	—	III. Type. " "
S.D. - 10° 513	2 30.2	- 9 53	8.0	IV. Type. " "
D.M. + 56° 686	2 33.9	+ 56 18	9.1	Bright lines.
D.M. + 56° 731	2 44.8	+ 56 31	9.5	" " "
Cord. G.C. 22280	16 21.2	- 18 14	4.6	F line bright.
S.D. - 10° 5057	19 17.7	- 10 54	7.0	IV. Type.
D.M. + 36° 4028	20 17.8	+ 36 36	9.5	Bright lines.
Cord. G.C. 30526	22 16.6	- 46 27	6.7	IV. Type.

The first and second stars on the list are in Perseus. Their spectra are similar to that of Mira Ceti. An examination of the Harvard College Observatory photographic chart plates prove that they also are variables. The fourth and fifth stars, also in Perseus, have a spectrum resembling that of the Wolf-Rayet stars in Cygnus. With respect to these it is remarked: "Probably we have here a group similar to that in Cygnus, only comprising much fainter stars, since several other objects in this region are suspected of having bright lines." The star Cordova, Gen. Cat. 22280, is χ Ophiuchi. Its spectrum is similar to that of δ and μ Centauri. The spectrum of D.M. + 36° 4028 is like that of the Wolf-Rayet stars.

The hydrogen line F is bright in the spectra of Harvard Photometry 3321 (*v* Sagittarii) and 3747. In the former star the hydrogen lines are very faint, and of the same intensity as the additional dark lines. Other bright lines are also seen.

The star Cord. G.C. 15177, noted in a previous communication as having a spectrum consisting mainly of bright lines (NATURE, vol. xlii. p. 429), should be Cord. G.C. 15,220.

HARVARD COLLEGE OBSERVATORY.—A series of articles on the history of this Observatory was written last year for the

Boston *Evening Traveller* by Mr. D. W. Baker. The articles were originally addressed to the general public, and may therefore be regarded as a popular description of the work accomplished at the Harvard College Observatory during the first fifty years of its existence (1840-90). Prof. Pickering has had this material reprinted in pamphlet form. Reproductions have also been made of some of the illustrations. The large amount of important work done at this Observatory renders the pamphlet of great interest to astronomers, while the many facts brought to light for the first time give it a high value.

The results of observations made with the meridian photometer during the years 1882-88 by Prof. Pickering and Mr. Oliver Wendell, have also just been issued. The principal work done by means of this instrument is "the determination of the magnitudes of a sufficient number of stars contained in the *Durchmusterung*, and distributed with approximate uniformity, to serve for future estimates or measures of magnitude, and to enable previous estimates to be reduced to the photometric scale."

The number of stars of which observations are recorded is 20,125; so that, when the stars enumerated in vol. xxiii. of the *Annals* of this Observatory are reckoned, the total number of stars observed with the meridian photometer reaches 20,982. Measures have also been made of 166 variable stars, and of several planets and satellites. To comment upon the importance of these observations would be superfluous. The authors are to be congratulated that the comparison is completed.

DR. KOCH'S REMEDY FOR TUBERCULOSIS.

THE following is a translation (sent to England on Friday last through Reuter's Agency) of an article by Dr. Koch in the *Deutsche Medizinische Wochenschrift*, January 15:—

"Since the publication, two months ago, of the results of my experiments with the new remedy for tuberculosis, many physicians have received the preparation and have been enabled to make themselves acquainted with its properties through their own experiments. As far as I have been able to review the statements which have been published and the communications I have received by letter, my indications have been fully and completely confirmed. There is a general consensus of opinion that the remedy has a specific effect upon tubercular tissues, and is therefore applicable as a very delicate and sure reagent for the finding out of latent and to diagnose doubtful tuberculous processes. As regards also the curative effects of the remedy, most reports agree in stating that, notwithstanding the comparatively short duration of the application of the treatment, many of the patients subjected to it have shown a more or less pronounced improvement, and it has been affirmed that in not a few cases even a cure has been established. Standing quite by itself is the assertion that the remedy may not only be dangerous in cases which have advanced too far—a fact which may at once be conceded—but also that it actually promotes the tuberculous process, and is therefore injurious. During the past six weeks I myself have had the opportunity to bring together further experiences touching the curative effects and diagnostic application of the remedy in the cases of about one hundred and fifty sufferers from tuberculosis of the most varied types in the City and Moabit Hospitals; and I can only say that everything that I have latterly seen accords with my previous observations, and that there is nothing to modify in what I before reported. So long as it was only a question of proving the accuracy of my indications, there was no need for anyone to know what the remedy contains, or whence it is derived. On the contrary, the subsequent testing would necessarily be the more unbiassed the less people knew of the remedy itself. But now that this confirmatory testing has been, as it appears to me, sufficiently carried out, and has proved the importance of the remedy, the next task is to extend the study of the remedy beyond the field of its heretofore application, and, if possible, to apply the principles underlying the discovery to other diseases also. This task naturally demands a full knowledge of the remedy, and I therefore consider the time to have come when the requisite indications in this direction should be made; and this is done in what follows.

"Before I go into the remedy itself, I deem it necessary, for the better understanding of its mode of operation, to state briefly the way by which I arrived at the discovery. If a healthy guinea-pig is inoculated with the pure cultivation (*Kultur*)

of the tubercle bacilli, the inoculation wound mostly closes over with sticky matter, and appears in the early days to heal. It is only after ten to fourteen days that a hard nodule presents itself, which, soon breaking, forms an ulcerating sore until the death of the animal. Quite a different condition of things occurs when a guinea-pig which is already suffering from tuberculosis is inoculated. The best adapted for this purpose are animals which have been successfully inoculated four to six weeks before. In such an animal the small inoculation assumes the same sticky covering at the beginning, but no nodule forms. On the contrary, on the following, or on the second day, the place of inoculation shows a strange change. It becomes hard, and assumes a darker colouring, which is not confined to the inoculation spot, but spreads to the neighbouring parts until it attains a diameter of 0.5 to 1 centimetre. In the course of the next few days it becomes more and more manifest that the skin thus changed is necrotic, and it finally falls off, leaving a flat ulceration, which usually heals rapidly and permanently, without any cutting into the adjacent lymphatic glands. Thus the injected tubercular bacilli have a quite different effect upon the skin of a healthy guinea-pig from that of one affected with tuberculosis. This effect is not exclusively produced with living tubercular bacilli, but is also observed with dead bacilli, the result being the same whether, as I discovered by experiments at the outset, they are killed by somewhat prolonged application of low temperatures or boiling heat, or by means of certain chemicals. This peculiar fact I followed up in all directions, and this further result was obtained—that killed pure cultivations of tubercular bacilli, after being diluted in water, might be injected in great quantities under the skin of a healthy guinea-pig without anything occurring beyond local suppuration. (Professor Koch here interpolates a note to the effect that such injections belong to the simplest and surest means of producing suppuration free from living bacteria.) Tuberculous guinea-pigs, on the other hand, are killed by the injection of very small quantities of such diluted cultivations; in fact, within six to forty-eight hours, according to the strength of the dose. An injection which does not suffice to produce the death of the animal may cause extended necrosis of the skin in the vicinity of the place of injection. If the dilution is still further diluted so that it is scarcely visibly clouded, the animals inoculated remain alive. There soon supervenes a noticeable improvement in their condition. If the injections are continued at intervals of one to two days, the ulcerating inoculation wound becomes smaller, and finally scars over, which otherwise is never the case. Further, the swollen lymphatic glands are reduced in size, the body becomes better nourished, and the morbid process comes to a standstill, unless it has gone too far, and the animal perishes from exhaustion.

"By this means the basis of the curative process against tuberculosis was established. Against the practical application of such dilutions of dead tubercle bacilli there presented itself the fact that the tubercle bacilli are not absorbed at the inoculation points nor do they disappear in other way, but for a long time remain unchanged and engender greater or smaller suppurative foci. Anything, therefore, that was to exercise a healing effect on the tuberculous process must be a soluble substance which would be liviviated to a certain extent by the fluids of the body floating round the tubercle bacilli, and be transferred fairly rapidly to the juices of the body, while the substance which produces suppuration apparently remains behind in the tubercular bacilli, or in any case dissolves but very slowly. The only important point, therefore, was to bring about outside the body the process which goes on inside, and, if possible, to extract from the tubercular bacilli alone the curative substance. This demanded much time and toil until I succeeded at last, with the aid of a 40 to 50 per cent. solution of glycerine, in obtaining the effective substance from the tubercular bacilli. With the fluids so obtained I made further experiments on animals, and finally on human beings. These fluids were given to other physicians in order that they might repeat the experiments. The remedy with which the new treatment against tuberculosis is practised is thus a glycerine extract from pure cultivations of the tubercle bacilli. Into the simple extracts there naturally passes from the tubercular bacilli, besides the effective substance, all the other matter soluble in 50 per cent. glycerine. Consequently there are in it a certain quantity of mineral salts, colouring substances, and other unknown extractive matter. Some of these substances can be removed from it tolerably easily. The effective substance is, namely, insoluble in absolute alcohol and can be precipitated by it, not indeed in