ments is botany, and the work is laid out for each month. According to the *American Naturalist*, the teachers will have to study the dog-tooth violet in November; in December they will be searching their gardens for flowering tulips, and scanning the orchards for the blossoms of the apple and peach; and in January the flower and fruit of the strawberry will form the subjects of discussion.

THE Government of New Caledonia proposes to establish a Museum at Noumea, and has appealed for support to members of the Civil Service, native chiefs, persons who are known to occupy themselves with scientific inquiries, and colonists generally. It is hoped that the authorities may be able to form important collections, not only of natural products, but of objects interesting to anthropologists.

MESSRS. MACMILLAN AND CO. are issuing a new and thoroughly revised edition of "A Treatise on Chemistry," by Sir H. E. Roscoe and C. Schorlemmer. In the part recently issued (Part III. of Vol. III.) the authors deal with the chemistry of the hydrocarbons and their derivatives. The whole of the subject-matter has been revised, but they draw attention especially to the renewed discussion of the constitution of benzene, and to the researches of Nietzki and his co-workers on the higher substitution-products of benzene, which have explained the constitution of the remarkable substances derived from the explosive compound of potassium and carbonic oxide.

A NEW edition of the "Year-book of New South Wales" has been issued. It contains much well-arranged information as to the history and resources of that colony.

MESSRS. GEORGE BELL AND SONS have published "The School Calendar, and Hand-book of Examinations and Open Scholarships, 1891." This is the fifth year of issue, and the present volume will certainly not be less welcome than its predecessors. In a preface Mr. F. Storr sums up the educational events of 1890.

MR. L. UPCOTT GILL has published an excellent "Book of Aquaria," which will be most welcome to many students of the ways of aquatic creatures. It consists of two parts, one dealing with fresh-water aquaria, by the Rev. G. C. Bateman, the other with marine aquaria, by Reginald A. R. Bennett.

MESSRS. D. C. HEATH AND CO., of Boston, are publishing a series of "Guides for Science-Teaching." We have received the eighth volume, which treats of "Insecta." It is by A. Hyatt and J. M. Arms, and contains a series of replies to questions which have arisen in the minds of the authors while teaching.

WE learn from the *Journal of Botany* that the series of British plants exhibited in the Botanical Gallery of the Natural History Museum has recently been extended by the addition of a series of British mosses, consisting of 576 species arranged in 129 genera. The arrangement is that adopted by Hobkirk in the second edition of his "Synopsis," and the descriptions have been taken from that work. The Museum has also acquired the extensive herbarium of the late M. Triana, containing upwards of 8000 plants, as well as a large collection from the province of Atacama, Chili, made by MM. Borchers and Philippi.

THE same journal informs us that, at the request of the Irish Land Commissioners, Mr. W. Carruthers, F.R.S., is preparing a plain account of the potato disease, with illustrations drawn by Mr. W. G. Smith, which will be reproduced in chromo-lithography as a wall-diagram for schools and farm-houses. A reproduction of Bauer's water-colour drawings of the germination of wheat, in the form of six wall-diagrams for educational purposes, is also being prepared, under the direction of Mr. Carruthers, for publication by the Royal Agricultural Society, at a sufficiently low price to bring them within the reach of the poorest schools.

SILICON bromoform, $SiHBr_3$, has been obtained in the pure state by M. Besson, and an account of its mode of preparation and more important properties is given by him in the current number of the *Comptes rendus*. It is well known that hydrobromic acid exerts an action upon crystalline silicon of a somewhat similar nature to the action of hydrochloric acid, which forms a mixture of silicon chloroform and tetrachloride; but hitherto, M. Besson states, the products obtained have never been separated. Buff and Wöhler, the discoverers of silicon chloroform, $SiHCl_3$, long ago obtained a colourless fuming liquid by the action of hydrobromic acid upon silicon, resembling the corresponding chloroform in properties, but which was certainly contaminated with other products, especially silicon tetrabromide. M. Besson has isolated the compound by repeated fractional distillation of the product obtained by passing a stream of dry hydrobromic acid gas over crystals of silicon heated to a temperature just below redness. The main bulk of the liquid product consisted of silicon tetrabromide, boiling at 153°, but 5 per cent. distilled constantly at about 110°, and gave numbers, on analysis, closely agreeing with the formula $SiHBr_3$. Pure silicon bromoform is a colourless liquid, most difficult to work with. In the first place, it fumes exceedingly strongly at the first contact with air, and in a few minutes spontaneously inflames. Again, the vapour forms highly explosive mixtures with air which occasionally suddenly detonate with great violence. It is only possible, of course, to distil it in an atmosphere of an inert gas, when it boils at 110°. It still remains liquid at temperatures as low as −60°. Water at once decomposes it, and with solutions of alkalies the decomposition is very violent. Strong potash liberates twice as much hydrogen as is contained in the compound, the reaction proceeding as follows:—

$$SiHBr_3 + 5KOH = K_2SiO_3 + 3KBr + 2H_2O + H_2.$$

Dry ammonia gas also reacts in a very lively manner with silicon bromoform, and if the reaction is not moderated it is accompanied by incandescence. The white product appears to consist of a definite compound mixed with more or less of its products of decomposition. Phosphoretted hydrogen is without action under ordinary circumstances, but when compressed to 25 atmospheres in a Cailletet apparatus in contact with a few drops of silicon bromoform at the ordinary temperature, a white solid body is formed, which persists for some time after the pressure is removed, and which loses phosphoretted hydrogen in a stream of carbon dioxide. Silicon chloroform, when in contact with compressed $PH_3$ under like circumstances, forms an analogous substance in definite isolated crystals, which rapidly grow as long as the pressure is maintained.

THE additions to the Zoological Society's Gardens during the past week include a Passerine Parrakeet (*Psittacula passerina*) from South America, presented by Miss Edith B. Burrell; a Markhoor (*Capra megaceros* ♂) from North-East India; a Bennett's Wallaby (*Halmaturus bennetti* ♀) from Tasmania; an Indian White Crane (*Grus leucogeranos*) from India, deposited; a Striped Hyæna (*Hyæna striata* ♂) from North Africa; a Maguari Stork (*Dissura maguari*); a Brazilian Teal (*Querquedula brasiliensis* ♂) from South America, purchased; an Indian Muntjac (*Cervulus muntjac* ♀), born in the Gardens.

## OUR ASTRONOMICAL COLUMN.

THE "CAPTURE THEORY" OF COMETS.—A memoir by M. O. Callandreau, on the capture theory of periodic comets, has recently been published (*Annales de l'Observatoire de Paris*, vol. xx.). It is generally known that the periodic comets are distributed in groups which depend in some manner on the major planets. Jupiter's family of comets is at least fifteen in number, and all the members of it have direct motion, orbits only slightly inclined to the orbit of Jupiter, and aphelion points near

Jupiter's aphelion; what is more—one of the two points where each of them intersects the plane of Jupiter's orbit is generally very near to the trajectory of this planet. The theory which best explains such distribution is that which regards the comets of which the groups are composed as having come under the perturbing influence of the major planet to which they are respectively related. If a comet arrives from interstellar space into the solar system with a sensible parabolic velocity, and passes near a major planet, the velocity will be either diminished or increased. In the former case, the parabolic orbit would be transformed into an elliptical one, and the comet would be, as it were, incorporated into our system—captured by the planet. If, on the other hand, the velocity is accelerated, the orbit becomes hyperbolic, and the comet moves away from our system, never to return. The results of a research on this subject were given by M. Tisserand a few months ago (*Bulletin Astronomique*, July 1889, and NATURE, vol. xlii. p. 31).

M. Callandreau has at present only investigated the strong perturbations which a comet experiences when passing in the neighbourhood of a major planet—that is, a particular case of the problem of three bodies. He has considered the perturbations when a comet approaches very near to the disturbing body, and examined the difficulties connected with the capture theory. The theory that periodic comets are "ejects" from the major planets is mathematically discussed, and shown to be an improbable one. But it is not sufficient to show that periodic comets may be produced by capture; it is necessary to explain why the hyperbolic comets which the capture operation ought to engender escape observation. M. Callandreau proves that such comets are not seen either because their perihelion distance is very great, or because they only pass perihelion once, and then move to infinity on the hyperbolic orbit. Many other conditions are treated, and similarly interesting results obtained. An accurate knowledge of the formation of comets is of great importance in cosmogony. Such a discussion as the one before us is a decided advance in the matter, the demonstrations being in accordance with M. Callandreau's established reputation.

ANNUAIRE DE L'OBSERVATOIRE DE BRUXELLES.—This interesting *Annuaire* for 1891 has just been received. It is composed of ephemerides containing astronomical data for the ensuing year, statistical, geographical, and meteorological information, and articles on various scientific subjects. The mean positions of the principal stars, with the right ascension for every tenth day, occultations of stars by the moon, and eclipses of Jupiter's satellites are tabulated, as in previous years. Tables are also given of physical units and constants, and a detailed note on absolute measures, on the definition of different electrical units, and on their expression in absolute units. Another section contains a large amount of physiographical information. Dr. Folie contributes an article on diurnal variations in the height of the Pole; M. Spée, one on solar activity in 1890; and M. Lancaster gives an extended account of the climate of Belgium in the same year. An important article on the similarity between maps of the earth and other planets is from the pen of M. W. Prinz. Elements of the planets, and of some of the asteroids discovered in 1890, are also given. The obituary notices refer to the late MM. Montigny, Fievez, and Pirmez.

NEW ASTEROIDS.—Prof. Millosevich discovered the 307th asteroid on March 1, and M. Charlois the 308th on March 5.

## THE LONDON-PARIS TELEPHONE.

LONDON and Paris are now connected by means of a telephone, and the completion of so great an enterprise deserves to be specially noted. The scheme was originally proposed by the French Government. It was at once taken into favourable consideration in England, and, when Mr. W. H. Preece had proved that it was practicable, it was adopted by the Postmaster-General.

The following details are taken from the *Times*, which printed on Tuesday a full account of what had been done in the matter. The scheme involved the construction of a trunk telephone line between the two cities, with a telephone cable across the Straits of Dover, the first ever made for the open sea. It was decided to have two separate circuits, so that if one should fail at any time, the other might be in use. The route for the English land line was chosen by Mr. Edward Graves, the Engineer-in-Chief to the Post Office, who has taken a keen personal interest in the whole work. It runs along the South-Eastern Railway to a point near Sidcup, and thence by road and rail through Swanley, Maidstone, and Ashford to the cable-house on the beach at St. Margaret's Bay, between Dover and Deal. The building, which began in September last, was continued throughout the severe frost, except when it snowed too hard to see, and the work was completed by the first week in March. The wire is of copper, the best material for the purpose, and weighs 400 pounds to the mile. The connection between the last pole on the chalk cliff at St. Margaret's Bay and the cable hut on the beach is effected by lengths of the cable core inclosed in an iron pipe and buried in a trench down the face of the cliff. The whole line is 85 miles long, and its excellence is proved not only by the electrical tests, but by the wonderfully clear and loud speaking through it between the cable-hut and the General Post Office. The voice of the speaker in London can be recognized at the hut, and the ticking of a watch distinctly heard.

The French land line follows the direct route of the Chemin de Fer du Nord, through Montdidier and Calais to the cable-house at Sangatte, between Calais and Boulogne. It is similar in construction to the English line, except that only one circuit is run at present, and the copper wire weighs about 600 pounds a mile. Its length is about 204 miles, and the speaking with the D'Arsonval apparatus employed in France is also excellent.

The connecting cable, which is the joint property of the two Governments, was designed by Mr. Preece, and contains four separate conductors, two for each circuit. It was taken on board Her Majesty's telegraph ship *Monarch*, on Monday, March 2, and the following day, in order to be laid when the weather was favourable. On Tuesday evening, March 3, the *Monarch* left her moorings near the *Warspite* and put to sea. Next morning she arrived off St. Margaret's Bay, and afterwards she steamed across to Sangatte; but for several days there was a nasty swell on the sea and a disagreeable haze. After waiting nearly a week in hopes of better weather, the morning of Monday, March 9, broke fine and clear. The long-expected opportunity seemed to have come, and preparations were made for landing the shore end of the cable into the hut at Sangatte. The two lifeboats were lowered, and a strong platform placed across them to form a raft, on which a length of cable sufficient to reach the shore was quickly coiled by the cable hands. The steam launch took the boat raft with the black coil of the cable in tow, the men paying it by hand as she went along to ground. She cast off and gave place to the men, who, in their white overalls and sea-boots, dragged the cable up the sand, along the trench, and into the cable hut. It was half-past 9 when the lifeboats were launched, and 12 minutes to 11 when the end was landed. No time was lost in returning to the ship, which immediately started paying out towards St. Margaret's Bay. The cable ran smoothly out of the tank, through the iron "crinoline," which keeps it from lashing about with the rolling of the ship, it glided along the guides, took three turns round the huge revolving iron drum, with its friction brake which controls the speed of egress, and passed over the starboard sheave or pulley projecting from the bows, then dived into the sea, just grazing the hull about the water line. Mile after mile was traversed in this way, and all was going on well. As yet there were no signs of an approaching storm. A drizzling rain began to fall, and the breeze freshened, but it was not until towards 3 o'clock, when 10 miles of cable had been paid out, and the *Monarch* was half seas over, that the gale came on, and the water became rough. At length it was decided to anchor until a lull in the storm should reveal the land, if only for a little while. The cable was fastened, and the anchor rattled out soon after 4 o'clock. The snow cleared about 5 o'clock, and it was then discovered that the *Monarch* was lying off St. Margaret's Bay, about a mile from the shore, and eastward of the cable hut. An attempt was made to lift the anchor and pay out all the cable, but the strong tide, aided by the furious wind, had driven the cable foul of the anchor, and after a fruitless attempt to clear, the anchor was slipped with 14 fathoms of chain. It was now a quarter past 8 at night, and very dark, but the *Monarch* paid out the rest of the cable to avoid cutting it, and buoyed the end well off the shore to the east of St. Margaret's Bay, about 20 minutes past 9, then ran for the Downs, where she anchored soon after 10 o'clock. Next morning the weather made further operations impossible. Wednesday was not much better, for, although it brightened up, the glass was still unsettled. The