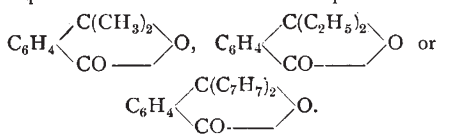
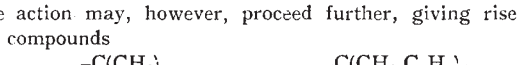
THE *Journal of Physical Chemistry* for November, 1909, contains a paper, by Mr. B. E. Curry, on the alloys of zinc with antimony, tin, cadmium, bismuth, and lead. Although the metal forms two layers with lead and with bismuth at low temperatures, the mutual solubility increases rapidly as the temperature is raised, the lead-zinc alloys becoming completely homogeneous at about 920° and the bismuth-zinc alloys at 820°. The formation of compounds was observed only in the alloys of zinc and antimony, which gave crystals of ZnSb and Zn_3Sb_2, but solid solutions were obtained of zinc in tin (up to 7 per cent. Zn), in bismuth (up to 4 per cent. Zn), and in cadmium (up to 4 per cent. Zn), and of cadmium in zinc (up to 4 per cent. Cd); the zinc-antimony alloys also gave three series of solid solutions, resulting in a very complex equilibrium diagram.

THE Journal of the College of Science, Tokyo, of June 15, 1909, which has recently come to hand, contains a paper, by Y. Shibata, on the action of the Grignard reagent on *o*-phthalic esters. The *p*-phthalic esters have been shown by Ullmann and Schaepfer to resemble the succinic esters in giving glycols of the type $C_6H_4\begin{cases}CR_2.OH\\CR_2.OH\end{cases}$, but the main product from the *o*-esters is a phthalide such as



The action may, however, proceed further, giving rise to the compounds



A remarkable compound of the second group is obtained by the action of phenyl magnesium bromide. It is formulated as $C_6H_4\begin{cases}C(C_6H_5)_2\\C(:C_6H_4)\end{cases}O$, but must be regarded as containing a trimethylene or "carone" ring in the group $—C{=}C_6H_4$.

MR. P. D. MALLOCH, of Perth, is publishing through Messrs. A. and C. Black a book on the "Life-history and Habits of the Salmon, Sea-trout, Trout, and other Fresh-water Fish." From his connection with the Tay Salmon Fisheries Co., the author has had unusual opportunities of studying the subject, and has been able to clear up many doubtful points by the marking of smolts and their recapture as grilse and salmon. The study of scales also forms a section of the book.

M. CH. DELAGRAVE, of Paris, has sent us a copy of "La Langue Internationale et la Science," which is published at the price of one franc. This volume is a French translation of a book reviewed in these columns on August 19 last (vol. lxxxi., p. 218), "Weltsprache und Wissenschaft. Gedanken über die Einführung der internationalen Hilfsprache in die Wissenschaft," by Profs. L. Couturat, O. Jespersen, R. Lorenz, W. Ostwald, and L. Pfaundler. The translation has been done by M. Boubier, of the University of Geneva.

THE issue of Willing's "Press Guide and Advertiser's Directory and Handbook" for 1910 (price 1*s*.) has reached us. It continues to be what its subtitle claims for it—a concise and comprehensive index to the Press of the United Kingdom. It provides information concerning all the newspapers, magazines, reviews, and other periodicals, including journals, proceedings, reports, and transactions of learned societies. Lists of the principal colonial and foreign journals are also included.

THE 1910 issue of "The Science Year Book," edited by Major B. F. S. Baden-Powell, and published by Messrs. King, Sell and Olding, Ltd., at 5*s*. net, includes several new features. The volume contains a monthly astronomical ephemeris which should be of particular service to astronomers and other observers, many useful tables, star-maps for the four seasons, with key-charts showing the names of constellations visible, a brief summary of matters of scientific interest in 1909, a glossary of recently introduced scientific names and terms, a full list of learned societies with particulars of membership, and a short account of various prizes and awards for scientific research. A good portrait of Sir Archibald Geikie, K.C.B., forms a frontispiece to the volume, and there is a chart showing the track of Halley's comet during 1910. The remainder of the volume consists chiefly of a diary, with a page for each day, and having at the head columns for the insertion of maximum and minimum temperatures, barometric height, rainfall, and other results of meteorological observation. The volume provides observers with exactly the kind of tabular information frequently required; and, with the diary, it constitutes a year-book which merits a place upon the study tables of many men of science and the bookshelves of observatories.

OUR ASTRONOMICAL COLUMN.

DISCOVERY OF A NEW COMET.—Telegrams from the Kiel Centralstelle announce the discovery of a new comet at Johannesburg on January 17. In the first it was stated that the comet was discovered by Mr. Drake, and was seen at and after sunrise. Its approximate position was given as five or ten degrees south-south-west of the sun, which it was approaching.

The second telegram gives the more exact position, at 21h. 21·5 m. January 16 (Johannesburg M.T.), as

R.A. = 19h. 50m. 28s., $\delta = 25° 9'$ S.,

and states that the daily motion is +16m. 32s. in R.A. and $-2° 25'$ in N.P.D.

As this object is intensely bright as it was seen in sunshine, and is travelling northwards, we may expect a fine display after sunset during the present week.

HALLEY'S COMET.—A telegram from Messrs. Frost and Parkhurst, dated December 31, 1909, and published in No. 4381 of the *Astronomische Nachrichten*, states that the prismatic camera shows the light of Halley's comet to be now largely due to the third cyanogen band. This suggests that attempts to photograph the comet should now be made with quartz objectives or speculum reflectors. Both glass objectives and silver-on-glass mirrors absorb a large percentage of the ultra-violet radiations, and the difficulty of obtaining quartz lenses of large aperture may possibly be compensated for by the much greater transparency of quartz, as compared with glass, to the more refrangible rays.

The anomalous apparent brightening of the comet which occurred in November has not been continued, and until about the middle of March the distance between the comet and the earth will continuously increase; but it is thought that the development of the comet, as it approaches nearer to the sun, should be sufficient to make naked-eye observations possible by about the end of February.

This anomalous increase of the apparent brightness is described by the Rev. T. E. R. Phillips in a note appearing in No. 2, vol. lxx., of the Monthly Notices. He commenced observing, with a 12¼-inch Calver reflector, on November 16, and observed the apparent brightness on ten nights between that date and December 8; from these observations he concludes that the apparent brightness of the comet was unquestionably greatest on November 22, when he was able to see it with the aperture stopped down to 3½ inches. The next night, under comparable atmo-

spheric conditions, it was quite inconspicuous even with the full aperture. Again, on December 6, with a very clear and transparent sky, he was unable to see the comet with the aperture at 4½ inches, and he estimates that its magnitude was not greater than 11·5 or 12·0; but on December 8 it was again brighter, the magnitude being estimated to be about 10·5 or 11·0.

On January 28·1 the comet will be in conjunction with, and 3° 48′ north of, Saturn; its conjunction with Mars occurred on January 15, when the actual distance separating the two bodies, about 37 million miles, was at its minimum value.

In a letter to the *Times* of January 14, the Earl of Crawford points out that for ages the sudden appearance of a great comet has been held to herald some great disaster or revolution. This view of the matter may still appeal to the native races of such countries as Morocco, Egypt, or India, where considerable unrest already prevails, and might be used by fanatical agitators to stir up further trouble. He suggests that the communication of a series of popular articles, written in the vernacular, to the native Press, might be beneficial. By announcing and welcoming the appearance of the comet, such articles would forestall the potential mischief-makers and render futile their possible announcements of supernatural manifestations.

THE SPECTRA OF COMETS' TAILS.—The observations of Deslandres, Evershed, Chrétien and others showed that in the spectra of the tails of Daniel's and Morehouse's comets there were certain radiations which were feeble in the heads but extended to considerable distances in the tails of those comets; the wave-lengths of the three strongest bands were about 402, 426, and 455, but no terrestrial origin could be found for them.

This has now been done by Prof. A. Fowler, who has succeeded in reproducing them terrestrially in the spectrum of the glow from vacuum tubes which were known to contain carbon compounds at extremely low pressures, 0·01 mm. or less. Further experiments are necessary to determine what particular form, or compound, of carbon is involved, but from the wave-lengths and the reproductions of the spectra published in No. 2, vol. lxx., of the Monthly Notices there can be no doubt that Prof. Fowler has succeeded in reproducing, in his laboratory, the conditions which obtained in the tails of the two comets mentioned above.

TWO CURIOUSLY SIMILAR SPECTROSCOPIC BINARIES.—When Messrs. Plaskett and Harper, of the Ottawa Observatory, published the determined orbit of the spectroscopic binary ι Orionis, the apparent presence of a secondary disturbance was not discussed, because the lines of the spectrum are too diffuse to justify any final conclusions; but the recent determination of the orbit of another binary, B.D. $-1°$·1004, showed that a similar case of secondary disturbance appeared there, and it was deemed desirable to make refined least-square solutions for both orbits.

The results show that the two binaries are remarkably alike. Both are in Orion, within 5° of each other, and both are helium stars; the periods are 29·136 and 27·160 days respectively, and the eccentricity of both orbits is abnormally high (0·74 and 0·76) for spectroscopic binaries. Other features are also very similar, but the most striking similarity is in the secondary disturbances, which are almost identical in period, amplitude, and phase. The period of the secondary in each case is the same as the period of the primary, a novel feature in spectroscopic binaries. It seems probable that the same physical cause is operative in both cases, but what it is is difficult to say; the orbital revolution of the system, produced possibly by a resisting medium or by tidal action, is tentatively suggested (*Astrophysical Journal*, vol. xxx., No. 5, p. 373).

THE "ANNUAIRE ASTRONOMIQUE," BELGIUM.—The "Annuaire Astronomique," for 1910, of the Royal Observatory of Belgium contains, besides the usual tables, ephemerides, &c., a number of useful notes and diagrams; among the latter is a coloured chart showing the official standard times of various countries. A list of observatories is also given, and special articles are contributed by various members of the staff of Uccle Observatory.

THE EVOLUTION OF THE BRAIN.[1]

AS the result of the investigations carried on in the Museum of the Royal College of Surgeons during the last seventy-five years by its conservators and those who have drawn their inspiration, directly or indirectly, from the work done in the museum, it has become possible to establish on a firm basis the criteria for instituting exact comparisons of the structure of the brain in the various groups of Vertebrata.

This analytical work has now been carried far enough to justify us in attempting a synthesis of our knowledge of the evolution of the cerebral cortex. The special aim of such a research is to investigate the nature of the factors and the circumstances which have brought into being the neopallium, the part of the nervous system which, more than any other, is responsible for the kaleidoscopic manifestations of psychical activities, and the possession of which has made the Mammalia what they are, and given them the dominant position in the animal kingdom.

At the very root of the Vertebrata we find that Petromyzon has a cerebral hemisphere no larger than the olfactory bulb of which it is little more than an appendage. Direct nerve tracts pour smell-impressions into almost every part of the surface of this hemisphere. The cerebrum at its commencement is thus almost purely an instrument for the reception and the conscious appreciation of stimuli evoked by odoriferous particles, and, in the second place, for providing the means whereby the physiological processes underlying this state of consciousness may affect the rest of the nervous system, and through it influence the behaviour of the lamprey itself. It is just possible that even in this lowly vertebrate gustatory fibres brought up to the lobus inferior (of the fore-brain) from the terminal nuclei of the seventh and ninth nerves may make their way into the primitive cerebral hemisphere, but it is still uncertain whether the lobus inferior itself may not be the place where impressions of smell and taste meet.

Even in Petromyzon there is some indication of a differentiation of the hemisphere into a superficial cortical layer (tuberculum olfactorium) and a deeper ganglionic part (corpus striatum), and there is also some slight trace at the extreme dorso-mesial edge of the presence of a small rudiment of the pallium. The tuberculum olfactorium in the Selachii assumes a definite cortex-like arrangement of cells, and is now recognisable as one of the receptive apparatus for olfactory impulses coming directly from the olfactory bulb. The corpus striatum does not receive any direct olfactory fibres; it is the part of the hemisphere which receives afferent fibres from the tuberculum olfactorium, and possibly also from more caudally situated regions of the brain—almost certainly gustatory fibres from the lobus inferior—and it emits efferent fibres, which pass to the hypothalamus and indirectly influence the executive mechanisms of the body, *i.e.* its functions find expression in the behaviour of the animal.

In some of the Selachii the dorsal part of the hemisphere is definitely transformed into a cortical area or formatio pallialis. In Petromyzon there is still room for doubt as to the existence of any such structure, but when we turn to the study of the brain in some of the sharks there can be no doubt of the existence of a considerable area of primordial pallium. There is every reason to believe that this pallial formation represents the undifferentiated rudiment of the *whole* pallium of the higher vertebrates. Its mesial edge ultimately becomes specialised to form the hippocampus, which in the higher Vertebrata does not receive smell-impulses directly from the olfactory bulb, but indirectly through the intermediation of the olfactory peduncle and tuberculum olfactorium on the mesial side, and of the pyriform on the lateral side. The lateral edge of the pallium eventually develops into the pyriform lobe, which continues to receive olfactory impressions direct from the bulb. Much later on, only, in fact, when the mammal appears on the scene, the pallial area intervening between the hippocampus and the pyriform lobe becomes specialised to form the neopallium. It is only right to say that this view of the nature of the primitive pallium differs funda-

[1] Summary of Three "Arris and Gale Lectures" on "Some Problems relating to the Evolution of the Brain," delivered in the Royal College of Surgeons on December 13, 15, and 17, 1909, by Prof. G. Elliot Smith F.R.S.