

probably a matter of hundreds of thousands of millions of years. Perhaps there is no real difficulty here; it might well take this long to get the doubling process really going. The real difficulty is that the stars carry intrinsic evidence of having lived through far longer periods than this.

Spectroscopic binaries provide further evidence. Observation reveals a complete sequence; it begins with systems which appear to have just broken into two as the result of rotation—pairs of stars describing circular orbits, and almost in contact—and ends with systems in which the two stars are far apart and describing elliptical orbits. Theory suggests that this observational sequence exactly depicts the evolution of a star which has broken into two as the result of excessive rotation. The outstanding importance of this sequence to our present discussion lies in the fact that the stars at the beginning of the sequence are undoubtedly many times more massive than those at the end. It seems likely that those which are now at the end must have begun at the beginning and lost the greater part of their mass in the form of radiation, and to do this would take millions of millions of years.

Considerations such as these make it very difficult to believe that the universe can be such an ephemeral concern as the apparent speeds of recession of the nebulae would suggest.

Birthdays and Research Centres.

Oct. 5, 1861.—Sir THOMAS HEATH, K.C.B., K.C.V.O., F.R.S., honorary fellow of Trinity College, Cambridge, Joint Permanent Secretary to the Treasury, 1913–19, and Comptroller-General of the National Debt Office, 1919–26.

Having published my "Manual of Greek Mathematics" in the early part of this year, I am continuing my life-study of Greek mathematics and astronomy, with the view of keeping pace with the new discoveries in that and allied fields which are continually being made. Thus it is that I was able to include in the "Manual" some interesting things that have come to light since the publication in 1921 of the "History of Greek Mathematics"; for example, an investigation by Archimedes of the problem of inscribing a regular heptagon in a circle (preserved in an Arabic treatise) and some very remarkable results of the study of Babylonian cuneiform inscriptions of 2000–1800 B.C.

I have long wished to write upon the mathematical passages of Aristotle, and hope to proceed with that work if circumstances permit.

Oct. 9, 1863.—Prof. A. C. SEWARD, F.R.S., professor of botany in the University of Cambridge.

Since the publication in 1925 of two papers on Cretaceous plants collected in Greenland by Mr. Holttum and me ten years ago, I have been working through a large consignment of fossils sent to me through the courtesy of colleagues from the museums of Copenhagen and Stockholm. With the help of the additional data thus obtained, I hope to complete in the near future a supplementary account of the rich Cretaceous floras of western Greenland. In this work much assistance has been received from junior co-workers.

Other lines of work are: a more systematic consideration of the bearing of palaeobotanical data on the general problem of evolution; and a more critical study of the geographical distribution of plants during the several geological periods.

One of the subjects which I would recommend for

treatment is a careful revision of European collections of Tertiary plants.

Oct. 10, 1893.—Prof. M. SAHA, F.R.S., University professor of physics, Allahabad.

The Physical Laboratory of the University of Allahabad is one of the oldest and smallest laboratories in India, having been established about thirty years ago, but little research work was done before I took charge in October 1923. Since then, my colleagues and I have been trying our best to organise the laboratory for research work, but I must confess that I am not satisfied with the progress so far made. Research work is being carried on chiefly in spectroscopy and X-rays. At present we are engaged in studying the absorption spectrum of saturated halides of multivalent elements, and on the modification of quanta by photo-ionisation. The work on thermal ionisation has been temporarily suspended owing to lack of space and time. Research students are engaged in the classification of spectral lines. There is a wireless section, with a good broadcasting station, and it is planned to undertake work on propagation of radio in India, but nothing has been achieved, in so far as the co-operation of other universities could not be secured. The staff (total strength, nine) is heavily overworked, as there are about 200 undergraduate and 25 advanced students, and the laboratory is too much congested, for there has been practically no extension since its foundation.

Societies and Academies.

LONDON.

Institute of Metals, Sept. 15* (Annual Autumn Meeting, Zurich).—W. E. Alkins: Experiments in wire-drawing. (2) Notes on the relation between reduction of area by cold-drawing and tensile strength of H.-C. copper. Annealed copper rod 0.435 in. diameter was drawn through straight-sided tapering dies at single drafts of slowly increasing amount. The resulting 'primary' tensile strength reduction of area curve consists of an approximately rectilinear portion up to about 15 per cent reduction and of a smooth curve concave to the reduction axis from 15 per cent upwards. Below 15 per cent, results are consistent with the view that drawing takes place by simple elongation under tensile stress; above 15 per cent the curve has the form of a rectangular hyperbola, and one asymptote appears to lie suggestively near the limiting tensile strength to which copper can be cold-drawn.—Clement Blazey: Brittleness in copper. The experiments described are a continuation of those described in two other papers already published under the title of "Brittleness in Arsenical-Copper". It has been found that the brittleness is not restricted to arsenical-copper, but may be produced in copper free from arsenic.—Edward J. Daniels: The attack on mild steel in hot-galvanising. Experiments have been carried out in the laboratory to determine the rates of attack on mild steel strip when immersed in different brands of zinc at various temperatures between 432° C. and 540° C. The influence of the addition of small percentages of aluminium, antimony, and tin has been investigated, and the action of alloys of zinc and cadmium has also been studied.—J. S. Dunn: The oxidation of some copper alloys. The zinc-copper alloys fall, so far as their behaviour under oxidation is concerned, into two classes, fairly sharply separated. Those with copper contents below about 80 per cent all oxidise at essentially the same rate, and all give rise to an oxide which is almost pure zinc oxide.

* Continued from p. 554.

Those with copper above about 86 per cent oxidise at approximately the same rate as copper, and the oxide contains the metal in the same proportion as the original metal. The rate of oxidation increases exponentially with temperature, doubling itself approximately for every 75° C. rise in temperature.—W. R. D. Jones: The copper-magnesium alloys. (4) The equilibrium diagram. Magnesium and copper form solid solutions to a limited extent. At the ordinary temperature 0.02 per cent copper is soluble in magnesium and 2-2.2 per cent magnesium in copper. Two compounds, Mg_2Cu and $MgCu_2$, exist which do not form solid solutions, but form eutectic series with each other and with the solid solutions of copper with magnesium, and of magnesium in copper. The compound $MgCu$ is not formed in the solid state.—Hugh O'Neill: Note on the diameter measurement of certain Brinell indentations in cold-rolled metal. Diameter measurements of the indent may differ by 3.4 per cent according to whether vertical or oblique illumination is used with the measuring microscope.—Hugh O'Neill and J. W. Cuthbertson: The work-hardening capacity and elongation properties of copper. So far as they go, the results indicate that (a) the Tetmajer 'uniform elongation' value, and (b) the 'extensibility', that is $(1+a)$, where a is the index in the Bertella-Oliver elongation equation, are reliable measures of the work-hardening capacity of a metal.—C. J. Smithells, S. V. Williams, and E. J. Greenwood: Melting nickel-chromium alloys in hydrogen. Sound ingots can be produced by this method, provided that all the oxides present in the melt are reduced by hydrogen before casting. Alloys prepared from commercial materials give better resistance to oxidation than those prepared from pure materials. The probability that the presence of certain impurities has a beneficial effect was confirmed by making deliberate additions of elements known to be present as impurities in the raw materials. The process of hydrogen melting of nickel-chromium alloys is being applied on a commercial scale. The process has also been used with success for the preparation of other metals and alloys in a ductile state without the use of the usual deoxidisers.

ROME.

Royal National Academy of the Lincei, Feb. 15.—U. Cisotti: Circulations about regions of dead water limited by a polygonal wall and by a free surface.—L. Cambi and A. Cagnasso: A new series of nitroso-sulpho-salts of iron: nitrosodithiocarbamates. Treatment of a solution containing $Fe(NO)SO_4$ with the aqueous solution of a dithiocarbamate results in the immediate formation of an emerald-green nitroso-salt of the general formula $(R_2N.CS.S)_2Fe.NO$. These compounds, several of which have been prepared and analysed, appear to be ferric nitrosodithiocarbamates, but their constitution has not yet been definitely established.—G. Dantoni: The definition of integrals.—R. Caccioppoli: Linear functionals in the field of analytic functions.—R. Calapso: A theorem on Green's angle.—E. Gugino: The behaviour of the forces of reaction in the motion of any material system acted on by positional forces.—G. B. Bonino and L. Brüll: Raman spectrum and chemical constitution of certain chloroethylenes. In a recent study of the ultra-red molecular spectrum of ethylene, Mecke classified the frequencies of the oscillations characteristic for the molecule of this hydrocarbon into valency and deformation oscillations. For tetrachloroethylene, the symmetry of which is similar to that of ethylene, the ratios between these frequencies are calculated to be

$$\sqrt{\frac{2}{C+2Cl}} : \sqrt{\frac{1}{2} \left(\frac{1}{2Cl} + \frac{1}{C} \right)} : \sqrt{\frac{11}{2Cl}} = 1.31 : 1.85 : 1,$$

No. 3231, VOL. 128]

the values obtained by Pringsheim and Rosen being 1.45 : 1.91 : 1. The cis- and trans-isomerides of 1:2-dichloroethylene are also considered.—A. Quilico and M. Freri: Azopyrrole blacks (3). For certain of the black products formed from pyrrole and diazo-compounds as the result of a complicated process of oxidation and coupling, attempts are made to establish the number of pyrrole and phenyl nuclei taking part in the condensation, and a hypothesis concerning the general lines of their structure is advanced.—A. Debenedetti: Determination of the optic axial angle of biaxial minerals by means of Fedorow's plate.—G. Tallarico: The biological value of the products of manured or artificially fertilised soil. Experiments with turkeys show that the birds given a vegetable diet grown on manured land are more resistant to disease than those fed on material grown on soil artificially fertilised.—Ada Bolaffi: Certain lipidal fractions of the adenocarcinoma of the rat.—G. Armellini: Memorial notice of P. G. Hagen.

SIDNEY.

Linnean Society of New South Wales, July 29.—W. J. Dakin: On a new bopyrid parasite from the coast of New South Wales. Description of a new genus allied to the group *Orbione*, *Parapenaeon*, and *Epipenaeon*, the type species being an ectoparasitic branchial parasite under the branchiostegites of a penaeid prawn, *Aristeus foliaceus*.—J. R. Malloch: Notes on Australian Diptera (28). Data on the occurrence of the family Rhagionidae in Australia. A key is given to the genera of the family.—G. H. Cunningham: The Gasteromycetes of Australasia (12). The genus *Scleroderma*. The genus is represented in this biological region by five species, of which *S. australe* and *S. radicans* are confined to Australia, *S. flavidum* extends to Africa and North America; and the other two species, *S. Bovista* and *S. verrucosum*, have a general distribution. A general account is given of the morphology and development of the genus, as well as an artificial key to the species.

Official Publications Received.

BRITISH.

- New Zealand: State Forest Service. Annual Report of the Director of Forestry for the Year ended 31st March 1931. Pp. 14. (Wellington, N.Z.: W. A. G. Skinner.)
- The Technique of Field Experiments: being the Report of a Conference held at Rothamsted on May 7, 1931, under the Chairmanship of Sir A. D. Hall. Pp. 64. (Harpenden: Rothamsted Experimental Station.) 1s. 6d. net.
- Mines Department. Ninth Annual Report of the Safety in Mines Research Board, including a Report of Matters dealt with by the Health Advisory Committee, 1930. Pp. 56+12 plates. (London: H.M. Stationery Office.) 2s. net.
- Department of Scientific and Industrial Research. Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for the Year 1930. Part 2. Pp. v+90+4 plates. (London: H.M. Stationery Office.) 2s. net.
- Transactions of the Institute of Marine Engineers, Incorporated. Session 1931. Vol. 43, No. 7, August. Pp. 305-344+xxxviii. (London.)
- Observations made at the Royal Observatory, Greenwich, in the Year 1929 in Astronomy, Magnetism and Meteorology, under the Direction of Sir Frank Dyson. Pp. vii + A110 + B2 + Cix + C181 + D65 + E46 + 19. (London: H.M. Stationery Office.) 37s. 6d. net.
- Photographic Magnitudes of Stars brighter than 14^m.0 in 40 of Kapteyn's Selected Areas, determined at the Royal Observatory, Greenwich, under the Direction of Sir Frank Dyson. Pp. 69. (London: H.M. Stationery Office.) 6s. 6d. net.
- East London College (University of London.) Calendar, Session 1931-1932. Pp. 206. (London.) 1s.
- Battersea Polytechnic. Technical College for Day Students, and Day School of Art and Crafts. Calendar, Session 1931-1932. Pp. 50+16 plates. 3d. Domestic Science Department and Training College. Full-time Day Instruction, Afternoon and Evening Classes, Session 1931-1932. Pp. 35+9 plates. 3d. Department of Hygiene and Public Health, Session 1931-1932. Pp. 24+6 plates. 3d. Calendar of Evening and Afternoon Courses and Classes for Session 1931-1932. Pp. 32+14 plates. Free. (London.)
- The Botanical Society and Exchange Club of the British Isles. Report for 1930 (with Balance-Sheet for 1929). By Dr. G. C. Druce. Vol. 9, Part 3. Pp. 247-504+30. 10s. Report for 1930 of the Botanical Exchange Club. By C. E. Britton. Vol. 9, Part 4. Pp. 505-534. 4s. (Arbroath: T. Buncle and Co.)