chemist merely as an employee instead of co-operating with him as a partner, and this almost invariably dampens his enthusiasm. Secondly, the adoption by the legislatures of a definite national policy as regards the establishment of independence in chemical supplies is advocated. This has already been inaugurated in the question of the fixation of atmospheric nitrogen. Thirdly, wise patent legislation is necessary. Applied chemistry is not wholly industrial: chemistry promises to be the guide, not only of physiologists, but also of bacteriologists, pathologists, and laboratory clinicians. Accordingly, it is essential that the chemistry departments of universities and colleges should keep up their output of men, and maintain a high standard of scientific quality. The great impetus which science has received from the war involves certain dangers. The chief of these is that superior research opportunities and financial returns will attract *all* the best men away from academic life. In the national interest professorial chairs must be occupied by the best men, and to ensure this salaries must be raised. The continued need for pure research untroubled by any possible industrial application of its results must not be forgotten. For chemistry in America a brilliant future is predicted provided that the chemist is given a "square deal," and that this science in the universities is placed on the plane occupied by law and medicine.

IN the week following November 20, the anniversary of the Cripplegate Fire, the British Fire Prevention Committee completed its first twenty years' work, which has been carried on entirely by voluntary effort. Among the activities of the committee may be mentioned the promotion of technical research, the initiation of legislation, by-laws, and regulations, the compilation of evidence on the subject of fires, and the preparation of literature and circulars of a precautionary character, more than 250 publications of this nature having been issued. The committee's recommendations have been endorsed by competent authorities in the United States, France, and Russia. Instances of co-operation with other countries are afforded by the organisation of the International Fire Prevention Congress, which was attended by 800 visitors, representing fifteen Governments and 200 municipalities and corporations from all parts of the world, and the International Fire Exhibition, at which a collection of historical and industrial exhibits was shown, and the lessons of many of the great conflagrations of the past decade were discussed. Apart entirely from the propaganda work in fire prevention and the extensive system of publishing trustworthy data, the committee established twenty years ago a complete testing station near Regent's Park for full-sized fire tests, without any encouragement or assistance from the Government whatever. With the advent of the war, which has severely affected professional men, it is unlikely that work of this kind can continue to be dependent solely on the voluntary effort and contributions of the technical professions concerned, and being of great national importance, the committee should be afforded the co-operation and assistance of those public departments which are now concerned in research work and have Treasury or special research funds available for it.

Engineering for November 30 contains an illustrated description of the standard propelling machinery for British standard ships. The main engines are triple-expansion, having cylinders 27 in., 44 in., and 73 in. diameter by 48-in. stroke. There are three boilers of the multitubular return-tube type, 15 ft. 6 in. diameter by 11 ft. 6 in. long, for 180 lb. per sq. in. working pressure, and working under Howden's system of forced draught. The outstanding features of the engine design indicate that it is of Clyde origin. All the designs, excepting the auxiliary machinery, were prepared by one firm, which had extensive experience in machinery for this size of cargo vessel, and were issued complete to various contractors. The advantages of manufacture to one common design were found of convenience in many ways. For example, one firm discovered defects in a soleplate casting; this was at once replaced by a similar casting from another firm, which did not require it immediately, thus preventing several weeks' delay. Orders for the auxiliary machinery, and for all small items, such as valves, branch pieces, etc., were placed with firms which specialise in such work, and furnished all these details ready to fit in place. The positions of the auxiliary machinery were so selected that all erection could be completed before the launch, thus simplifying greatly the amount of pipe-fitting which usually has to be done.

AMONG the forthcoming books of science we notice the following:—"The Education of Engineers," H. G. Taylor (*G. Bell and Sons, Ltd.*); "What Industry owes to Chemical Science," R. B. Pilcher and F. Butler-Jones, with an introduction by Sir G. Beilby (*Constable and Co., Ltd.*); "Synthetic Products," A. R. J. Ramsey and H. C. Weston (*G. Routledge and Sons, Ltd.*); "Elements of Graphic Statics," "Moving Loads by Influence Lines and other Methods," "Strength of Structural Elements," each by E. H. Sprague; "Estimating Steel Work for Buildings," B. P. F. Gleed and S. Bylander; "Machine Shop Practice," G. W. Burley; and "The Theory of the Centrifugal and Turbo Pump," J. W. Cameron (*Scott, Greenwood, and Co.*). *Messrs. Longmans and Co.* have in preparation for appearance in their series of "Monographs on Biochemistry":—"The Development and Present Position of Biological Chemistry," Dr. F. Gowland Hopkins; "The Polysaccharides," A. R. Ling; "Colloids," W. B. Hardy; "Physical Methods used in Biological Chemistry," Dr. S. G. Walpole; "Protamines and Histones," Dr. A. Kossel; "Lecithin and Allied Substances," Dr. H. Maclean; "The Ornamental Plant Pigments," A. G. Perkin; and "Chlorophyll and Hæmoglobin," H. J. Page.

OUR ASTRONOMICAL COLUMN.

ERRATIC CHANGES IN CLOCK RATES.—An interesting suggestion as to the cause of the sudden variations which are sometimes observed in the rate of the three standard clocks of the U.S. Naval Observatory has been made by Mr. W. A. Conrad (*Popular Astronomy*, vol. xxv., p. 522). It has long been noticed that the rates are subject to sudden fluctuations, and that the three clocks usually vary in the same direction at the same time, and by almost equal amounts. As the temperature and pressure controls appear to be beyond suspicion, such changes have hitherto been attributed to imperfect determination of instrumental constants. In seeking the cause of a very bad jump in the rates of the three clocks in February, 1917, it was found that many jumps were coincident with "cold waves," and that on this occasion there was a very marked low-pressure area receding to the east and an abnormally high barometer to the west. It is suggested that the observations of the clock stars may have been affected by lateral refraction, and that a study of the weather map might possibly help to explain the anomalous results which have occasionally been obtained in determinations of the positions of stars.

THE HECTOR OBSERVATORY, NEW ZEALAND.—The report of the Government Astronomer for the past year includes an account of the excellent system of time-signals which has been organised by Mr. Adams, and a plea for the establishment of a wireless time-service. In co-operation with Mr. H. F. Johnston, of the Mag-

netic Department of the Carnegie Institution, a determination of the longitude of Papeete, in Tahiti, was made by wireless signals from the observatory. Local time was determined by means of a theodolite, with a probable error of half a second of time. The longitude of Point Venus was found to be 149° 30′ 1″ west, this being about three seconds of time greater than that usually quoted. The adopted position of the transit instrument at the Hector Observatory is longitude 11h. 39m. 4·27s. east of Greenwich, latitude 41° 17′ 3·8″ south, and height 418 ft. above 1909 mean sea-level. Improved equipment for an observatory so far south is greatly to be desired.

ORBITS OF THREE SPECTROSCOPIC BINARIES.—Three spectroscopic binaries of considerable interest have been further investigated at Ottawa by Dr. W. E. Harper (Journ. R.A.S., Canada, vol. xi., p. 341). The star 20 π Cassiopeiæ, of type A5 and photographic magnitude 5·2, has two luminous components, and the orbits of both have been determined. The period is 1·96408 days, and the range of velocity of each component 235 km. per sec. The orbit is nearly circular.

The star 29 Majoris is the typical star of the Harvard class Oe, showing the dark lines of hydrogen, helium, and the ζ Puppis series, in addition to faint emission bands at 4633 and 4688; its visual magnitude is 4·77. The range of velocity is 437 km., and is the largest for any spectroscopic binary yet discovered. The period is 4·3934 days. The emission band 4688 shares in the periodic shiftings due to the orbital motion. The eccentricity of the orbit is 0·156.

In the case of the star Boss 3511, of type F and photographic magnitude 5·3, the range of velocity is 20·5 km., and the period 1·61275 days. The eccentricity of the orbit is 0·067.

PALÆONTOLOGICAL PAPERS.

FOSSIL floras figure largely in the recent publications of the United States Geological Survey. In Professional Paper 98-H, F. H. Knowlton describes thirteen species of plants from the Fox Hills Sandstone of S. Dakota, only four of which were previously known. Remains are scanty, since the beds are marine; but their interest lies in their position between series, the Montana and Laramie formations, that contain abundant plants. The affinities are distinctly with the Upper Cretaceous, and the flora seems to have been well supplied with moisture along a shore-line. E. Wilber Berry (Prof. Paper 91) furnishes a detailed report, accompanied by 117 plates, on "The Lower Eocene floras of South-Eastern North America." The material is derived from the widely spread Wilcox series, which is typically developed in Wilcox County, Alabama, and is known through Mississippi, Arkansas, Texas, Tennessee, and Kentucky. Except for a small fauna (a "faunule") recently discovered in Mississippi, the almost entire absence of animal remains in this vast area is remarkable. Insects, which must have been abundant, are represented merely by the traces of their activities among the plant-remains. The flora is of Ypresian age (p. 152), and contains thirty-nine genera in common with that of Alum Bay in the Isle of Wight. Identical climatic conditions on both sides of the Atlantic are implied.

In Publication No. 254 of the Geological Survey of Queensland, J. H. Reid clears up an important point in connection with the upward range of Glossopteris. Newell Arber had previously, and with good reason, doubted the occurrence of this genus in the Lower Cretaceous Desert Sandstone of Bett's Creek, and it is now shown that there is an unconformity at this locality, and that the remains of Glossopteris belong to the underlying Permo-Carboniferous system.

The problematic *Parka decipiens* of the British Old Red Sandstone has been reinvestigated by the late Lieut. A. W. R. Don and George Hickling (Quart. Journ. Geol. Soc. London, vol. lxxi., p. 648, 1917 for 1915). The vegetable nature urged in 1890 by Reid and Graham is confirmed; but considerable doubt is thrown on the alleged microspores and prothalli, and the general form and vegetative structure are found to be "closely reproduced by some specimens of the recent alga, *Melobesia lichenoides*" (p. 659). A tentative suggestion is made that Parka was a thallophyte with algal affinities.

C. D. Walcott deals with "The Albertella Fauna in British Columbia and Montana" (Smithsonian Miscell. Coll., vol. lxvii., No. 2, 191,), and shows, after field-investigations in a picturesque and mountainous district (plates 1 and 2), that the Mount Whyte Beds containing Olenellus are truly Lower Cambrian and not in the Middle Series, and that the fauna characterised by the trilobite Albertella is found above them, and is of Middle Cambrian age. The author is thus able to accept L. D. Burling's conclusion with regard to the latter fauna, while correcting him in reference to an alleged survival of Olenellus. Numerous species of trilobites are figured.

L. W. Stephenson adds to our knowledge of the exclusively Cretaceous genus of corals, Micrabacia (U.S. Geol. Survey, Prof. Paper 98-J, 1916), and adds six new species and two varieties from Upper Cretaceous horizons in the United States. Bruce Wade (*Amer. Journ. Sci.*, vol. xliii., p. 293, 1917) describes *Busycon cretaceum* as the oldest known of the Fulgurid gastropods. He points out that the family should strictly be called Busyconidæ. It has special interest in being restricted to the eastern region of the United States, from this Upper Cretaceous example to the present day, a fact that is explained by the absence of a free-swimming larval stage.

Several new species of trilobites are described by A. Ware Slocum from the Upper Ordovician Maquoketa Beds of Fayette County, Iowa (Ann. Rep. Iowa Geol. Survey for 1914, published 1916). The new genus Cybeloides is established (p. 212) as distinct from Cybele in the characters of its cephalon. The remarkable genus Sphærocoryphe, with its globular apex to the glabella, is abundant in the upper beds.

The genus Eurypterus is so rare in Upper Carboniferous strata that we welcome the description of a new species from the Coal Measures of Belgium by Xavier Stainier of Ghent (Quart. Journ. Geol. Soc. London, vol. lxxi., p. 639, 1917). A review is given of the eleven Carboniferous species previously recorded.

The largest amphibian known from the Trias of North America is represented by part of the left half of a labyrinthodont jaw from the Newark Beds of Pennsylvania (*Amer. Journ. Sci.*, vol. xliii., p. 319, 1917). The describer, W. J. Sinclair, names the genus Calamops, since impressions of "horse-tail rushes" occur upon the layer encrusting the bone. Surely this is making too much of an accident to an individual. The name "Reed Face" among American Indians would not be extended to others of the tribe.

Joseph Barrell (*Scientific Monthly*, vol. iv., p. 16, 1917) suggests that a climatic change, involving desiccation, reduced the forests that were the habitat of arboreal anthropoids, and thus led to the development of primitive man. "The apes which were trapped in this way in Central Asia were forced to win most of their living on the ground" (p. 23). Pithecanthropus of forest-clad Java must have arisen farther north, and the ancestors of true man must be looked for in Miocene strata in regions which were then passing into steppes. Incidentally Prof. Barrell seems to accept too readily (p. 21) G. S. Miller's view that the jaw found at Piltdown is that of an ape and not of *Homo dawsoni*.

G. A. J. C.