OUR ASTRONOMICAL COLUMN.

THE SOLAR ACTIVITY.—Sun-spot activity has been especially noteworthy during the past few days, a feature being the great extent and disturbed character of several of the groups.

COMET 1916*a* (NEUJMIN).—The discovery of the first comet of the year by M. G. Neujmin, of the Simeis Observatory, Crimea, on February 24 was announced last week. According to a telegram received last Friday from Prof. E. Strömgren, the comet was observed by Prof. Biesbroeck (Yerkes) on February 29, at 14h. 41·3m. G.M.T.; its position was R.A. 8h. 58m. 46·5s., declination +13° 35′ 14″. The comet is thus a little south of κ Cancri.

COMET 1915*e* (TAYLOR).—On February 4, 1891, Dr. Spitaler, searching for Winnecke's comet, observed a cometic object that afterwards could not be refound. On the basis of the orbit calculated by M. J. Braae and Mlle. J. Vinter Hansen, Prof. A. Berberich finds (*Astronomische Nachrichten,* No. 4827) that this solitary observation possibly refers to comet Taylor. Assuming changes of +6·5° and −6·3° in longitudes of node and of perihelion respectively, and calculating the comet's place for M=5·1°, gives about the position of the object seen by Dr. Spitaler. Decided alterations in the position of the nodes due to perturbations by Jupiter were possible in 1901, and again in 1912–13. If perihelion occurred in 1891·0, then the interval, 25·1 years=4×6·27, would be equivalent to four revolutions. Dr. Spitaler recorded that at about 9½h. he saw the object "between the faint stars lying together in the same parallel 20s. preceding the star DM+26°, 1714," *i.e.* R.A. 7h. 58m. 43s., declination 26° 15′. This position was in fairly close agreement with that calculated for Winnecke's comet according to the orbit of von Haerdtl.

THE ORBIT OF VV ORIONIS.—A paper by Mr. Zaccheus Daniel (Publications, Allegheny Observatory, vol. iii., No. 21) deals with this eclipsing variable and spectroscopic binary. Chief interest centres in the fact that situated within 1° of δ Orionis it is now found to present the same spectral peculiarity, the calcium K line not sharing the oscillations shown by the lines of other elements. Its spectrum is of the B2 type, and the lines are generally diffuse. The period, 1·4854 days, agrees with that previously found by Hartmann from photometric observations, but this rapid oscillation is superposed on a slower, having a period of 120 days. The velocities given by the K line are not quite constant, hence possibly the calcium atmosphere belongs to the system, and has an orbital movement in the same direction as the brighter component. The mean value from the K line is +16·7 km./sec., agreeing with the mean for δ Orionis (+17·2) and ε Orionis (+15·6), and with the value of the sun's motion away from that part of space. Thus the calcium vapour is stationary, but as the early type stars themselves have very small velocities, the present evidence does not settle whether the calcium belongs to the stars or not.

OBSERVATIONS OF VARIABLE STARS.—Dr. C. Hoffmeister (*Astronomische Nachrichten,* No. 4827) has recently published a considerable collection of observations of many Algol and short-period variables, and also of a number of suspected variables. Among the latter is η Ursæ Majoris, for which the present observations indicate a range of 0·3 magnitude. Dr. G. Hornig (*Astronomische Nachrichten,* No. 4828) gives dates of maxima and minima of φ Persei observed during November, 1914–April, 1915. The period of the latter star is found to be 18·1 days, very nearly one-seventh that found by Lau. Maxima date from November 28, 1914, and thus the next would be due March 12. The variation is of the Cepheid type (M−*m*=7·5 days). Observations of 7 Arietis, 15 Trianguli, and 31 Orionis show them to be irregularly variable in periods of about 70, 200, and 356 days respectively.

SEA-SPIDERS AND FEATHER-STARS.[1]

DR. CALMAN reports on the Pycnogons or sea-spiders collected by the British Antarctic Expedition of 1910. The collection far exceeds that of any Antarctic expedition yet reported on, comprising no fewer than forty-four species, eleven of which are new. There seems no doubt that Antarctic seas are far richer in these quaint, slow-living creatures than any other area of the oceans. While most of the species were obtained in very small numbers, this was not always the case, for we read that two hundred specimens of *Nymphon australe* were obtained at a single station, and presumably at a single haul.

The author discusses the meaning of the ten-legged species which occur, the great majority being eight-legged, and defends, against Prof. Bouvier, the view, which he shares with Prof. Carpenter, that the decapodous Pycnogons represent a recent specialisation, not a primitive survival. An interesting parallel is found in Pliotrema, a Pristiophorid shark, described by Mr. C. Tate Regan, which has six gill-arches instead of the usual five, but is evidently a very highly specialised form, derivable from some ancestor like Pristiophorus, with the normal number of arches.

Attention has been directed to the great range of variability in sea-spiders, but Dr. Calman does not think that it is greater than, for instance, in many groups of Crustaceans. And as to the theory of Döderlein, that lack of the power of wandering is a factor which favours the development of local races, varieties, and species in any group of animals, the author finds no corroboration in the case of Pycnogons, which are extremely slow-going creatures. Although some species can swim in the adult state, their efforts seem to be awkward and ineffective, and none of the larvæ are better adapted for locomotion. The memoir is marked by Dr. Calman's well-known carefulness of workmanship, and the illustrations drawn by Miss Gertrude M. Woodward are remarkably fine.

Mr. A. H. Clark is to be congratulated on the appearance of the first part of the monograph on present-day Crinoids, to which he has largely devoted his energies during the last ten years. The study of these singularly beautiful animals has been heretofore dominated by the palæontological approach, and not unnaturally, since the fossil record is extraordinarily complete, and not very many recent forms have been known or have been available for investigation. This, as the author says, has led to "the recent Crinoids being considered as the impoverished and decadent remnants of a once numerous and powerful class, the last forlorn and pitiful exponents of a dwindling phylogenetic strain. During the 1906 cruise of the *Albatross* I handled tens of thousands of specimens; several times I saw the forward deck of the steamer literally buried under several tons of individuals belonging to a species exceeding any fossil form in size; everywhere we went we found Crinoids; we dredged them at all depths."

1 "British Museum (Natural History). British Antarctic (*Terra Nova*) Expedition, 1910. Natural History Report. Zoology, vol. iii., No. 1, Pycnogonida." By Dr. W. T. Calman. Pp. 1–74+22 figs. (London: British Museum (Natural History), 1915.) Price 5*s*.

Smithsonian Institution. U.S. National Museum, Bulletin 82. "A Monograph of the Existing Crinoids." By A. H. Clark. Vol. i. The Comatulids. Part i. Pp. 1–406+17 plates+513 figs. (Washington: Government Printing Office, 1915.)

So Mr. Clark ceased to regard the group as decadent or degenerate, and became convinced that recent Crinoids play as important a *rôle* in the economy of the sea-floor as do the other Echinoderms. He has written his monograph, therefore, under the influence of a study of recent forms rather than of extinct forms.

The present instalment contains a general introduction, a history of investigation, a most elaborate glossary, and a general account of Crinoid structure which is strongest as regards skeletal parts, dealing rather sketchily with the "innards" and the development. We regret to see that the learned author defends the extraordinary view that Echinoderms are affiliated to Crustaceans and to barnacles in particular. To support this by "the very close correspondence between the development of the larvæ of the Echinoderms and that of the larvæ of certain types of Crustaceans," or by the correspondence between the crustacean eye and the asteroid eye, or by comparing the genital plates of a sea-urchin to the protopodites of the walking legs of a crayfish, or indeed by any of the arguments used, seems to us an extraordinary perversion of morphological judgment. Attention should be directed to the numerous graphic figures drawn by Miss Violet Dandridge for the text.

CHEMISTS AND THEIR TRAINING.

SPEAKING at the thirty-eighth annual general meeting of the Institute of Chemistry, held on March 1, Sir James Dobbie, the president, referred briefly to the work of the institute during the war and the importance of the services of professional chemists to the nation, particularly in the production of munitions and other material of war. His address is here summarised.

Both in the interests of the profession and of the industries of the country, the institute has encouraged by every means possible the production of laboratory requirements of all kinds hitherto obtained almost entirely from Germany and Austria. In co-operation with the Society of Public Analysts, steps have been taken to ensure supplies of satisfactory chemical reagents, and a number of British firms have undertaken their manufacture according to standards prescribed by a joint committee of the two societies.

The work of the Glass Research Committee of the institute has been remarkably successful. At the end of six months' work formulas were produced for practically all the various kinds of glass required in chemical operations, in addition to glasses for miners' lamps, pharmaceutical ampoules, and X-ray tubes. A number of manufacturers who have taken up these industries are now able to supply immediate requirements, and there is good reason to expect that within a short while they will have completely mastered the technique involved in the production of such articles. The credit for this achievement is due to Prof. Herbert Jackson, of King's College, London, assisted by Mr. T. R. Merton. The work of the committee has received the recognition of the Advisory Council on Scientific and Industrial Research, from whom grants have been received for the furtherance of investigations with a view to the determination of formulas for other glasses required for scientific purposes, including certain forms of optical glass.

As to the necessity for taking adequate measures for equipping ourselves for the economical struggle which must ensue when peace is restored, the discussions which have taken place on the subject have revealed a wide divergence of views, both as to the cause of the unsatisfactory position in which we found ourselves and the steps required to remedy it. In chemical industries, however, it is generally agreed that the relations between chemical science and chemical manufactures should be more intimate in the future than they have been in the past. That condition can be fulfilled only if the country possesses an ample supply of highly trained chemists. Dr. Beilby has expressed the belief that the remarkable development of chemical industry in Germany resulted much more from the large command of chemists and engineers of sound professional training than from the possession of an even larger supply of research chemists of mediocre ability. That opinion should not, however, be taken as giving the impression that the value of research is to be underrated. So far as the supply of chemists of sound professional training is concerned, we can face the future with some confidence, particularly as the facilities for training chemists have been remarkably increased. It has to be admitted, however, that the great public schools are, for the most part, unsympathetic towards the study of science, and, even when they are excellently equipped for the purpose, the results are meagre and unsatisfactory.

As to the older universities, it must be allowed that Cambridge has lately achieved an extraordinary measure of success in adapting its teaching to the needs of modern times, while the fact that Oxford is rousing herself to meet her responsibilities is shown by the terms of a memorandum issued by the Natural Sciences Board in support of a reform in the regulations for the honours degree in chemistry, whereby research will become a compulsory part of the curriculum. What must be advocated is a system of general education on broad lines throughout, including both classics and science, up to the proper age for specialisation. Should the expectation of the country in this matter not be realised, the inevitable result will be that schools established on more modern lines will gradually replace the old public schools as the training ground of the leaders of the nation.

The council of the institute is about to give further consideration to the problem of promoting a more complete organisation of professional chemistry in the interests of the industries of the country. Chemistry is a comparatively young profession, which is gradually establishing itself in the knowledge and the good opinion of the community. It will be successful in this in proportion as it attracts men of strong character and individuality, efficient and capable of holding their own as professional men. As it gains in strength its services will become more widely recognised and will meet with the same appreciation as that accorded to the older learned professions. The fact that the title chemist has long been identified in this country, alone of all European countries, with the craft of pharmacy is responsible for much of the confusion existing in the public mind, but the public is learning at present so much about the work of the chemist that we need not despair of seeing the day when it will be common knowledge that while in law all pharmacists are chemists, all chemists are not pharmacists.

We extract from the report of the council a statement as to the work on glass research to which Sir James Dobbie referred in his address.

The Advisory Council on Scientific and Industrial Research has allotted the institute a grant of 400*l.* for one year's research work on laboratory glass of various kinds, and a grant of 500*l.* for research on optical glass, covering a period up to March 31, 1916. The grants are made on certain conditions, providing for the use of the results by British firms on terms to be arranged between the Advisory Council, the Glass Research Committee, and the manufacturers concerned. The Glass Research Committee has lately for-