OUR ASTRONOMICAL COLUMN.

COMET NEWS.—*Astronomische Nachrichten* (No. 4686) gives improved elements for comet 1913*b* (Metcalf), and also an ephemeris, including the current week, from which the following positions are taken :—

12*h*. *M.T. Berlin.*

	R.A. (true) h. m. s.	Dec. (true) ° ′	Mag.
Oct. 23 ...	20 51 54	... +15 7·8	
24 ...	50 52	... 13 18·9	
25 ...	49 57	... 11 36·2	... 9·1
26 ...	49 9	... 9 59·7	
27 ...	48 26	... 8 28·6	
28 ...	47 50	... 7 2·9	
29 ...	47 19	... 5 42·0	... 9·4
30 ...	20 46 53	... +4 25·8	

The comet is rapidly reducing its northern declination, and as its magnitude is also decreasing it will become an object only for larger apertures.

Westphal's comet is becoming an interesting object, and will for some time be in a good observing position. It is moving into the constellation of Vulpecula, and during the first week of November will pass into Cygnus and become involved in the Milky Way. A photograph taken on September 28 showed a broad tail 3·5° long, a round nucleus of 20 min. in diameter, and a distinct nucleus. It has been glimpsed with the naked eye, and is an easy object for binoculars. The following is an approximate ephemeris :—

	R.A. h. m.	Dec. ° ′
Oct. 24 ...	20 48	... +19 46
28 ...	43	... 22 23
Nov. 1 ...	39	... 24 50
5 ...	20 36	... +27 16

It is worthy of note to mention that both Westphal's and Metcalf's comets are in about the same region of the sky, being less than two degrees apart on October 22.

The following are three positions for comet 1913*c* (Neujmin), now a faint object, published in *Astronomische Nachrichten* (No. 4685) :—

	R.A. (true) h. m. s.	Dec. (true) ° ′
Oct. 22 ...	23 34 0	... +13 55·7
26 ...	35 29	... 14 33·3
30 ...	37 29	... 15 7·4

The same journal (No. 4686) publishes the information received by Banachiewicz to the effect that the brightness of Neujmin's comet appears to be fluctuating. Its magnitude is fainter than 11.

ORBITS OF EIGHTY-SEVEN ECLIPSING BINARIES.—Dr. Harlow Shapley contributes to *The Astrophysical Journal* for September (vol. xxxviii., No. 2) a summary of an important though laborious piece of work on the orbits of eighty-seven eclipsing binaries. In the present publication he restricts himself to a few of the general results, leaving the complete statistical discussion for a future Princetown University Observatory publication. Some of the conclusions here briefly summarised show that the better the observations of an eclipsing binary are, the more satisfactory is the theoretical representation of the light variations. Further irregularities in the shape of the light-curves disappear with increased photometric accuracy. The existence of darkening towards the limb of the stellar disc is clearly indicated, and actually demonstrated in a few cases. There is a positive indication that the fainter star is self-luminous, and no case arises where it is necessary to assume one component completely dark. In discussing the distribution of densities relative to spectra the first-type stars (spectra B and A) show a marked preference for an intermediate density. The second-type stars fall into two groups, one preceding and the other following in order of density the first-type stars. Dr. Shapley points out that these two groups are obviously identical with the two classes of second-type stars of very greatly different luminosity discussed by Hertzsprung and Russell, and the facts collected afford direct support of Russell's theory that the differences in brightness of the two groups are to be ascribed in the main to great differences in the mean density.

VARIATIONS IN THE EARTH'S MAGNETIC FIELD.—In a short article in *Science* (August 29, 1913) Prof. Francis E. Nipher states that a series of open-air observations has fully verified the conclusions he has published regarding local magnetic storms. It appears that clouds prevent the solar ionisation of the air in their shadows, just as does the earth. When the molecules of air are ionised they become little magnets, and arranging themselves along the lines of force add their effect to that of the earth's magnetic field. In the absence of the solar radiation, wind or falling rain destroys this arrangement. It is hence suggested that local, daily, and annual variations are due to local variation in the weather. In a previous article in *Science* (May 30) Prof. Nipher describes a model with which a somewhat similar magnetic storm can be produced experimentally. In the model iron filings take the place of the ionised molecules of air.

THE LIGHT CURVE OF *o* CETI.—In the *Memorie della Società degli Spettroscopisti Italiani*, September, 1913, Sig. G. B. Lacchini publishes the results of his observations of this variable made during the period July 12, 1912–March 11, 1913. He used a telescope of 6 cm. aperture, 80 cm. focal length, with powers of 20 and 40, the comparison stars employed being those of the variable star section of the B.A.A. The epoch of minimum found was December 10, 1912, a result differing by only one day from that found by Dr. E. Guerrieri (December 9, 1912). The star lost one magnitude per twenty-seven days, and gained one magnitude per eleven days, according to Sig. Lacchini, which figures compare with 29·6 days and nine days respectively as determined by Dr. Guerrieri. The actual faintest magnitude recorded was 9·09 on December 3, 1912.

THE FRAUENFELD MEETING OF THE SWISS SOCIETY FOR THE ADVANCEMENT OF SCIENCE.

THE ninety-sixth annual meeting of the Société Helvétique des Sciences Naturelles was held, as already announced, at Frauenfeld in September. The set discourses were largely attended, and were listened to with considerable interest. Prof. Grubemann, in his lecture on the most recent methods employed in petrography, referred especially to the evolution of rocks, and the bearing of metallography and the chemistry of colloids on his subject. Prof. Maillefer gave an account of his researches on the geotropism of plants, partly from an experimental and partly from a mathematical point of view. He claimed to have proved that gravity has an effect on the curvature of a plant which requires time to take effect, and may be expressed by saying that the curvature possesses a velocity proportional to the sine of the angle made by the plant with the vertical and an acceleration proportional to the time of exposure. The effect is, he said, felt by the plant from the outset, though the time measurements seem to depend on the instruments used in the observations. His results were in a subsequent communication partly

corroborated by Dr. Tröndle, who, however, does not admit the presence of an acceleration.

We pass over the remaining lectures, interesting as they were, remarking only on those of Profs. Keller and Dutoit. Prof. Keller dwelt on the points of resemblance between life in the Caucasus and that of the lake-dwellers in Switzerland in prehistoric times. Prof. Dutoit gave a brilliant exposition of the assimilation which is going on of the methods of analytical chemistry to those of physical chemistry and biology. The new processes employed—which are, in point of fact, due in great measure to Prof. Dutoit himself, and have already rendered considerable services both to manufactures and science—are indirect, and have the advantage of great precision and extreme rapidity.

Turning to the separate sections, we commence with botany. Prof. Chodat, whose unique collection of cultures of algæ now numbers more than half a hundred, spoke of the bearing of his experiments on the systematic classification of these plants. Dr. Baumann, who has been studying the vegetation of the Lake of Constance, described how the small shells of gasteropods in these regions become coated with tufa, deposited by the algæ. In this interesting way immense sandbanks of coarse sand, called after the little snails whose débris form it, "Schneckerlisand," are deposited in the lake. Prof. Ernst discussed parthenogenesis and apogamy among the Angiospermæ, and showed that, contrary to Treub and Lotsy, the embryo of the Balanophoraceæ is formed normally. The asexual reproduction of garlic from the point of view of heredity and natural selection was treated by Dr. Vogler. Prof. Edouard Fischer, who has been engaged in experiments on corn-rust, showed the connection between the appearance of this plague and the position of the leaf attacked with respect to the horizontal. Mr. Jaccard discussed the influence of a mechanical force on the production and constitution of wood and woody plants.

The section of geology occupied itself with the fossils, the stratification, and the relief of Switzerland. Prof. Albrecht Heine communicated his latest observations of glacial deposits as corroborating his somewhat controverted explanation of the formation of alpine lakes by a subsidence of the earth's crust in these regions during the diluvial epoch. Dr. F. Mühlberg showed by an interesting collection of lantern-slides the fallacious nature of the interpretation of the formation of part of the Jura given by the Bonn school. Prof. H. Schardt spoke on a subject which belongs properly to the borderland of geology, the typical phenomena of injection. He pointed out how, during the gradual cooling of a mass of magma, sudden pressures of a tectonic nature must sometimes occur, squeezing the molten material into the interstices of the neighbouring rocks and causing the phenomena in question.

In the chemical section the school of Geneva was strongly represented. Dr. Reverdin's determination of the constitution of certain anisidines, in particular of the two still doubtful trinitro-*p*-anisidines, is of a more advancedly technical character than Prof. A. Pictet's interesting discovery by the process of distillation *in vacuo* of a new kind of tar smelling of petroleum, and Messrs. Briner and Kühne's reinvestigation of the still obscure mechanism of the chamber process for the production of sulphuric acid. The opinion arrived at by these latter investigators is that SO_4H_2 is obtained by direct oxydisation of SO_2 into SO_3, the nitrous anhydride serving only as a catalytic. Of quite a different nature were Dr. Piccard of Munich's account of his experiments on certain dyes, and Dr. W. Baragiola's report on the physical, chemical, and physico-chemical experiments which have been made on wine and grape-juice.

In the physical section there were several communications deserving of mention; we content ourselves with signalising that of Prof. Perrier and H. Kamerlingh Onnes on the magnetisation of mixtures of liquid oxygen and nitrogen. These mixtures are found simpler to deal with than pure oxygen, the specific magnetisation coefficient of which had been already shown to differ materially from what would be expected by the law of Curie-Langevin. Experiments made at a temperature between $-195°$ and $-210°$ show that the deviation from the law in question depends on the mutual approach of the molecules caused by the fall of temperature.

In the mathematical section Prof. Fueter gave some instructive examples of algebraic equations possessing a prescribed group; Prof. Crelier read a paper, conceived in the order of ideas of Sturm, on correspondences in synthetic geometry, with special reference to the curve of the third order and third class; while Dr. Speiser and Prof. Bieberbach dealt with factorisation of algebraic forms and conformal representation respectively. Dr. Mirimanoff communicated a new and elegant proof of the theorem of Cantor-Bendixon, which, as he pointed out, falls into the same category as the first proof of that theorem without Cantor's transfinite numbers, that given by W. H. Young in "Sets of Intervals on the Straight Line" (Proc. L.M.S., 1, xxxv., pp. 245–268). Prof. W. H. Young gave a paper on "The Integral of Stieltjes and its Generalisation," showing how the theory of the integration of any function with respect to a function of bounded variation could be built up by the method of monotone sequences alone, and giving examples of new theorems, into the enunciation of which the new concept does not enter, and which he had obtained by means of its use.

Communications were also made to the sections for zoology, and for geophysics, cosmical physics, and meteorology, among them one by Dr. P. Mercanton, who added some details to Dr. de Quervain's account of the Swiss expedition across Greenland last year and the meteorology of that country. The rate of motion of the Greenland glaciers, which are mostly riddled with crevasses, was found, he said, to vary from one to two metres a day. At the base the grains of dust were not very large, the mean size not exceeding that of those in the alpine glaciers. Observations on some of the ancient glacial terraces showed that part of the dust was of cosmic origin.

PLANKTON DISTRIBUTION.[1]

IN the University of California Publications in Zoology (vol. ix., No. 6), Mr. C. O. Esterly discusses the vertical distribution of certain Copepoda as shown by a large number of hauls made in the region of San Diego, between the years 1905 and 1911. Dividing the twenty-four hours into a "day" period from 6 a.m. to 6 p.m., and a "night" period of the remainder, the author finds in the results obtained a distinct night migration towards the surface, with a corresponding downward movement during the day. For nine out of ten species specially considered the time of this maximum occurrence at the surface is found to vary between 6–8 p.m. and 10–12 p.m., *Calanus finmarchicus* attaining its maximum in the latter period. The depth shown for the day plurimum is more obscure, ranging between 50 and 200 fathoms.

[1] "The Occurrence and Vertical Distribution of the Copepoda of the San Diego Region, with particular Reference to Nineteen Species." By Calvin O. Esterly. (Berkeley: University of California Press.)