OUR ASTRONOMICAL COLUMN.

A NEW COMET.—A Copenhagen telegram reports the discovery of another comet by Mr. J. E. Mellish. In addition to the signatures of Profs. Pickering and Strömgren, the message bears the name of Aitken, and the position of the object appears to have been measured at Lick. Thus there are sufficient grounds for presuming an authentic comet has been detected, although the communcation contains no information regarding the movement (or magnitude) of the object. Its position on September 19 16h. 19m. 2s., Lick time, was R.A. 10h. 37m. 54s., dec. 26° 13′ 17″, *i.e.* between 40 and 41 Leo Minoris.

With reference to the note in this column last week, readers who have not the opportunity of consulting Dreyer's Catalogue may be interested to learn that N.G.C. 2261 is therein stated to show a cometic nucleus.

THE VARIATION OF LATITUDE.—Two papers in recent numbers of the *Astronomische Nachrichten* bear on this subject. In No. 4811 Dr. E. Przybyllok publishes results of an investigation into the effect on latitude determinations of that part of the atmospheric refraction due to the air inside the observatory differing in temperature from the external. It is found that measures of the altitude of the pole show a daily fluctuation in magnitude varying directly with the altitude of the sun. Among the numerous citations —there seems to be no reference to the work of Mr. S. Shinjo—one significant item concerns a systematic difference amounting to 0·11″ found between visual and photographic determinations caused by the heating effect of a small dark-room lamp fixed to the south of the photographic zenith sector.

In No. 4812 von B. Wanach discusses the Kimura term "z." Dr. de Sitter's view is adopted that the greater part of this term is due to the method of reduction. Refraction anomalies are considered to be a sufficient cause for the remaining part. The "z" term having been hypothesised out of existence, the attempt is made to modify the group corrections as obtained by the "Kettenmethode," so that in the mean "z" vanishes for all stations and years. To this end a modified "z" is taken as a negative declination correction, and new values are derived for the group corrections for the six northern international stations. The differences between successive groups show an annual oscillation having a maximum in spring and a minimum in autumn, whilst the amplitudes for the three Continental stations markedly exceed those at the "maritime" situations, thus indicating the probability that variations of zenith refraction of meteorological origin are operative.

STELLAR PROPER MOTIONS DETERMINED STEREOSCOPICALLY.—Quite recently M. Comas Sola, of the Barcelona Observatory, recorded some qualitative observations of stellar cross-motions obtained by stereoscopic comparison of stellar photograms (this col., August 26). According to the *Astronomische Nachrichten* (No. 4811) it now appears that Prof. Max Wolf has employed the stereoscope most successfully in quantitative determinations. Results are given of measures of the proper motions of eight stars in the neighbourhood of σ Leonis made on plates secured with the 16-in. Bruce telescope at an interval of 12·108 years, one of the plates having been taken in 1903, the other in the early part of the present year. The stars measured range from 7·0–12·5m. magnitude, and the yearly motions vary from 0·31″ to 1·18″. Some of the stars have been measured previously, *e.g.* the pair 83 Leonis by Kobold among others, who found the annual motion of 0·77″, whilst the new method gives 0·74″ for the same quantity.

ROTATION PERIOD OF NEPTUNE.—Mr. Maxwell Hall has published (Monthly Notices R.A.S., vol. lxxv., No. 8) the results of photometric observations of this planet made during its recent opposition; thirty-five measures of magnitude were obtained during the period February 26 and May 10 of the present year. The magnitude ranged from 6·87 to 7·76, and the period which best fitted the measures was 7h. 50m. 68s. Similar observations made during November, 1883, gave a period of 7h. 55m. Greater continuity in the series of observations is necessary, and the co-operation of observers well distributed in longitude is therefore invited.

THE INTERNAL CONSTITUTION OF THE EARTH.—Mr. Harold Jeffreys, who has recently published several important theoretical investigations on the physics of the earth and moon (Mem. R.A.S., vol. lx., part vi., and Proc. R.A.S., vol. lxxv., No. 8, pp. 648–658), contributes a very useful article to the current number of the *Observatory* on the mechanical properties of the earth A good idea is given of the manner in which a number of apparently widely differing lines of investigation have in reality converged in adding to our information—albeit at times in a somewhat conflicting fashion—regarding the state of the earth's interior.

PHOTOMETRIC OBSERVATIONS OF δ CEPHEI.—During the period June 10–September 26, 1914, Dr. Giuilo Bemporad and Dr. V. Fontana collaborated in making a fairly numerous series of photometric measures of the light of this star. Dr. Bemporad's results appear in the *Mem. Spett. Ital.*, June, 1915. The mean light curve shows a secondary maximum, and at a later phase an inflection. A further analysis of the data was made with special reference to the secondary oscillations.

THE EVOLUTION OF THE STARS AND THE FORMATION OF THE EARTH.—The second course of lectures on the William Ellery Hale foundation was given at the meeting of the National Academy of Science at Chicago last December by Dr. W. W. Campbell under the above title. These lectures are now being published in *The Popular Science Monthly*, beginning in the September number.

THE ETNEAN EARTHQUAKES OF MAY, 1914.

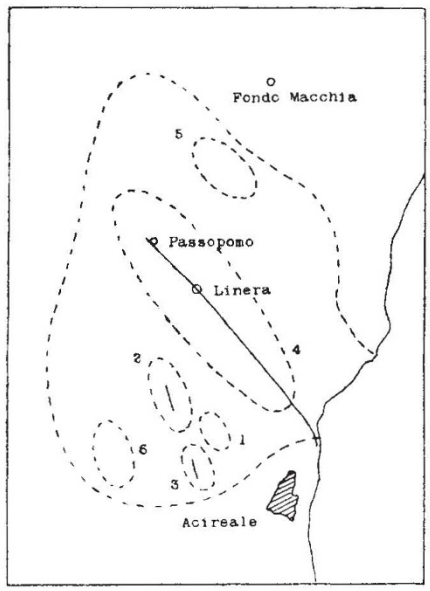
THE term *volcanic earthquakes* has for long been applied to all earthquakes originating within the bounds of active or dormant volcanoes. Such earthquakes are usually distinguished from ordinary tectonic earthquakes by their small disturbed areas, the great intensity of the shocks near the centres of those areas, the brevity and abruptness of the shocks, and the comparative absence of fore-shocks and after-shocks. While the countless tremors which precede and accompany volcanic explosions are no doubt the effects of such explosions, it has been assumed, perhaps rather hastily, that all volcanic earthquakes are as intimately connected with the volcanic operations. Several recent investigations (see NATURE, vol. xcii., pp. 716–7; vol. xcv., p. 215) have, however, shown that many volcanic earthquakes are of a tectonic or semi-tectonic character, and that both earthquakes and eruptions are in all probability effects of the same cause or causes.

The more important Etnean earthquakes evidently belong to this category. They originate beneath the volcano—in recent cases, below its eastern flank—and they are closely associated in point of time with explosions or periods of increased activity of the volcano. Moreover, their seismic foci are at a slight depth. On

the other hand, the meizoseismal areas are much elongated and their longer axes are directed roughly towards the central crater and at right angles to this direction, implying that they are probably due to slipping along radial and peripheral fractures (see NATURE, vol. xciii., pp. 272–3).

The earthquakes of May, 1914, on the eastern flank of Etna, supply useful evidence on this subject. They have been studied with great care by Prof. Gaetana Platania,[1] who, with ample materials at his command, confirms the conclusion arrived at in the last-mentioned paper. Several of the shocks, besides the principal earthquake of May 8, were of destructive intensity, and the outer broken line on the accompanying map includes all the places in which houses were damaged by the different shocks.

Slight earthquakes were felt within this area on April 28 and 30, and May 1 and 2. The series proper began on May 5. On May 7 at 5.35 p.m. (G.M.T.) there was a strong double shock, the two parts being separated by an interval of three to four seconds. In the epicentral zones, indicated by the curves Nos. 1 and 2, walls were cracked and some houses damaged.



This may, as Prof. Platania suggests, have been a twin-earthquake, but the evidence is insufficient to decide the point. Soon afterwards, at 9 p.m., another strong shock caused slight damage within the area represented by the curve No. 3.

On the morning of May 8, only light vapours were being emitted from the central crater of Etna and from the vent on the north-east flank opened in May, 1911. At about 5.30 p.m., however, extraordinary activity was manifested in both, and this continued for several days with a first maximum on the evening of May 10, and activity above the average for the rest of the month.

Shortly afterwards, at 6h. 1m. 30s. p.m., occurred the principal shock of the series, by which the towns of Passopomo, Linera, Cosentini, Carico, and Mortara were destroyed. The meizoseismal area is an elongated ellipse (No. 4), about 6 km. long and 2 km. wide. There was also a detached area of somewhat less destruction (No. 5). Within the meizoseismal area not only were the houses ruined, but the ground itself was crushed. A slightly sinuous fracture traverses the axis of this zone, as shown by the continuous line in the map, and in its neighbourhood the ruin was complete. Throughout its course there is almost everywhere a change of level, in some places of a few centimetres only, in others of as much as 40 centimetres or more, the ground on the north-east side being depressed relatively to that on the south-west side. There are also traces of a slight horizontal displacement.

Between May 8 and June 4 thirty after-shocks were recorded, only one (that of May 28) being of any importance. The meizoseismal area of this shock is indicated by the curve No. 6. Prof. Platania notes that there were other migrations of the epicentres besides those noted above. He concludes that, during this seismic period, the whole eastern flank of Etna was disturbed, probably by subterranean movements of the magma, which were responsible both for the increased activity of the volcano and for the slips along radial fractures which resulted in the earthquakes.

C. DAVISON.

[1] Sul periodo sismico del maggio 1914 nella regione orientale dell' Etna, *Publ. dell' Ist. di Georg. Fisica e Vulcanologia della R. Università di Catania*, No. 5, 1914. Pp. 1–48.

METEOROLOGY WITHOUT INSTRUMENTS.[1]

THOSE who have been compelled to wade through the long-continued record of meteorological observations know and dread the serried columns of figures that tell of the scrupulous care with which the conscientious observer has read his barometer and thermometer. As a rule, it is impossible to inspire the mechanical and lifeless record of the weather of the past year, or of the past decade, with any lasting interest, but Mr. Backhouse, departing from stereotyped methods, has given us a book on climatology that does not weary by its monotony or tire by its endless repetitions.

Much of the success and charm of this volume depends upon the fact that it is a human document, recording what has been seen and experienced, not what is automatically registered by ingeniously devised instrumental methods. It is a revelation of character as well as an inquiry into the variation of climatic factors. This record goes back to the time when the author was a schoolboy at York, and demonstrates the value of habits of accurate and intelligent observation, diligently preserved through life. With perseverance and practice has come an acuteness of perception that has made Mr. Backhouse one of the most successful observers of those minute differences in the appearance of the sky or of the atmosphere that escape untrained observers, who prefer to consult the barometer rather than natural phenomena. And with the increased capacity for observation has come apparently the greater opportunity for exercising it. To most people, the observation of such phenomena as lunar rainbows or parhelia is a rare event, and without such a trustworthy record as we have here, many would be inclined to doubt their frequency. Take again such instances as the successive alternation in the wind direction, known as "land and sea breezes." Although the cause is operative all over the world, we have come to regard these winds as confined mainly to a few tropical localities, and believe that it would be vain to attempt their observation, except in these favoured spots. But Mr. Backhouse shows how the attentive observer can study the behaviour of these alternating breezes on our own coast, and even mark the varying direction, as the azimuth of the sun, at rising and setting, changes at different

[1] Publications of West Hendon House Observatory, Sunderland. No. iv. Meteorological Observations, chiefly at Sunderland. By T. W. Backhouse. Pp. v+188. (Sunderland : Hills and Co., 1915.)