## OUR ASTRONOMICAL COLUMN.

THE METEORIC SHOWER OF OCTOBER.—Between October 13 and 28 last, inclusive, observations were obtained at Bristol on fourteen nights, and 197 meteors were seen in twenty-three hours of watching, chiefly before sunrise. Fifty-six of the meteors recorded belonged to one or other of the two principal displays of the October epoch near $\xi$ Geminorum (98°+14°, thirty-two meteors) and $\nu$ Orionis (92°+15°, twenty-four meteors). The former was also the stronger shower in 1916, and in some previous years, though in 1877 and 1887 the Orionids formed by far the richer display. Of the minor showers the most active were at 42°+20° in Aries, and 163°+59° near $\beta$ Ursæ Majoris.

Two fireballs have been recently observed with sufficient completeness to allow their real paths to be ascertained, viz.:—

(1) October 18, 2h. 15m. a.m., radiant 90°+16°, height seventy-two to forty-seven miles over Lincolnshire.

(2) October 23, 7h. 33m. p.m., radiant 42°+20°, height sixty-five to thirty-three miles from over North Sea to west of Scarborough.

GALACTIC CONDENSATION OF STARS.—Expressing galactic condensation as the ratio of the number of stars per unit area at 5° galactic latitude to the number at 80°, Kapteyn found values ranging from 2·8 at the ninth magnitude to 27·7 at the sixteenth. The relatively large value for the very faint stars did not appear in Chapman and Melotte's discussion of the Franklin-Adams plates, but it has since been substantially confirmed by work with the 60-in. reflector at Mt. Wilson. A further investigation of this question has been based by Dr. F. H. Seares on the counts of nearly 600,000 stars which have been collected by Prof. Turner (*Astrophysical Journal*, vol. xlvi., p. 117). The galactic condensation deduced from these is in close agreement with the results obtained by Kapteyn. The variations of density with right ascension, however, are not greater than the uncertainties affecting the results, so that no evidence was found for the spiral of obscuring matter derived by Prof. Turner from the same data. It would appear that Prof. Turner did not make sufficient allowance for the high galactic concentration of the faint stars.

THE VARIABILITY OF B.D. +56·547°.—The variability of this star was first detected by Mr. J. Van der Bilt, and, at his suggestion, the photographic magnitudes have been determined by Messrs. Martin and Plummer from numerous plates taken at Dunsink in connection with a previous study of three other variables in the region of $\chi$ Persei (Monthly Notices, R.A.S., vol. lxxvii., p. 651). The star has turned out to be of rather special interest, inasmuch as it shows an unexpected periodicity. The interval from maximum to maximum is about 704 days, and the range of variation is from magnitude 9·8 to 10·3. The other three stars resemble it in having a high colour-index, and are therefore probably in a similar physical condition, but these vary in the irregular way which is characteristic of nearly all variables which are very red.

THE "JOURNAL DES OBSERVATEURS."—The index to vol. i. and the first number of vol. ii. of this publication have been received. The journal is especially noteworthy for communications relating to observations and ephemerides of minor planets and comets. The current issue gives ephemerides of the planets (108) Hecuba and (394) Arduina, together with observations of numerous planets made at Nice, and of Mellish's comet (1917*a*) made at the Cape Observatory. The editor is M. Henry Bourget, director of the Observatory of Marseilles.

## MILITARY AIRCRAFT AND THEIR ARMAMENT.

AN article of considerable interest, under the title of "La Technique Allemande de l'Armement Aérien," appears in *La Nature* for October 6 by Jean-Abel Lefranc. The author traces out the development of German aerial warfare, with particular reference to the armament of military aircraft. Victory in the air, he says, depends on two sets of factors—tactical and technical. Under the former head he places favourable time of attack, good position, powerful formation; under the latter, armament, speed, flexibility of control, and altitude. To secure a good tactical position a machine must possess good technical factors; for instance, good armament is useless unless a machine is fast enough to be able to challenge the enemy to battle. Nevertheless, the pilot counts for a great deal, and the "Farmans" of 1915 beat the "Aviatiks," although the latter were faster, better armed, and more flexible. M. Lefranc remarks that the relative importance of the technical elements depends on the purpose of the machine; for a battle-plane, he places them in the order speed, flexibility, armament, and altitude. The last attribute might be omitted, since a fast machine is always a good climber unless the landing speed is abnormally high. For slow and heavy machines designed for bombing, a powerful defensive armament is most essential. For night raiders radius of action, bomb capacity, and facility of landing are more important than armament. The speed of both French and German fighters varies from 100 to 120 miles per hour. These speeds could be higher but for the necessity of a reasonable landing speed and a good climbing rate. The heavy bombing machines fly at speeds from eighty to ninety-five miles per hour. Flexibility has now developed almost without limit.

M. Lefranc divides the period since the war commenced into two parts. In the early days the importance of the mastery of the air had not been fully appreciated, and aerial combats were rare. The chief use of aeroplanes was to obtain information as to the enemy's position. The French machines, being of the "pusher" type, mounted the gun in front, and had a large "dead angle" behind, which was out of the range of fire of the gun. The German machines were mostly tractors and mounted their guns behind the main planes. They had the decided advantage that their "dead angle" was under the surveillance of the pilot. Early aerial fights were generally ineffective, and resulted in a few bullet-holes in the wings, mainly owing to difficulties of aim and the small quantity of ammunition carried.

The later period of the war has produced three main types. The first type resulted from the design of a gun firing through the propeller and under the control of the pilot. Firing through the propeller may be achieved by fitting metal shields to the blades to prevent destruction by the bullets, but is better attained by automatic timing of the firing to miss the blades, as this need not interfere with the design of an efficient propeller. The second type, a heavier machine, mounts a rear gun on a turntable, in addition to that firing ahead through the propeller. In the third type, of which the 1916–17 Gotha is an example, twin propellers are used, and both forward and rear guns have a wide angle of fire. There is also a third gun firing below the fuselage, as a defence against attack from below—a very vulnerable point in the older machines. This third type has no "dead angle," but can bring one or other of its guns to bear on any point. One of the greatest difficulties of effective gun practice in the air is that due to error of aim resulting from the relative movement of the two machines. Various

attempts to correct the aim by automatic sights have been made, but the most effective measure is to fire as many rounds as possible during the combat; hence the frequent duplication of a forward fixed gun.

M. Lefranc concludes his article with a brief description of the types of bullet used by the Germans. He mentions four types: the ordinary bullet, the perforating bullet for destroying the engines and metal parts of a machine, the incendiary bullet, and the explosive bullet. The articie is liberally illustrated with sketches and diagrams, and is well worthy of perusal. Any attempt to trace developments further than M. Lefranc has done would doubtless be censored; indeed, some ten lines of the article in question have been censored as it is. We have, therefore, contented ourselves with a brief *résumé* of the most important points of the article, as they will doubtless be of interest to those who follow the progress of the scientific development of aircraft.

## *REPORTS ON CLIMATES.*

AN interesting memoir on the climate of Bagdad ("Sul Clima di Bagdad"), by Prof. Filippo Eredia, appears in a recent issue of the *Bollettino della Reale Società Geografica Italiana*, under the auspices of which a mission was dispatched in 1908, led by Dr. A. Lanzani. Prof. Eredia summarises the more salient features of this expedition's work, and further utilises information given in various papers by Eliot, Hann, and Gilbert Walker. Bagdad is in lat. 33° 19′ N., long. 44° 26′ E., the height of the cistern of the barometer above sea-level being 127 ft. The mean barometric pressure at 32° F. sea-level and lat. 45° is 29·893 in., being highest, 30·149 in., in January, and lowest, 29·543 in., in July, a variation in the monthly means of 0·60 in. The mean annual temperature is 73·0° F., ranging from 94·5° in July and August to 48·9° in January. The mean of the daily maxima is 86·0°, the mean monthly values ranging from 109·9° in August to 59·5° in January. The mean of the night minima is 60·1°, highest in July, 79·5°, and lowest in January, 38·1°. The highest temperature recorded was 122°, and frost is not uncommon from November to February. The mean daily range of temperature varies from 33° in August and September to 20° in December. The relative humidity is 58, rising to 80 per cent. of saturation in December and January, and falling to 38 per cent. in June. The mean cloud amount (overcast sky = 100) is only 16, the extremes being 29 in March and 1 in July. Various authorities place the annual rainfall between 6·94 in. and 9·04 in., practically all of which falls between November and April. June, July, and September are rainless, but slight showers have fallen in May, August, and October.

A useful paper appears in the *Bollettino d'Informazione* (Anno iv., N. 7–8–9) of the Italian Ministry for the Colonies, by Prof. Eredia, on the climate of Derna, an important commercial centre of Bengasi, situated in lat. 32° 45′ N., long. 22° 40′ E. Some fragmentary data collected by previous writers is first summarised, but the greater part of the paper is taken up with a discussion of observations extending from March, 1913, to December, 1915, made with a complete instrumental installation. The observations made at 9 a.m., 3 p.m., and 9 p.m. are collected in ten-day periods for each of the three hours. The mean annual temperature is 68° F., of August, the warmest month, 78·3°, and of January, the coldest month, 57·4°. The extremes noted have been 112° and 40°. The mean annual barometric pressure is exactly 30 in., showing a range of 0·17 in. between December (the month of highest pressure) and July (the month of lowest pressure). The annual rainfall is 7·94 in., of which 86 per cent. falls between November and February. There are fifty-one days in the year with precipitation, July and August being rainless. In spite of the small rainfall heavy downpours are occasionally observed. Thus 3·13 in. have fallen in two days, and three daily falls exceeding an inch have occurred. The prevailing wind, except in December and January, is north-west, one result of this being the remarkable steadiness of the relative humidity, which in no month differs appreciably from the annual mean of 62. The mean amount of cloud varies from 9 per cent in July to 57 per cent. in February.

Prof. Eredia discusses in vol. xxvi. of the *Rendiconte della R. Accademia dei Lincei* the monthly variations of barometric pressure at twelve places in Italy, based on data for the thirty-five years 1881–1915. The maximum is in January and the minimum in April at all stations. At Pesaro, Florence, Rome, and Lecce there is a well-marked secondary minimum in July. The variation in the monthly means diminishes appreciably with latitude, the amplitude between the months of highest and lowest pressure being 0·07 in. less on the southern coasts than at northern inland stations. Prof. Eredia also contributes a paper, "Le Brine in Italia," to a recent issue of the *Bollettino Bimensuale della Società Meteor. Ital.*, in which he summarises the results of an investigation into the frequency of hoar frost in Italy. The mean monthly number of cases is given for fifty stations well distributed over the country for the five months, November to March, during the twenty years ending 1915. The greatest number of cases is in January, closely followed by December. Pavia, in Lombardy, has an average of forty-one cases during the five months under consideration, whilst at Naples the mean frequency is only 0·4. In most districts coastal stations have a relatively small number of cases as compared with inland stations contiguous. The distribution of pressure and also local conditions favourable to the production of hoar frost are discussed in considerable detail. The insertion of a small map showing the position of the stations utilised would add much to the interest of Prof. Eredia's valuable investigations into various phases of Italian climatology.

R. C. M.

## *EVOLUTION OF THE PRIMATES.*

DR. W. K. GREGORY, of the American Museum of Natural History, New York, has contributed to the Bulletin of that institution a series of studies on the "Evolution of the Primates." In part i. he reviews the theory of cusp-formation which was first formulated by Cope and afterwards elaborated and perfected by Osborn, and contends that all later discoveries have justified their supposition that the upper molars of primates (and also of all typical placental mammals) are modifications of a common tritubercular type, while the lower molars are modifications of a "tuberculo-sectorial" form. In his opinion the similarity of the molar type in all forms of man and anthropoid, both living and extinct, is a matter beyond dispute.

In part ii. Dr. Gregory discusses the phylogeny of the known anthropoid and human types. He regards the chimpanzee and gorilla as man's nearest allies, and, on the present evidence, thinks the common stock from which all three arose may have been in existence during the Miocene period. His review of the dental characters of extinct anthropoids is most welcome. He cannot agree that the genus Sivapithecus, recently described by Dr. G. E. Pilgrim, of the Geological Survey of India, stands in the direct line of human