OUR ASTRONOMICAL COLUMN.

OCCULTATION OF MARS, APRIL 13.—An occultation of Mars by the moon will take place at 10.28 p.m. on April 13, the planet disappearing behind the dark limb of the moon in position-angle 0°. Emersion will take place at 11h. 4m. p.m. in position-angle 278°, the angle in each case being reckoned from the zenith point of the moon towards the east.

COMET 1910*a* AND HALLEY'S COMET.—From an article by Mr. Knox Shaw, published in No. 40 of the *Cairo Scientific Journal*, we learn that photographs of comet 1910*a* were secured at the Helwan Observatory. The comet was first seen ten minutes after sunset on January 20, clouds having prevented earlier observations. The Reynolds reflector was not ready for photographing objects at such low altitudes, but some good photographs were secured with a 4-inch Cooke lens on January 24, 25, 27, and 28; more cloudy weather then intervened. The photographs show the twin tails and also the southern secondary tail, which is much fainter, and can only be traced to a distance of 40′ from the head.

Mr. Shaw also publishes a useful diagram of the path of Halley's comet, with regard to the sun and the earth, during the period February 1 to May 29. A photograph of this object, obtained at Helwan on January 28, showed faint traces of a tail about 18′ in length.

Three excellent photographs of 1910*a*, and one of Halley's comet, appear in No. 1, vol. iv., of the Journal of the Royal Astronomical Society (Canada). They were taken at the Dominion Observatory, Ottawa, on January 25, 28, 31, and February 10, respectively. On the last-named date the negative of Halley's comet showed a tail ½° long.

A brief message from M. Jean Mascart informs us that he is at Teneriffe, where, at an altitude of 2700 metres, he intends making observations of Halley's comet. M. Mascart's station is very near that occupied by Piazzi Smith during his sojourn, for astronomical observations, in the island.

SUN-SPOTS AND FACULÆ IN 1909.—Prof. Ricco's usual annual summary of the sun-spots and faculæ observed at Catania during 1909 appears in the February number of the *Memorie di Astrofisica ed Astronomia* of the Società degli Spettroscopisti Italiani (vol. xxxix., p. 17). On the whole, the activity displayed during 1909 was markedly less than that of 1908. In April, 1909, there was a sudden decrease of spots, the mean frequency becoming 2·5 instead of 4·1 as it was in March. This low value continued for six months, but in October there was a renewal of activity, the mean frequency again rising to 4·3, a value which it maintained until the end of the year. Thus, although the quarterly values of the frequencies were 4·1, 2·4, 2·3, and 4·3 respectively, the half-yearly values were more nearly equal, at 3·1 and 3·2, the latter also being given as the mean frequency for the whole year. The frequency values for faculæ vary in the inverse to those of spots, the quarterly values being 1·2, 1·4, 2·1, and 1·2; the mean for the year is 1·6.

THE NATURE OF COMETS' TAILS.—In the course of an article on the present position of the problem of the formation and constitution of comets' tails, which appears in the *Physikalische Zeitschrift* for March 15, Dr. L. Zehnder revives and extends a theory he first put foward twenty-six years ago in the pages of *Kosmos*. According to this theory, as the swarm of meteorites which constitutes a comet approaches the sun, the meteorites nearer the sun begin to give out gases and vapours which arrange themselves as atmospheres about single or about groups of several meteorites. These atmospheres refract the light from the sun, and, according to their densities, concentrate the sun's rays to foci at different distances behind themselves. If a meteorite is present at a focus it may be rendered visible, or even be heated sufficiently to produce combustion of any hydrocarbons present in it. The meteorites thus heated surround themselves in turn with atmospheres which concentrate the sun's rays on still more remote meteorites, and the visible tail of a comet is, according to the theory, the locus of the successive foci. Dr. Zehnder considers the forms of the refracting atmospheres which would produce the various types of tails now known.

PERIODIC ERRORS IN RIGHT ASCENSION OF STANDARD STAR CATALOGUES.—A comparison of the periodic errors of the right ascensions of the Newcomb, Auwers, and Boss standard catalogues is published by Dr. Downing in No. 420 of the *Observatory*. The comparisons were made with the "Standard Mean Right Ascensions of Clock Stars for 1900·0, based on Twelve-hour Groups," published in the Greenwich "Second Nine-year Catalogue," the places there given being, presumably, free from periodic errors depending upon right ascension.

The differences found are very small in amount, but most interesting in their distribution. There is a distinct drop at R.A. 4h. and a rise at R.A. 20h. which are too persistent, throughout the catalogues, to be entirely due to accidental errors. It is suggested that the peculiar distribution of magnitude through R.A. may account for some of, but not all, the discordances in question.

OBSERVATIONS OF SOUTHERN DOUBLE STARS.—The first number of the Circular of the Transvaal Observatory is devoted to the measures of a number of double stars discovered by Mr. Innes, with the 9-inch Grubb refractor, south of declination −19°. Experience shows that this instrument, used at the altitude (5900 feet) of the Transvaal Observatory, is capable of resolving very close doubles (0·3″) discovered by Prof. Hussey with the 36-inch refractor at Lick, and 11 per cent. of the 268 stars (Innes, 433–700) now given are separated by not more than 0·5″; 43 per cent. have distances of 1·0″ or less. Mr. Innes also gives a list of stars which have been wrongly identified by other observers.

THE "GAZETTE ASTRONOMIQUE."—We regret to learn from the current number of the *Gazette Astronomique*, published by the Antwerp Astronomical Society, that, until further financial support is forthcoming, this very useful journal for amateur astronomers will only be published alternate months, instead of monthly, as heretofore. The *Gazette* always contains ephemerides, notices of phenomena, &c., in addition to interesting accounts of observations; the subscription is 3 francs per annum, post free.

AURORAL DISPLAYS.

BRILLIANT displays of aurora were reported from many different parts of Scotland on the nights of March 27, 28, and 29, and aurora was also observed in Ireland and the northern portion of England. At Aberdeen aurora was seen each night between 8 and 9 o'clock. The *Westminster Gazette* gives an account of a brilliant display seen at Edinburgh early on the morning of March 28, stating that two separate displays were seen before 2 a.m., and there was a third shortly before 2.30 a.m. One of the first indications of the coming of this third display was a long, luminous shaft stretching upwards and intersecting the constellation Cassiopeia at a point near the star δ Cassiopeiæ. For some seconds it remained motionless and alone, like the tail of a great comet. Then the sudden flashing forth of a myriad quivering shafts and sheaves of light, exquisitely and delicately tinted, outlined a wide arch of striking beauty.

Mr. Wilfred C. Parkinson, writing from Eskdalemuir Observatory, Scotland, gives the following interesting details of the display on March 28:—

8.10 p.m.—Luminous band first observed in N. rising slowly like a bank of light cloud.

8.14–8.38.—Gradually assuming a curved form 10°–12° above horizon at middle point, which was rather to the W. of N., and about 8° in width. Length about 140°.

8.40.—Band very bright and well defined, very intense at top edge, gradually thinning out towards the lower edge.

8.53.—The lower edge of the main band had formed a distinct band by itself, running parallel to the higher band, but not so wide, long, or intense. Higher band of uniform intensity throughout.

8.54.—Vertical streamer gradually forming, and also smaller ones, fluctuating in length and brilliancy.

8.56.—Vertical streamer very intense, especially where the curved bands cross it.

8.59.—Lower horizontal band gradually disappearing. Upper band growing faint and ill-defined. Vertical streamers growing more numerous.

(A most marked feature after 9h. was the way in which the streamers formed in the north and moved in a procession towards the west.)

9.8.—Lower band entirely gone. Upper band still visible, but faint. Numerous vertical streamers forming and intersecting the horizontal band.

9.16.—Horizontal band had entirely disappeared. Vertical streamers had increased in numbers and intensity. Constant fluctuations in brilliancy until 9.28, when last streamer had disappeared.

Mr. S. L. Elborne, writing from Peterborough, reports that on March 28, about 6 p.m., he saw a magnificent display of parhelia or mock suns, lasting about twenty minutes; on each side of the sun, and at equal distances from it in the same straight line, and parallel with the horizon, appeared a brilliant spot displaying the colours of the spectrum in the centre of each, giving the effect of three suns setting simultaneously; from each arose a luminous band, thus making a splendid arch over the true sun.

THE PUBLIC HEALTH OF THE METROPOLIS.[1]

THIS report abounds in information of great interest to all who have at heart the well-being of the metropolis. The first part relates almost exclusively to vital statistics, the second to public health administration, and the third part contains much instructive matter upon school hygiene.

The year 1908 was a very exceptional one for London so far as vital statistics are concerned, for the marriage-rate (15·9), birth-rate (25·2), and death-rate (13·8) were the lowest ever recorded. The death-rate has shown a decline for the past forty years, while in the case of the birth-rate the fall year by year has been slight, but uninterrupted, for some thirty years. What this decline in the death-rate of a population of 4,795,757 persons implies is very forcibly expressed in terms of "life capital." By this expression is implied the years of life saved to the community by a reduction in the death-rate. The number of lives saved at each age period (as calculated by comparing the number of deaths for the year, in each age period, with the mean death-rates for those age periods for ten years, and crediting each life saved with the years representing the expectation of life at that age) represented a saving of 26,205 lives, and a gain to the community of 1,066,770 years of "life capital." The highest corrected death-rates were furnished by the City of London, Finsbury, and Bermondsey, and the lowest by Hampstead and Lewisham.

The infant mortality rate was lower in London for the last decennium than in all save one of the thirteen other large English towns; and London had a lower figure for 1908 than any of those towns. This fact, as Sir Shirley Murphy, the Medical Officer of Health, states, is matter for congratulation, though, as he adds, it needs to be remembered that the infant mortality rate is liable to considerable fluctuation, owing to climatic conditions and varying degrees of prevalence of epidemic maladies. There are notable differences in the rates of infant mortality in districts well and badly circumstanced socially, a fact which sufficiently indicates the results which might be obtained if the infants of the less favoured districts had extended to them the same care as that bestowed upon infants of the better favoured districts. Among metropolitan boroughs the loss of infant life has for several years been greatest in Shoreditch and Bermondsey, and least in Hampstead.

The infant mortality rate is, of course, affected by the administrative efforts made to reduce it, but the rate is so extremely sensitive to other influences, which vary from year to year, that the value of this work cannot be judged by the mortality of the moment. Among systematic efforts now being made in the metropolis for the preservation of infant life, Sir Shirley Murphy commends the system of visitation by health visitors, and he points out that the Notification of Births Act, 1907, which is such a valuable measure for enabling this work to be undertaken most advantageously, had in 1908 been adopted in all but eight boroughs. In some districts official workers were supplemented by a staff of voluntary workers supplied by local health societies.

During the year 1908 the lowest death-rate from the epidemic diseases was recorded. No death occurred from small-pox, and the deaths from measles, whooping-cough, diphtheria, enteric fever, diarrhœa, and phthisis were below the averages of the last ten years, but those from influenza and scarlet fever were above the averages.

The London vaccination returns give food for thought and apprehension. As legislation has made it more and more easy to obtain exemption from vaccination, the unvaccinated children would be expected to increase. The latest returns recorded are those for the year 1906, when the percentage of unvaccinated children was 21·2, as against 26·4 in 1896, 7·8 in 1886, and 6·5 in 1876. There can be little doubt that the percentage of exemptions for the past three years will, when these are available, demonstrate a considerable increase. A notable feature in the behaviour of enteric fever in London in recent years has been the manifestation of localised prevalence occurring in poor populations and lasting often for a considerable number of weeks. There were two such prevalences in 1908, one in Bethnal Green and the other in Shoreditch, and Dr. Hamer furnishes, in an appendix, a full report on these two outbreaks.

Special reference is made to results obtained by Dr. Sidney Davies from the voluntary notification of zymotic diarrhœa among infants in Woolwich in the months of July, August, and September. Dr. Davies is of opinion that the infection spreads from person to person, and he thinks the distribution of the cases is consistent with the hypothesis that the disease is conveyed by flies. An examination of the statistics contained in his inquiry shows that while infants who are breast-fed suffered much less than those artificially fed, there is not much difference between the incidence of attack on children fed on cow's milk and those fed on condensed milk—except among the children fed on cow's milk at the Infants' Milk Depot, who suffered much less than other infants artificially fed.

The phthisis death-rate for 1908 was the lowest ever recorded. It amounted to 1·32 deaths to every 1000 persons living during the year. In dealing with phthisis the Medical Officer comments upon the work done in connection with the voluntary notification system in operation in twenty-one London boroughs in 1908, and he refers to the Order of the Local Government Board requiring notification of cases of phthisis in London which occur in Poor Law practice. London is, however, as the medical officer points out, but very imperfectly provided with the opportunities which are needed for utilising the knowledge thus gained. Phthisis mortality occurs especially among the poor, and measures for its reduction must not only include sanatoria and hospitals, but also those which afford assistance not only to the sufferer, but often to the families which are dependent upon him. It is here that the extension of philanthropic effort is greatly needed.

For the purpose of enabling the incidence of cancer on the several populations of the London sanitary areas to be more precisely stated, factors have been calculated for correcting the death-rates, so far as possible, for the differences in the age and sex constitution of the several populations compared. When these allowances are made it is found that in the year 1908 St. Pancras (1·17) had the highest rate, and that the lowest obtained in Fulham (0·79).

The question of nuisance from flies in connection with deposits of house refuse and stable manure has again been dealt with on lines similar to those followed in 1907, and the observations form the subject of another appendix to the report. In 1907, as in 1908, the large part played by collections of horse manure in determining fly prevalence was abundantly apparent, and the need for regulating the sanitary condition of stables was thus again emphasised.

On July 1, 1908, the administration of the General Powers Act, 1907, part iv., was brought into operation, and from that time until the end of the year 620 samples of milk were taken, principally from churns at the large railway stations. Of the samples in which it was found practicable to make a complete examination, 11·6 per cent. were found to be tuberculous. The farms supplying the

[1] Report of the Public Health Committee of the London County Council, submitting the Report of the Medical Officer of Health of the County for the Year 1908. (London: P. S. King and Son.) Price 3*s.* 6*d.*