Between April and May, however, the isotherm of −55° passes into the upper atmosphere, where, comparatively speaking, warm conditions prevail in the advective layer from May to September. As this method of plotting the results shows clearly the temperature variations throughout the year at high levels, I thought the diagram might be interesting to your readers. R. M. DEELEY.

Inglewood, Longcroft Avenue, Harpenden.

The Weather of 1911 and the Ultra-violet Radiations of the Sun.

IN connection with Dr. Shaw's attempt to explain the remarkable weather of this summer (NATURE, November 30), I should like to direct attention to a point of view which in general, but especially in the past summer, deserves the attention of meteorologists. My remarks are based on a series of experiments which I carried out, together with Prof. Lenard (P. Lenard and C. Ramsauer, "Über die Wirkung sehr kurzwelligen ultravioletten Lichtes auf Gase und eine sehr reiche Quelle dieses Lichtes," Heidelberger Akademie, five parts, 1910–11).

Dr. Shaw states that all conditions necessary for a heavy rainfall appeared to be present, without rain falling. But he has not paid attention to an important condition: for the production of rain nuclei must be present, which can serve as centres of condensation when all other necessary conditions are fulfilled. The absence of such nuclei is in my opinion the chief cause of the remarkable weather of this year.

In the work just quoted we have clearly separated, for the first time, the different actions of ultra-violet light on gases, and explained the complicated effects due to their simultaneous existence. We distinguish three actions of ultra-violet light on dust-free gases:—

(1) The formation of electrical carriers of molecular size, caused by selective absorption of the light; the power which these carriers possess of producing condensation is, according to our experiments, very small compared to that of the nuclei, originally neutral, mentioned under (3).

(2) Chemical action, *e.g.* formation of ozone in oxygen; this effect is connected with but small absorption of the light.

(3) Formation of condensation nuclei, *i.e.* formation of solid or liquid products by the direct action of the light on the gases; *e.g.* formation of drops of hydrogen peroxide from water vapour, as found by Mr. C. T. R. Wilson, or by subsequent reaction of the products formed with the other components of the air, *e.g.* formation of ammonium nitrate and nitrite from ozone and ammonia. The size of these nuclei depends on the intensity of the light and their time of formation. Their chief property is their great power of acting as centres of condensation, and the larger they are the more active in this respect. They possess *originally* no electric charge, but easily acquire one if carriers of electricity are simultaneously produced by coming together with these; the presence of a charge has no effect on their power of acting as condensation nuclei.

This gives us the chief source of nuclei in the earth's atmosphere. If we neglect the purely local formation of nuclei in large centres of industry, then the ultra-violet, and to a minor degree the kathode, radiation of the sun is chiefly responsible for the nuclei which are meteorologically so important. This production of nuclei extends from the uppermost down to fairly low-lying layers of the air, as the active rays are only absorbed to a small extent, and is chiefly conditioned by the amount of oxygen and ammonia present.

Thus the lack of nuclei, and the consequent fine weather of this year, can be attributed to a much diminished ultra-violet radiation of the sun. This is in accord with the now existing minimum of general activity of the sun, as characterised by the minimum of sun-spots and northern lights. This view is not contradicted, but confirmed, by the high temperature on the surface of the earth, as this is principally conditioned by the increased clearness, *i.e.* transparency to heat radiations, of the atmosphere.

CARL RAMSAUER.

Radiologisch-Physikalisches Institut, Heidelberg, December 9.

"Draysonia."

IN NATURE of November 16 you have done me the honour of inserting a review of my book "Draysonia." As the reviewer appears to have been under some misapprehension, I beg you will in justice do me the favour of inserting a few words of explanation.

I am well aware of my inability to do full justice to the late General Drayson in attempting to bring his theory under public notice. But it is evident that your reviewer, after perhaps a hasty glance at "Draysonia," has not considered it worthy of close perusal; otherwise he would scarcely have assumed that a naval officer who has had the "Nautical Almanac" in use for more than seventy-one years (and has made nautical astronomy an occupation and recreation) "confuses precession with aberration," and is therefore "scarcely fitted" to deal with the subject.

Your reviewer may possibly be a professional astronomer (who perhaps dislikes anything unorthodox and not in accordance with the text-books), and, if so, he will be aware that in the later "Nautical Almanacs" the word "precession" in the catalogue of stars has been substituted for the old and better term "annual variation," which was used in the "Nautical Almanac" and by our old astronomers for as many years as I can remember up to 1894 or 1895, when the change was made. Previous to this the word precession had been mainly confined to precession of the equinoxes (dealt with in section 6 of "Draysonia"), which at present is about 50″ and is totally distinct from what astronomers term aberration, but which I prefer to call annual motion of the pole.

Your reviewer further states that I have computed the precession of many stars by Drayson's method, and that, if this proves anything, it proves the correctness of the "Nautical Almanac." This is a mistake and is an inversion of my process. Instead of having, as he stated, calculated the so-called precession of many stars, I have used the precessions, so accurately given in the "Nautical Almanac," in order to find therefrom the amount of the annual motion of the pole; and I have shown that the so-called annual precessions of the stars, all varying in amount and direction, both in right ascension and declination, are exactly accounted for by one single movement of the pole of about 20″, which produces the apparent annual precession as obtained by observation and recorded in the "Nautical Almanac," the accuracy of which I have never impugned.

I am unable to understand why your reviewer questions my statement that Mr. Stone, the late Radcliffe observer at Oxford, made the error of sidereal time erroneous to the extent of 41·51s. in 1892. A reference to the Royal Astronomical Society's notes of March, 1894, will show that I am correct. ALGERNON DE HORSEY.

Melcombe House, Cowes, November 19.

I AM quite willing to admit that I have misunderstood the gallant Admiral, and accept unreservedly his statement that he does understand the difference between precession and aberration. In my own defence you will perhaps permit me to quote the passage which misled me.

"Possibly I shall be told that I have found a mare's nest, and that it has been known all along that the right ascension of a star and its annual precession in declination are functions of the annual motion of the pole, and that such motion can be found in the 'Nautical Almanac,' *and is properly termed aberration.*"

The italics are mine. To my mind this sentence admits of only one construction; and, if I have been so unfortunate as to misconstrue it, I have no doubt I have not correctly apprehended the author's meaning in other places, and therefore it is of little use to discuss the several points raised. THE REVIEWER.

Dust Explosions.

PROF. GALLOWAY'S brief article on dust explosions in NATURE of November 30 is very timely; but readers of it would receive the impression that the true cause of the explosion at the Tradeston Flour Mills, Glasgow, in 1872, was first made known in the report of Profs. Rankine and Macadam. This is not the case: the fact that flour-mill ex-