Atmospheric Light Columns from Artificial Lights.

THE light columns observed by Mr. Currie (NATURE, April 5, p. 526), though rather unusual phenomena, have been described previously. Once in France and twice in Italy, during the War, I noticed that gun flashes at distances of the order of 15 kilometres appeared as narrow vertical streaks of light centred about 10°-15° above the horizon. The occasion in France (Nov. 6, 1916) was a most striking one; a note giving the details was published after the War in the *Quar. Jour. Roy. Met. Soc.*, **45**, pp. 366-368 (1919). About 9.30 P.M. on that evening there were visible, in addition, parts of a lunar halo of 22°, a horizontal circle or mock moon ring, and a halo of 90°. During the remainder of the evening continual gun flashes produced a weird and unnatural effect as of vertical slits opening and closing suddenly in a dark curtain with a fiery background. Later in the same evening a still more remarkable spectacle was presented in that, as a result of enemy action, a large ammunition depot, some 15 km. distant from the point where I was stationed, was set on fire. The fire (or fires) appeared also as great vertical streaks in the sky, with a dark patch at their centre, the altitude of this dark centre, measured by theodolite, being 32½°.

The meteorological situation at the time was that northern France lay under the warm front of an advancing depression, and the sky by this time (11 P.M.) was overcast with thin alto-stratus cloud, deteriorating, through which the moon still shone dimly. The optical phenomena produced on this evening by the coincidence of a modern bombardment and a great ammunition fire with the peculiar meteorological and optical situation which produces mock moons, etc., have possibly seldom been equalled in history. Even in less sensational form, the phenomenon of vertical light columns from artificial lights is apparently seldom seen in western Europe; at least, even knowing of its existence, I have not often seen it.

Again, Prof. Carl Stormer states (in *Geof. Pub.*, vol. 4, No. 7, pp. 57-58) that he saw "a singular atmospheric optical phenomenon", near Oslo on Feb. 5, 1922, when spectroscopic examination enabled a column of red light to be distinguished as not being an auroral ray. It was verified later that in this case the fire had been 6 km. distant. It is remarked that there was diffuse thin cloud through which one could distinguish the stars, and that this cloud must have consisted of ice crystals and have been at a height of about 3000 metres. Prof. Störmer told me recently that he has not on any other occasion seen such a phenomenon.

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Edinburgh, April 10.

MR. HUGH NICOL'S explanation (NATURE, May 3, p. 671) of atmospheric light columns from artificial lights is not merely an extension of mine but an alternative. My explanation, the orthodox one, is that the columns are due to the *reflection* of light from laminar crystals; his suggestion is that the columns are due to *diffraction* by laminar or acicular particles.

I do not think the diffraction hypothesis can be accepted. The laminar crystals which are in the majority when phenomena like sun pillars occur are not microscopic objects. The diameters of flat crystals without rays were measured by Dobrowolski. He found, for example, that at −6·3° C. the average diameter was 1·7 mm. The cloud particles which produce diffraction phenomena, coronæ, are much smaller, having diameters of the order 0·02 mm.

The most satisfactory demonstration that reflection does take place from crystals with horizontal surfaces comes from aeronautical observations. It sometimes happens that the aeronaut flying over a cloud sees on the cloud a white patch, the under-sun. When he comes to a break in the cloud and catches a glimpse of a sheet of calm water below, he realises that the direction of the brightest part of the under-sun is just that of the image of the sun in the water.

As we are obliged to admit the effectiveness of reflection in this case, there is no need to doubt that the same cause is operative in the other.

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Telosynapsis or Structural Hybridity in *Œnothera*?

IN a recent article[1] I have put forward a hypothesis which I consider provides an explanation in terms of segmental interchange and parasynapsis of (i) the occurrence of ring-formation in *Œnothera*, (ii) its inheritance on selfing and crossing, and (iii) the occurrence of mutant forms differing in properties of ring-formation from their parents. These seem to be the essential requirements of a working hypothesis expressing the relationship of *Œnothera* with other plants and animals. Further, the premises on which the hypothesis is based have been defined very fully in later articles.[2, 3, 4, 5]

Two of Prof. Gates's pupils, Miss Sheffield[6] and Mr. Catcheside,[7] have defended his earlier views and criticised this hypothesis on general grounds, without, however, providing any evidence that the hypothesis is incompatible with earlier observations. Their objections are directed against my first paper and would, I feel, be removed by a study of the theoretical principles enunciated with some precision and a great amount of detail in the later ones [2, 3, 4, 5] which they do not quote. It seems superfluous to define these principles again, for there is little to add and nothing to take away.

Catcheside,[7] however, has also made a new observation, namely, that a ring of 21 chromosomes is formed in a triploid plant; this he concludes "completely disposes of the hypothesis of segmental interchange, adapted (*sic*) by Darlington as a basis for parasynapsis in *Œnothera*". Mr. Catcheside has been good enough to show me his preparations. The critical structures seemed to me susceptible of being interpreted, not as a ring of 21 chromosomes, but as consisting of various configurations of the kind observed by Håkanssen in his account of triploid *Œnothera*.[8] Thus the associations I made out were the following: (i) unpaired chromosomes; (ii) rod pairs, united at one end; (iii) ring pairs, united at both ends; (iv) chains of three and of four chromosomes; (v) branched chains of chromosomes (with triple union); (vi) ring pairs associated (by a triple union) with one end of a third chromosome. Mr. Catcheside has given a formula, based on my hypothesis, with which these types agree.

In view of the difficulty of interpretation of diakinesis figures in triploid *Œnothera* (cf. Catcheside's figures 35 and 36), I think the novel conclusion that he has arrived at is a little precipitate. Earlier workers on triploid *Œnothera* have often hesitated to come to any decisive conclusion with regard to the delicate question of the association of the chromosomes. Gates,[9] for example, has contented himself with saying that "the chromosomes are scattered for a considerable distance along the long axis of the spindle", and later[10] that the 21 chromosomes are "somewhat scattered along the spindle as is usual in many Œnotheras". These difficulties led Gates to