a nonet. Runge's law is applicable to 5770; the type of the nonet is such that the lines form aliquot parts of $a=e/m.H/4\pi$, and the difference in the number of vibrations of these lines can be represented by

$$0, \pm\frac{a}{8}, \pm\frac{8}{8}a, \pm\frac{9}{8}a, \pm\frac{10}{8}a.$$

Considered as a triplet, which corresponds to lines 0, $\pm\frac{9}{8}a$, Gmelin found that $e/m=2\cdot02\times10^7$; v. Baeyer and Gehrcke obtained $2\cdot06\times10^7$, which is also the number I have arrived at from the same standpoint. Considered as a nonet, however, we have to multiply the above number by $\frac{8}{9}$, so that the corrected result turns out to be:—

Gmelin	$1\cdot80\times10^7$
Gehrcke and v. Baeyer	$1\cdot83\times10^7$
Nagaoka	$1\cdot83\times10^7$

This is in close agreement with the same constant obtained from measurements on the nonet of the mercury line 5461, for which $e/m=1\cdot80\times10^7$.

The above examination of the line 5770 shows how the different types of a class of nonets are derived from normal triplets.

Starting from the normal triplet A, we get nonets of types B, C, and D by doubling the intervals of component

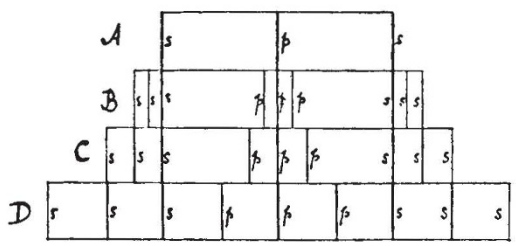

FIG. 1.

lines of each group, as shown in Fig. 1. Considered as aliquot parts of a, they are represented by

B. $0, \pm\frac{a}{8}, \pm\frac{8}{8}a, \pm\frac{9}{8}a, \pm\frac{10}{8}a.$

C. $0, \pm\frac{a}{4}, \pm\frac{4}{4}a, \pm\frac{5}{4}a, \pm\frac{6}{4}a.$

D. $0, \pm\frac{a}{2}, \pm\frac{2}{2}a, \pm\frac{3}{2}a, \pm\frac{4}{2}a,$

with direction of electric force as shown in the figure, p indicating that it is parallel, and s at right angles, to the direction of the field. B is represented by the line 5770, C by the neon lines 6678 and 6305, and D by the mercury line 5461. Probably there is also a type

$$0, \pm\frac{a}{16}, \pm\frac{16}{16}a, \pm\frac{17}{16}a, \pm\frac{18}{16}a,$$

intermediate between A and B. Of the different lines which I have examined, the copper line 5105 seems to belong to this type, but as it requires high resolving power I have not been able to clear up this point. It appears to me quite probable that triplets, which show broadening of lines and no asymmetry in high fields, and give values of e/m greater than $1\cdot87\times10^7$, belong to some of the intermediate types.

H. NAGAOKA.

Physical Institute, University of Tokyo, March 29.

The Fertilising Influence of Sunlight.

IN NATURE of February 17 is a communication from Mr. and Mrs. Howard pointing out that the probable explanation of the advantage of leaving land rough ploughed during the hot weather in India is that the biological changes which occurred under the conditions of Messrs. Russell and Hutchinson's experiments occur here also.

The following temperature record, which is one of the highest I have, will be of interest in this relation:—

Date, May 28, 1906.

Maximum shade temperature	107° F.	... 42° C.
Maximum temperature of soil 3 in. deep	109	... 43
,, ,, ,, 6 ,,	109	... 43
,, ,, ,, 9 ,,	104	... 40
,, ,, ,, 12 ,,	100	... 38
,, ,, ,, 24 ,,	93	... 34

Other records of soil temperature in Behar are published in "An Account of the Research Work in Indigo at Dalsing Serai, 1903–4," by Bloxam, Leake and Finlow (Appendix ii.). Temperatures approximating to 50° C. at 1 inch from the surface were recorded.

The hot-weather temperature here (Behar) is not so high as in some other parts. Jacobabad "enjoys" one which runs up to 127° F. on occasions, and the whole of the western part of the Punjab (an area equal to about twice that of the British Isles) is liable to maximum air temperatures of 110°–115° F. (43°–46° C.), so that the surface soil in that part may be assumed to attain an average temperature some 10° F. (5° C.) higher than here at Pusa; but it is certain that, however uncomfortably hot India is, its soils never attain a temperature anything approaching 100° C.

Dr. Russell mentions (NATURE, March 3) that biological changes at temperatures below 100° C. are being studied, so that we shall doubtless learn shortly in how far they assimilate under these conditions to the effect at 100° C. In any case, it must not be forgotten that there cannot be much difference in temperature between roughly ploughed land and unploughed land which has carried a cold-weather crop; in both the amount of moisture in the first 6 inches will be nominal, and the thermal capacity of each must be much about the same. The roughly ploughed soil will include more air, and I should expect the rise of temperature at 6 inches to be rather greater in unploughed land. Hence if this agricultural practice is found to be accompanied by important biological changes, this must be due to some cause other than mere temperature.

Regarding the effect of *sunlight*, this can only affect the outside surface; in unploughed land this is better defined than in broken-up land, and during the ploughing operation more soil is exposed (temporarily) to the sun than in the former case, but the ploughing here referred to is commonly *one* ploughing, not a "multiple stirring" such as occurs in the preparation of the seed bed.

Finally, it is perhaps unnecessary to mention that this rough ploughing results in other advantages than those mentioned. One is that the soil absorbs more of the first monsoon rain than unploughed land, and can be prepared for monsoon crops much more quickly.

Pusa, April 13. J. WALTER LEATHER.

Observations of Halley's Comet.

I SAW Halley's comet through field-glasses on Sunday morning, April 24, at 3.40. It was then about 10° above the horizon, 20° to the left of Venus, and slightly under it. It was very distinct from 4.0 to 4.20. At its best, 4.15, I could just distinguish the head by the naked eye, but only for a minute.

The tail appeared broad and short, only about twice the moon's apparent diameter in length, with its axis at 40° to the horizon. The tail began to grow indistinct at 4.30, but the head was visible to 4.45.

The sky was not ideal, Pegasus not distinct, Cassiopeia only partially seen, but Venus was very distinct and bright.

I saw the comet again yesterday—Monday, April 25—from 4.0 to 4.15. The sky was not at all clear. The comet was in a line with Venus, and still about 20° to the left. I could not see it with the naked eye.

This morning, April 26, comet was clearly seen from 3.45 to 4.30. The tail appeared longer and more elegant in appearance. It was perhaps 5° above Venus, and less than 20° to the left. The head was easily seen at intervals by the naked eye, but the tail showed only a trace, and that only once.

The measurements are only by the eye, but are, I think, fairly correct.

C. LEACH.

Malta, April 26.