a contributing factor in the further development and maintenance of storm energy.

To take the very fact which Mr. Dines cites, namely, the exceptional storminess of the Atlantic to the north-west of Scotland. This region is, in a most conspicuous degree, stormier in the winter months than in the summer, and it is almost one of the canons of physical geography that the excessive development of storm-energy during the cold season is favoured by the great contrast in temperature between the frostbound continents and the warm Atlantic, the individual cyclonic systems breeding not so actively over the land areas, where the general pressure is high, as over the oceanic areas, where the general pressure is low. On the other hand, during the warm season—when the temperature gradient between the oceans and the continents is reversed, but is much less steep than the winter gradient—cyclonic energy in the North Atlantic is far less powerful, whilst over the sun-heated continents storm-energy takes the form, not of extensive wind-systems, but of localised convectional thunder-systems. Furthermore, in the southern ocean, between 40° and 60° S., where there are no disturbing land masses, there does not appear, judging from the reports of navigators, to be such conspicuous seasonal difference in storminess, and this is borne out by statistics available for the Falkland Islands (Meteor. Office Geophys. Mem., No. 15). L. C. W. BONACINA.

November 19.

SIR OLIVER LODGE'S suggestion and mine in NATURE of November 25 are not contradictory, but rather complementary. Work done by the alternate evaporation and condensation of moisture implies a thermodynamic cycle. Both air and aqueous vapour must, I think, play the part of working substance.

J. R. COTTER.

Trinity College, Dublin, November 26.

Luminosity by Attrition.

ALLOW me to add to the list of minerals showing this phenomenon one which I have already given in my book "Diversions of a Naturalist." It is that of corundum. I found that water-worn pebbles of corundum (so identified in the department of minerals of the Natural History Museum) gave flashes of light when rubbed together, but required for this result a heavier pressure than do pebbles of silica. The same odour as that observed when silica is used was produced.

I may also repeat here what I have stated in my book, that a spectroscopic examination of the luminous flashes of quartz pebbles gave a continuous spectrum and no detached bright lines.

E. RAY LANKESTER.

November 28.

SOME ten years ago when grinding down a thin slice of limestone under water I was surprised to find that the operation was accompanied by faint flashes of light which seemed to issue from certain spots of superior hardness; on examining the slice under the microscope it was found that these spots consisted of quartz. This led me to devise an apparatus by which the luminescence could be continuously produced and so rendered a subject for precise observation. The substance to be examined was attached to the free end of a hinged bar and adjusted so that it rested against the edge of an emery, or, still better, a carborundum, wheel which was rotated by an electric motor. Of some forty minerals experimented upon no fewer than eighteen emitted light while being ground. Those that did not included all the sulphides which were examined, viz. zinc blende, cinnabar, antimonite, galena, copper pyrites, and arsenical pyrites. Iron pyrites, of course, yielded sparks, but these were not accompanied by triboluminescence. Almost all the silicates emitted light, *e.g.* orthoclase, labradorite, idocrase, garnet, tourmaline (one variety, another did not), epidote, zircon, topaz, and glass; several oxides, *e.g.* corundum, magnetite, hæmatite, cassiterite, quartz, and flint; light was also obtained from wavellite, apatite, celestine, and barytes. But the most remarkable results were obtained from fluorspar; all the varieties of this mineral which were examined gave light, but one in particular, distinguished by its green colour, emitted blue light, not only in great quantity, but also of such persistency that the whole periphery of the wheel was alive with it.

Curiously enough, no electrical phenomena were observed in any case; an electroscope, possibly not a very sensitive one, gave no signs even when fully exposed to the current of dust driven off during grinding.

The light emitted was in most cases white, but often coloured reddish or yellowish, and in a few instances bluish. It would be quite possible to examine (as I did) the light with a spectroscope, and after some preliminary trials I planned apparatus for photographing the spectrum. The outbreak of the war, however, put a stop to my experiments, and I have not yet had time to resume them.

November 25. W. J. SOLLAS.

Stellar "Magnitudes."

MAY I ask whether it is not time to overhaul and improve the conventional specification of stellar magnitudes?

When first introduced, on the basis of ordinal numbers, the plan was natural enough; a third magnitude was naturally inferior to a first, and a group of some twenty stars could be considered as of the first magnitude.

But when it was found possible to measure and specify magnitudes with numerical accuracy—by instrumental means not, I confess, fully known to me—so that a Variable could be said to decrease from 2·14 to 2·56, the cardinal number specification looked inverted. Moreover, magnitudes less than unity became necessary for the brighter stars, and a sufficiently bright star would presumably have the magnitude 0; a nova, for instance, might blaze up from magnitude 12 to magnitude zero, or even become of negative brightness at the height of its career. Indeed, I gather that a more recent system, of what are called "absolute magnitudes," really does involve negative numbers.

Would it not be well to reconsider the convention and devise something more convenient?

OLIVER LODGE.

Higher Forestry Education for the Empire.

THE question has been recently raised by the Government of India as to the advisability of either training the probationers for the Indian Forest Service entirely in India or confining the training to one centre in this country. The question has come to the front owing to the changes to be introduced in the administration of India, under which a larger proportion of Indians will enter the Indian Forest Service in the future, it being therefore considered desirable to train the European and Indian probationers all together. The professional forestry opinion of Indian