Cyclones

MR. BARHAM, in NATURE (vol. xviii. p. 249), concludes that "a cyclone is occasioned by the meeting and passing each other of a northerly and a southerly current, so that they pass each other on the left hand respectively." Supposing this to be true for the northern hemisphere, we must for the southern hemisphere substitute *right* hand for *left*.

There is nothing in this contrary to dynamical principles, but the facts of the geographical distribution of cyclones appear to show that the eddies or swirls in which they originate are formed, not by north and south currents *passing* each other, but by the same *meeting* each other, that is to say, in the zone where the north and south trade-winds meet, when this zone is at some distance from the equator. Cyclones are not formed on or near the equator, because there the earth has no rotation relatively to an axis drawn vertically to its surface.

Mr. Blanford has written in NATURE (vol. xviii. p. 328), showing that Mr. Barham has not accounted for the motive power of the cyclone, and explaining it by the liberation of latent heat from the condensation of vapour in an ascending current at the centre of the cyclone. This explanation was first given by Espy in his "Philosophy of Storms," and is certainly true. But the two questions are quite distinct, viz., what sets the cyclone going? and, how is it supplied with motive power?

Three conditions are needful for the formation of a cyclone—first, an eddy produced where currents of air meet; second, sufficient "steam power of the atmosphere," as Espy calls it, to produce a strong in-draft to the centre of the eddy; third, a position sufficiently far from the equator for the currents of air towards the centre to be sensibly deflected by the earth's rotation.

But how is the in-draft first set up? I reply, by the centrifugal force of the eddy causing a barometric depression at its centre, whence follow cold, the condensation of vapour, and the liberation of heat which had been latent. The liberated heat expands the air in the upper strata, thus supplying the motive power of the cyclone. JOSEPH JOHN MURPHY

Old Forge, Dunmurry, Co. Antrim, April 20

Showers of Rain and Gusts of Wind

IT is a matter of common observation that showers of rain are usually accompanied by more or less violent gusts of wind, but as far as I know no explanation of the fact has yet been offered.

The cause I am about to suggest must be productive of some result, but whether it is sufficient to account for the whole phenomenon I cannot say without quantitative observations, though I guess it is.

It is quite certain that the actual velocity of even large drops of rain is very small compared with that which they would acquire by falling through the same height *in vacuo*, and, practically, a drop may be considered to fall with uniform velocity during the whole time of its descent.

Now, after a drop has ceased to accelerate, it leaves an amount of water in air equal to the weight of the drop multiplied by the distance through which it falls, and most of this will appear as a current of air accompanying and following the drop.

In fact, when the drops which compose a shower are falling without accelerating, the air through which the shower falls is acted on by a downward force equal to the weight of the shower, and the downward current of air thus caused must spread laterally as it approaches the ground.

Thus, if a shower were to fall on a calm day, there ought to be a wind on the ground blowing in all directions from the shower as a centre. The rough experiment of throwing a shovelful of sand into the air and watching the dust as it reaches the ground serves very well to show the kind of thing which must happen. But when there is a wind blowing at the time the shower falls, which is generally the case, another, and perhaps more potent, cause than the mere lateral spreading of the downward current comes into operation.

The wind at the surface of the ground is moving more slowly than that at a higher level, because of the retarding effect of friction, and the effect of the shower will be to import air with a high lateral velocity from the upper regions to the lower, where the velocity is small.

With regard to the magnitude of the force which the shower exerts on the air, if we take the rainfall as 2 centimetres per hour, the velocity of the falling drops as 7 metres per second, and the height of the cloud as 700 metres, not improbable numbers for a thunder-shower, the pressure per square metre of shower is 560 grammes; but the downward velocity which this force would generate in the air would depend on the total area of the shower, and would vary from place to place in the shower itself. A. MALLOCK

May 8

Phosphorescence

THE study of phosphorescence has lately received a considerable impetus, mainly from its having been made use of in a commercial form for clock faces, door plates, &c., but as Prof. Morton lately remarked, the present producers must have discovered some method of greatly increasing the luminosity of the sulphide used. After great difficulty I succeeded in getting a small quantity from the French makers, the same that I know Mr. Crookes had in obtaining it from the same source. Its luminosity is undoubtedly infinitely superior to that of any of the old methods of production, and gives hopes that further advances may be made. My reason for troubling you with this letter is to put on record a curious fact that has come under my notice in making some experiments detailed in the *Photo News* for May 2, with a view to making luminous photographic images in various ways—that is, that not only light, but heat produces the phosphorescent light. If we take a sheet of card and dust it over with the powder, after coating it with a sticky varnish and allowing to dry, we have a surface that when exposed to daylight for a few seconds will remain luminous for a certain time afterwards. If we place a transparent positive in front we have an evanescent photographic image presented to us on removing to a dark room, but if after simply exposing the sheet to daylight we place the tips of the fingers against the back of the card, spots of two or three times the luminosity will appear at these places showing that the heat from the hand has a great increasing action. The same occurs if the paper has not been exposed to light, the mere warmth of the hand being sufficient to render the sulphide luminous. Here we have light produced by warmth on a small scale. That phosphorescence is yet in its infancy I am convinced, and also that it will yet have a greatly extended future. WALTER B. WOODBURY

Manor House, South Norwood, S.E.

A Large Egg

ONE of my Houdan fowls has laid an egg weighing 7 oz.; her ordinary eggs weigh 2½ oz. I ordered my man to blow the egg in order to preserve the shell, when I was surprised to find that, besides a small yolk and much white of egg, it also contained a *perfect ordinary-sized egg*. This is now lying loose within the large shell, which latter measures 8¼ inches and 9¼ inches in its two principal circumferences. E. L.

Barham, Ipswich, May 6

THE IRON AND STEEL INSTITUTE

THE annual spring muster of this young and vigorous society, now in the tenth year of its age, and numbering close upon a thousand members, was held, according to custom, in the house of the Institution of Civil Engineers in Great George Street, last week. This gathering has been awaited with considerable interest for some time past, as communications of more than usual importance were expected upon the problem of dephosphorising ordinary brands of cast iron, such as are smelted from the stratified ores of Cleveland, Lincolnshire, and Northamptonshire, sufficiently to be able to produce from them steel of fair merchantable quality; and the attendance fully justified the expectations, the large meeting room being, as a rule, filled to overflowing each day within a very few minutes after the opening of the proceedings. With the exception of a morning devoted to complimentary and formal business, including the address of the new president, Mr. Edward Williams, who succeeds Dr. Siemens, and, in a few pages, presented a bold and rapid sketch of the progress of the malleable iron and steel industries since 1855, the year of Bessemer's great invention, and the presentation of the medal to Mr. Peter