

science that might not be "briefly refuted" by such a method; but I think it would be fair to employ the words, "particular opinions of Sir W. Thomson" in place of "principles of natural philosophy," and "imaginary consequences of these opinions" in place of "facts." If this were done, all would admit that Sir W. Thomson's arguments are conclusive demonstrations; granted the premisses, the conclusions certainly follow. But geologists have simply to assume the contrary premisses, and they may mathematically demonstrate the reverse. Agree to beg all the difficulties of a question, and a certain conclusion may easily be obtained. This fact was recognised in the Middle Ages, and Mayer has not got rid of it.

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[The remarks of Prof. Tait are contained in his opening lecture for Session 1869-70, which was sent to us with permission to make what use of it we chose. As the matter of Geological Time had been very fully discussed in this country, we did not insert the portions bearing on it. We believe that the portion which we did insert induced the editor of the *Revue* to apply to the author for the whole MS. As to the queries in the above letter we may note,

1. The Dissipation of Energy is a necessary consequence of the second law of Thermodynamics.

2. If "Mayer categorically denies its universality," so much the worse for his own credit, and for that of "the French Academy and the eminent English and German savants" who support him.

3. It is not for us to say what Sir W. Thomson would, or could not, do.

4. So, after all, Mayer seems to be no better than Sir W. Thomson.—ED.]

In Re Fungi

It may allay the alarm of your correspondent "W. G. S." as to the decay of fungology in England, as far, at least, as one of the cases which he quotes is concerned, to be informed that so careful and critical a student of fungi as Mr. W. G. Smith confirmed the determination referred to, and on the faith of the abnormal specimen, included this rare and very critical species without any hesitation among the Middlesex fungi in the "Middlesex Flora," p. 408. Your correspondent "W. G. S." has missed the point of the paragraph from the *Journal of Botany* which he criticises. The specimens of this fungus collected by Mr. Wooster at Whitehall Gardens have a regular and normally developed pileus, and were in striking contrast to the "abnormal specimens" (W. G. Smith, *l. c.*) from the Goswell Road.

F. L. S.

A Shadow on the Sky

I do not know how common is the phenomenon described by Mrs. Charlotte Hall in *NATURE* of Nov. 9 (p. 25), but her communication leads me to report a much less striking appearance of the same kind, which I witnessed Feb. 20, 1870, in this neighbourhood. I was taking an early walk, and had mounted to the top of a ridge commanding an eastern view, about fifteen minutes after sunrise. The sky was veiled in a dark white. Above me, a little to the south and east, hung a ball of vapour in mid-air, warmed into smoke-colour by the rays of the sun, and yet so dense as to cut off these rays, and cast a rectilinear shadow of dark blue against the white coat of the sky. The shadow was sharply defined, and the whole effect was not unlike the nucleus and tail of a comet. In a few moments the shadow faded out, and, shortly after, the ball itself was dispersed. The moon, in its third quarter, was visible somewhat past the zenith, and surrounded with vapour. Twelve hours later we had a violent rainstorm.

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Coal Measures of Ireland

IN the new edition of Jukes's "Manual of Geology," by Prof. Geikie, at page 592, it is stated, on the authority of Mr. E. Hull, that "in Leitrim, Fermanagh, and Tyrone, there are true representatives of the Yoredale series of England." I, however (as also the late Mr. Jukes), contend that no comparison can be drawn between the coal bearing rocks of Ireland and those of England. Furthermore, as Mr. Hull is unacquainted with these

Irish rocks, having only seen a few isolated patches of them, I protest against his being quoted as an authority on the question, more especially as in the paper to which Mr. Geikie referred, "On the Geology of the Ballycastle Coal Fields, &c.," Mr. Hull states that while in the counties above mentioned there are true coal measures, in the provinces of Leinster and Munster there are none—a statement quite contrary to facts, as all the sections of these rocks in Leinster, Munster, and Connaught are identical, and probably, as suggested by the late Mr. Jukes, were once connected, as the lowest bed of coal occurs everywhere at a nearly equal height above the limestone. Furthermore, the intervening strata are nearly identical, there being a certain thickness of argillaceous beds below, next the limestone, and a mixture of arenaceous and argillaceous beds above.

Naturally it may be expected in all places where a sea gradually became shallow, that limestone would be succeeded by fine argillaceous beds, the latter by shore beds, more or less coarse and arenaceous, and eventually by land beds, such as coal, fire-clay, clunch, and the like.

Similar sequences are not uncommon, both on a large and small scale. On the large scale in the passage rocks from the limestone to the coal-bearing rocks of most countries, and on a small scale in the north of Ireland and in Scotland, where a bed of limestone will be succeeded by a shale, the shale by a sandstone, and the latter by a clay or coal.

If we examine into the thickness of the English and Irish rocks, the difficulty of a comparison is apparent. In the latter country the greatest thickness of the rocks called coal measures never exceeds 3,500 feet; this series of strata including all the rocks above the limestone; whilst in Lancashire, according to Mr. Hull's sections, the Yoredale beds alone exceed 5,000 feet in thickness.

Moreover, if any value is to be attached to palæontological evidence, we find that from the base upwards in the Irish rocks there are fossils which in England are considered to be characteristic of the true coal measures. The latter fact would seem to suggest that while in Ireland the upper part of the limestone was being deposited, in England the millstone grits and Yoredale rocks were accumulating, whilst subsequently, in both countries, true coal measures were deposited; those in Ireland being unfortunately very poor in coal, although containing very similar fossils.

In the northern extremity of Ireland, and in Scotland, the measures are very similar, and in certain places apparently identical, as pointed out years since by Sir R. Griffith. This, therefore, is no new fact, as Messrs. Hull and Geikie would suggest to their readers.

G. HENRY KINAHAN

Recent Changes in Circumpolar Lands

SOME years ago I wrote a paper for the Ethnological Society on some changes of surface affecting Ancient Ethnography. Since this was printed many facts have accumulated. These have led me to a tentative generalisation on the subject, which I should like to have discussed in your pages.

The question of the upheaval and subsidence of different areas of the earth's surface, as it is going on at the present moment, is of very great importance in geology, and yet few subjects have been more neglected. A few facts have been here and there collected; but even the best authorities treat the matter in a jejune fashion. According to them the areas of upheaval and subsidence are scattered over the earth's surface in an irregular manner, without any definite law or rule. I believe that with very slight local exceptions there is a very distinct law which governs the subject.

Putting aside altogether the southern hemisphere for the present, I wish to prove that the area of upheaval is confined to the land bordering the Polar Sea, and to the Polar Sea itself; that it is perfectly continuous all round the earth, and that it is greatest near the Pole, and gradually diminishes until it disappears about the 57th parallel, leading to the conclusion that the focus of upheaval is the Pole itself.

Of course, my observations are entirely confined to what is taking place *now*, and are not to be confused with the facts of any other period, historical or geological.

Commencing with Scandinavia, we have the remarkable testimony of Pliny, Mela, Solinus, and others, to the fact that Scandinavia was considered by the Roman geographers, whose authorities were bold and expert seamen, to be an archipelago. Ptolemy speaks of the Scandian Islands. The very name Scandinavia is evidence that those who used it looked upon it as an