LETTERS TO THE EDITOR

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Nebulous Star in the Pleiades

A SHORT paragraph in a recent number of NATURE (vol. xv., p. 244) on the nebulous star in the Pleiades appears to call for a few remarks. With reference to the supposed difficulty of seeing with very large instruments a faint nebulosity in close proximity to a bright star, I may say, that the words of my assistant, quoted in the paragraph referred to, viz., "The Merope nebula *is never* perceived with Lord Rosse's telescopes," are perhaps a little too strong.

The entries relative to this object are five in number. In February, 1871, "Examined under very favourable circumstances; no nebulosity seen." August, 1872, "Examined Merope for Tempel's nebulæ; not a trace of nebulosity visible." (Both the above with the 3-foot reflector.) October, 1872, "Tempel's variable nebula not found; sky clear." September, 1873, "Nothing seen; much false light in field." December, 1875, "Examined Merope in consequence of M. Tempel's letter (*Ast. Nach.*, No. 2,045); no nebulosity seen; only same little false light as around the other bright stars; sky very misty."

It may be expected *à priori* that imperfections of a certain class, such as dust and other opaque substances, will interfere more with the action of a speculum than of an object-glass in searching for faint nebulosity near a bright star, inasmuch as in the former they will throw back and disperse over the field light which would otherwise have contributed to form the image of the star; whereas in the latter they will cause a general darkening by intercepting a certain percentage of light from stars and sky alike. It may therefore still be possible that under peculiarly favourable atmospheric conditions, and with a speculum just repolished, we may still be able to detect the nebulosity, but it appears far more probable that we must look for an explanation of the difficulty of seeing the nebulosity to the comparative smallness of field of so large an instrument, which in general prevents the simultaneous comparison of the star under observation with neighbouring ones, and of a nebulous sky with an adjacent part free from nebulosity, so well as with a smaller telescope, and to the greater brilliancy of the image of the star while the nebulosity about it is only as bright as in the smaller telescope. From D'Arrest's remarks, quoted in NATURE, it appears that such objects are seen with much difficulty with a large refractor also. I have myself noticed, particularly in working with the six-foot reflector on the great nebula in Orion, that the fainter parts of the nebulosity, whether or not in the vicinity of bright stars, could best be seen with a finding eye-piece of 26′ field, of too low magnifying power to utilise more than two-thirds of the diameter of the speculum, and with my eighteen-inch Newtonian, the very faint nebulosity on the preceding side of the nebula could be much better traced.[1]

The absence of symmetry of the nebulosity round the star, as of that round ι Orionis, should, however, enable real nebulosity to be more easily distinguished from false light than in other cases. The more southern position of M. Tempel's observatory probably gave him some slight advantage.

It appears to be in the detection of minute stars and the examination of small details, where they exist, rather than in the search for faint diffused nebulosity, or nebulosity round stars that a large aperture gives so great an advantage. ROSSE

"The Movement of the Soil-cap"

UNDER the above heading Sir C. W. Thomson gives an interesting account of the "stone-rivers" of the Falkland Islands in a recent number of NATURE (vol. xv. p. 359), and attributes their origin to a general movement of the "soil-cap." Nothing can be clearer than his explanation of the mode in which the quartzites weather and break up on the hill-slopes, and one can quite understand how the resultant *débris* is gradually brought down into the valleys by the agents of change he refers to. But it is hard to see how these agents, after having got the *débris* down into the valleys, can subsequently spread it out into wide sheets, reaching "from a few yards to a mile or so in width," and resembling at a distance glaciers that seem as if descending from the adjacent ridges. The stones, as Mr. Darwin tells us, "are not thrown together into irregular piles, but are spread out into level sheets or great streams." Sir C. W. Thomson is apparently of opinion that these great streams of stones move *en masse* down the valleys, as "earth-glaciers," and he refers to the occurrence in Scotland of certain phenomena which seem to him to indicate similar movements of the "soil-cap." Geologists who have worked much in hilly countries, will readily recognise the truth of his descriptions—indeed the appearances to which he calls attention are quite common in such districts as the Northern Highlands and Southern Uplands of Scotland. The soil and rock-rubbish which are found resting upon our hill-slopes, and the bending-over of the truncated ends of the underlying vertical or highly-inclined strata are of course the results of atmospheric action. Rain or thawing snow filters into joints and crevices, and insinuates itself between bedding-planes, and frost tends to force these apart—the loosened rock moving in the line of least resistance, that is, *down hill*. At the same time both solid rock and detached fragments "weather," and thus grit and soil gradually form, while in like manner this gradually-forming "soil-cap" being itself acted upon by frost, is forced in the same way to move down the slope, a movement which is of course aided by a *vis a tergo*, the weight of the descending mass. Partly in this way, and partly by the direct action of rain, which not only washes the particles down, carrying away surface after surface, but sometimes soaks the loose "soil-cap" to such a degree as to cause the entire accumulation to "flow," whole hill-sides become swathed in mantles of soil and *débris*. But it is difficult to believe that an experienced observer would be puzzled to discriminate between such rubbish-heaps and true glacial moraines. Arrived at the foot of the slope, the rock-rubbish accumulates there, unless there be some stream at hand to denude it, and to sweep its materials, in the form of gravel, sand, and mud, down the valley. There are many good grounds, however, for believing that much of that "surface-wash" of soil and rock-rubbish which cloaks our hill-slopes to a depth sometimes of many feet, dates back to a time when our climate was considerably colder than it is at present, and that, while it was accumulating, local glaciers occupied many of our mountain-valleys. Putting aside "screes" and *débris*-slopes generally, I must say I have never seen any indication of that movement *en masse* of the soil-cap upon which Sir Wyville insists; and I hardly think many geologists will agree with him that it is "almost self-evident that wherever there is a slope, be it ever so gentle, the soil-cap must be in motion, be the motion ever so slow; and that it is dragging over the surface of the rock beneath the blocks and boulders which may be embedded in it," &c. Soil, as we all know, is always travelling from higher to lower levels, but this movement consists for the most part in the mere sweeping downwards of its component particles by rain and surface-drainage. It is true that the expansive power of frost, and the action of vegetation as described by Sir Wyville, may force a certain proportion of a soil-cap *en masse* down a gentle slope, but these influences will affect only an inconsiderable stratum; and, besides, the movement thus caused will be so trifling that the mere surface-action of rain would suffice to carry away the whole soil, particle by particle, long before the power of frost could have moved it bodily more than an inch or two. In reading the accounts of the wonderful "streams of stones" in the Falkland Islands, one is strongly reminded of the great moving masses of *débris* in certain valleys of the Rocky Mountains, as described by Dr. Hayden, and to surmise that the stone-rivers of the Falkland Islands may possibly be of the same nature. Dr. Hayden tells us that entire valleys are "covered thickly with earth, filled with more or less worn rocks of every size, from that of a pea to several feet in diameter. The snow melting upon the crests of the mountains, saturates these superficial earths with water, and they slowly move down the gulch much like a glacier. This is another process of grinding the underlying rocks, smoothing, and grooving them." But he apparently finds no difficulty in distinguishing between such "earth-glaciers," and the moraines left by those gigantic ice-rivers, which, according to him, flowed down the valleys of the Rocky Mountains during the glacial period. Suppose now that owing to some change of climate these earth-glaciers were no longer to be saturated with water to such an extent as to cause them to flow *en masse*, it is evident that the loose soil of which they are partly composed

[1] P.S.—Although the faint diffused nebulosity preceding the nebula in Orion can in general scarcely be detected by any gradations of light within the limits of the field, the general luminosity of the field increasing up to the nebula is strikingly apparent in the six foot.