LETTERS TO THE EDITOR.

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Radium and the Geological Age of the Earth.

AT various times since the appearance of Mr. W. E. Wilson's suggestion (NATURE, July 9) that the presence of radium in the sun might enter as an important factor in contributing to solar radiation, I had intended directing the attention of geologists to the direct application of this suggestion to the views entertained as to the extent of geological time. Absence from home led me to defer doing so.

Prof. Darwin has in a large measure anticipated my remarks (NATURE, September 24) by pointing out that the age of the sun can no longer be determined from dynamical considerations if supplies of energy from radio-active bodies go towards maintaining solar temperature. It will have to be shown, indeed, that such bodies do not enter even as a small ingredient into solar stuff (see Mr. Wilson's letter), or else that they do not retain their heat-generating properties at high temperatures. So far as experiments go—especially on the radio-active emanations—the latter contention seems improbable.

The gross dynamical supply of solar heat must no longer be regarded as affording a major limit both to solar age and geological time.

But there was one other good argument from the physical side opposed to the geological estimate of the earth's age: that derived from the observed gradient of temperature from the earth's surface inwards. Prof. Perry has pointed out (NATURE, Jan. 3, 1895) that an increase of conductivity towards the interior would lead to extension of Lord Kelvin's minor limit of time since the *Consistentior Status*. Quite equivalent to increased supplies from the interior would be a source of supply of heat in every element of the material. The establishment of the existing gradient of temperature inwards may, in fact, have been deferred indefinitely during the exhaustion of stores of radium and similar bodies at greater or shallower depths. In fact, we find these bodies here; the only question is as to how much of them exists, or at one time existed, in the earth's interior.

The remaining physical objection (that based on tidal retardation) being condemned for good reasons, it would appear that the estimates derived from physical speculations are now subject to modification in just the direction which geological data required. The hundred million years which the doctrine of uniformity requires may, in fact, yet be gladly accepted by the physicist. J. JOLY.

Trinity College, Dublin, September 26.

Some Overlooked Zoological Generic Names.

IN the course of my reading, I have found a few generic names of animals which have been overlooked in the preparation of the invaluable "Index Zoologicus," recently published by the Zoological Society of London. It may be as well to direct attention to them, so that zoologists may take note of them, and avoid duplicating them for other animals. They are:—

Callobombus, Dalla Torre, Cat. Hymenop., x. p. 503 [nom. emend.].

Cephalacanthus, Lapworth, tenth Ann. Rep. U.S. Geol. Surv., p. 641 [nom. præocc.].

Fiorentinia, Dalla Torre, Cat. Hymenop., x. p. 334.

Helenia, Walcott, *Proc.* U.S. Nat. Mus., 1889, p. 39 [not Helena, Hartm., 1881].

Holmia, Matthew, 1890 (subg. of Olenellus).

Isoxys, Walcott, tenth Ann. Rep. U.S. Geol. Surv., p. 625.

Leptomitus, Walcott, *Bull.* U.S. Geol. Surv, 1886, p. 89.

Linnarssonia, Walcott, *Amer. Journ. Sci.*, 1885, p. 114.

Olenoides, Meek, *cf. Amer. Journ. Sci.*, 1888, p. 165.

Protopharetra, Bornemann, *Geol. Zeitschr.*, 1883, p. 274.

Protocaris, Walcott, *cf. Bull.* U.S. Geol. Surv., 1886, p. 148.

Protospongia, Salter, *cf. Bull.* U.S. Geol. Surv., No. 30, p. 90. [I suppose Protospongia, Kent, 1880, is different.]

Authorities will differ as to whether Helenia should be changed because of Helena. I think it should not; the difference of a letter is enough to constitute it a distinct name. T. D. A. COCKERELL.

Colorado Springs, Colorado, U.S.A.

Height of the Atmosphere Determined from the Time of Disappearance of Blue Colour of the Sky after Sunset.

THE extreme height of our atmosphere has been determined heretofore from the observation of meteors, which begin to glow when the friction becomes sufficiently intense to vaporise the materials of which they are composed. This method is very satisfactory from most points of view, and will perhaps continue to be used by astronomers. Nevertheless, I think it worth while to direct attention to another method, which is more simple, and which, I believe, will be found equally accurate. It consists in observing with the naked eye the gradual disappearance of the *blue* colour of the sky as darkness comes on. It is surprising how accurate a person of good sight can make this observation when the atmosphere is perfectly clear. The time of sunset should be noted, and the time of the last sensible blue of the sky. With the data in the Nautical Almanac a simple computation by spherical trigonometry gives the depression of the sun at the instant the blue fades out into black, and we at once calculate the height of the illuminated particles overhead. The following are the results of some observations taken by the writer at Annapolis, Md.:—

1903.	Height.	Remarks.
August 10	125 miles	A trace of blue remaining.
,, 21	130 ,,	Blue just vanishing.
,, 22	133 ,,	Sky just black.
,, 23	135 ,,	Blue has disappeared.
,, 24	132 ,,	Blue vanishing.

Average height, 131 miles.

The uncertainty of this value will probably be between five and ten miles.

The instant the blue disappears from the sky is a little indefinite, owing to the gradual thinning out of particles in the upper air sufficiently dense to reflect blue light which can be seen by the eye against a black night sky, but I have not found this indefiniteness so great as might be expected. It does not seem to lead to greater uncertainty in the height of the atmosphere than the method depending on meteors.

Prof. Newcomb, in his "Popular Astronomy," p. 397, says that, from observations taken at Richmond and Washington during the meteoric shower of November 13, 1867, "the general result was that they (the meteors) were first seen at an average height of 75 miles, and disappeared at a height of 55 miles. There was no positive evidence that any meteor commenced at a height greater than 100 miles. It is remarkable that this corresponds very nearly to the greatest height at which most of the brilliant meteors are ever certainly seen. These phenomena seem to indicate that our atmosphere, instead of terminating at a height of 45 miles, as was formerly supposed, really extends to a height of between 100 and 110 miles."

According to Lord Rayleigh's theory the blue colour of the sky is due to reflection of sun-light from minute particles of oxygen and nitrogen in the upper layers of our atmosphere. This theory receives its most striking confirmation from the long duration of the blue colour after sunset, showing the great height of the particles which scatter the blue light. There can, I think, be very little doubt that our atmosphere extends to a height of about 130 miles.

Washington, D.C., September 1. T. J. J. SEE.

The Lyrids of 1903.

BEING absent I did not see the letter on the Lyrids of 1903 at the time of its appearance in NATURE of July 23. The Lyrid maximum occurred this year, it would seem, on the night of April 22, or a day later than an important display observed by Mr. Denning on April 21, 1901. The night of April 22 happened to be overcast here. There was a fair amount of meteoric activity seen by the present