LETTERS TO THE EDITOR

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[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

The Dust of Krakatao

IN the interesting paper by Mr. John Murray and the Abbé Renard, which appears in your last number (p. 585), there is an erroneous reference which it may be well to correct without delay. I am made responsible for a verbal statement concerning Krakatoa dust which fell in Japan. In your issue of the 3rd inst. (p. 525) a letter from myself will be found, stating, on the authority of Prof. John Milne of Tokio, that, contrary to the original statements made on the subject, no dust of Krakatoa is known to have fallen in Japan. My friend M. Renard must have misunderstood the communication which I made to him, which was to the following effect:—I have had the opportunity of examining a great number of specimens of the dust of Krakatoa which fell at different distances from the volcano, ranging from 50 to nearly 1000 miles. The dust collected at the greatest distance from Krakatoa, with which I am acquainted, is that which fell on board the *Arabella* in lat. 5° 37′ S. and lat. 88° 58′ E., Java Head bearing E.½ S. about 970 miles. It is certainly true that the dust which has fallen at the greater distances from the volcano contains less magnetite, augite, and hypersthene than that descending nearer to the source of eruption; and the obvious explanation of this is found in the greater density and compactness of the particles of those minerals as compared with the associated glassy fragments. At the same time it must be remembered that this is not the *only* explanation of the high silica-percentage in these ashes. The prevailing rock in the islands and on the shores of the Sunda Strait appears to be a hypersthene-augite-andesite, containing an unusually large proportion of a brown, glassy base. This base contains a far higher proportion of silica than the included minerals; and hence, as shown by Verbeek and Fennema, these rocks have a percentage of silica ranging up to, and even exceeding, 70 per cent. The same is true of the pumices formed from the glassy andesite rocks, including that of Krakatoa itself. JOHN W. JUDD

Hurstleigh, Kew

ON January 13 I collected a sample of snow from an open field, and examined under the microscope the residue left by its evaporation. This residue showed a number of objects which are not usually found in atmospheric dust. Great precautions were taken to prevent the entrance of dust during evaporation, the vessel being kept covered with filter-paper. Crystals of common salt were very abundant. There were numbers of rather large prismatic crystals, colourless, insoluble in water, and doubly refracting. But the most characteristic objects were minute granules, transparent, colourless, and scattered in thousands all over the field of the microscope. These were insoluble in water. Many black particles were visible and some of these were attracted by the magnet. In fact, when the magnet was swept slowly over the residue, its poles became covered with fine black crystalline particles, evidently magnetic oxide of iron. However, there are large iron-works in this vicinity, which *may* account for the presence of the magnetic dust. To determine this and other interesting points, it is my intention to examine the snow and rainfall regularly during the next twelve months at least.

A specimen of snow, freshly fallen on March 10 showed none of the prismatic crystals referred to above. With a high power very small crystals of similar shape and properties were observed. The small granules were, however, to be seen along with crystals of common salt and ammonic nitrate. No magnetic dust was found in this specimen.

These results are, in my opinion, in favour of the dust theory of the remarkable sunset phenomena of the past winter.

W. L. GOODWIN

Queen's University, Kingston, Canada, March 31

P.S.—Snow fell to-day (April 1), and a sample was examined for dust. The insoluble prisms have completely disappeared, and the minute dust is present in much smaller proportion.

W. L. G.

"Earthquakes and Buildings"

PROF. JOHN MILNE, of Tokio, refers in an article under this heading (NATURE, vol. xxix. p. 290) to *buildings in Caracas, which are low, slightly pyramidal, have flat roofs, and are bound along their faces with iron.* Being for more than twenty years a resident of this city, I hope I may be credited with knowing something of its architecture, and as such I must say that certainly the houses are generally one-story buildings, but all the remainder of the foregoing description is quite erroneous. However, I do not wish to make Mr. Milne answerable for its inaccuracies, as it appears to be taken from a ridiculous article published by one Horace D. Warner in the *Atlantic Monthly*, March 1883. This article is a most audacious fiction from beginning to end, and in none of the statements it pretends to give with graphic seriousness is there any shadow of truth, as I have pointed out in the *American Journal of Science*, July 1883, with respect to the principal assertion of an earthquake said to have been witnessed by the author on September 7, 1882, in Caracas.

House-building in our good city is of the most ordinary type, and certainly not what it ought to be in a place which already once was ruined by an earthquake (1812): the walls are built of brick and mortar; the roofs are very seldom flat, but have a very slight inclination, say 15 to 20 degrees. They are, however, made too heavy by a thick stratum of loamy mud, spread over the closely-joined laths (generally the stems of the arborescent grass, *Arundo saccharoides*), on which the tiles are set in alternately convex and concave rows.

The earthquake of Cua (NATURE, vol. xviii. p. 130) is an instance of the remarkable influence of the soil on the intensity of destruction: all the houses built on the rocky hill in the middle of the town were ruined, whilst those on the surrounding alluvial plain suffered scarcely any damage. The same happened in 1812 in Caracas: the northern part of the city, where the stratum of detritus is less deep, was almost completely laid waste; but the southern part, built on a far deeper deposit of loose matter, experienced comparatively small destruction. A. ERNST

Caracas, March 16

On the Transmission of Organic Germs through Cosmical Space by Meteoric Stones

IN his *addendum* to his well-known lecture on "The Origin of the Planetary System" Prof. Helmholtz uses the following remarkable sentence, to which so far as I am aware, attention has not hitherto been directed:—

"But even those germs which were collected on the surface when they reached the highest and most attenuated layer of the atmosphere would long before have been blown away by the powerful draught of air, before the stone reached the denser parts of the gaseous mass, where the compression would be sufficient to produce an appreciable heat."

Helmholtz is contending in favour of the possible transmission of germs from one heavenly body to another, and his point here is that the germs, owing to their being small and light, will be more rapidly retarded (blown back) on reaching the first traces of our atmosphere than the stones on which they reside, and will thus escape the great rise in temperature to which the stones are subject in consequence of friction and air compression.

Now when a germ just leaves its meteorite its velocity is equal to that of the meteorite. If m be the mass of the germ, $\frac{m v^2}{2J}$ will be the heat developed in destroying its velocity. Were all this heat to go to raise the temperature of the germ, the rise in temperature would be $t = \frac{v^2}{2Js}$, s being the thermal capacity of the germ. This shows that the rise in temperature is independent of the mass of the body brought to comparative rest by the atmosphere. In reality, since the germ experiences a greater retarding acceleration than the stone, its temperature must rise much more rapidly and consequently higher than that of the stone. Further, the terminal velocity of the germ will be less than that of the stone, which will conduce to further raise the temperature of the former. Of course neither the stone nor the germ will get all the heat generated, but this cannot materially affect the question. J. H. STEWART

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