

### Uniformitarianism in Geology.

DR. ALFRED WALLACE, in his letter to NATURE of May 2, calls attention to the significant fact that catastrophes caused by volcanoes "may be of greater magnitude now than in geologic times," owing to the crust of the earth being thicker now than it was then. He, however, is mistaken in supposing that this consideration has been overlooked by geologists. If he will kindly refer to "Geology," vol. i. p. 449, he will find it there stated, speaking of the older fissure and explosive eruptions, that "there is nothing to show that this [the explosive] action was on the same scale of magnitude and permanence as those of late Tertiary and recent date. With the greater thickness of the earth's crust and the greater resistance presented by its rigidity, volcanic eruptions must with time, as suggested long ago by Elie de Beaumont, have altered with the alterations of those conditions, and may now be exhibited under a phase very different from those of the earlier periods."

Or again, he will find in "The Position of Geology" ("Collected Papers," p. i.) it stated that, though one form of volcanic action (the fissure) was more active in the past than at present, that "explosive eruptions are more violent now than in former times." And again, at p. 145 of the same work, I remark that "while with the thinner crust of former times, there would be a more frequent extrusion of the molten rock, there are probably with the thicker crust now formed and consequently its greater resistance, greater forces stored in the explosive eruptions of the present day."

The instance relied upon by Dr. Wallace is, however, another striking example, if others were needed—though in this case it is on the inverse side as against meteorological agencies—of the non-uniformity *in degree* between the action of the forces of past and present times. The increased thickness of the crust is not, however, the sole cause of the violence of recent eruptions, nor are they, I imagine, due to the presence of occluded water in the volcanic foci. The terrific eruptions of Krakatão and other volcanoes are, I conceive, due simply to the access of vast volumes of surface waters and their sudden flashing into steam.

Volcanic action, therefore, does not seem to me to be in any way in contradiction to the conception of uniformity of *kind* or law, and to non-uniformity on the question of *degree*.

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JOSEPH PRESTWICH.