CORRESPONDENCE.

MR. SCROPE'S VIEWS OF VOLCANIC HEAT.[1]

SIR,—My objection to Mr. Scrope's notion of the source of volcanic heat, as enunciated by him in the GEOLOGICAL MAGAZINE for August, page 344, viz. that "volcanic heat is derived chiefly and directly by conduction or convection, or both, from that intensely heated interior mass of the globe," which he says, but erroneously, is necessary to my views, is not so easily set aside as Mr. Scrope would have to be believed by the above article. My objection is that this vague notion involves in reality a thin crust and liquid nucleus which Mr. Scrope professes to repudiate, and he rejoins that, with unpardonable ignorance, I have assumed that the liquefied matter filling his reservoirs and the material of the nucleus have the same melting point.

My objection does not involve any such assumption, and is equally valid, though the melting point of the nucleus be assumed much above that of the matter filling these reservoirs. What does Mr. Scrope *know* of the material constituting the deeper portions of our globe or of their fusibility. The only ground for conjecture even as to the latter is derivable from protruded granites, porphyries, elvans, traps, or other ancient fissure-extruded matter, none of which differ greatly in fusibility from modern lavas. But if we assume *argumenti gratiâ* that the material of the nucleus at a still greater depth than is indicated by these is fusible only at a temperature twice or thrice that of fused lava, the physical conditions under which alone heat could be conducted from the nucleus to one of these reservoirs through some hundreds of miles of intervening rocky matter, are sufficient to prove that if the lava in the reservoir be thus brought into fusion, the temperature of the nucleus must be so vastly higher that its material, if like anything we are acquainted with, must be in fusion likewise. Is Mr. Scrope aware that, apart from all question of imperfect conductivity, matter heated by conduction from the central parts of a globe decreases in temperature faster than the inverse square of the radial distance from the centre? If the heat be transmitted by convection or in vapour, there must be liquid or gaseous connexion between the nucleus and the reservoir, for without such, convection is impossible. Thus two of Mr. Scrope's alternatives directly involve fluidity in the nucleus; solids do not pass into the state of vapour except through the intermediate stage of liquidity. Thus I reiterate that this notion of reservoirs of matter melted by heat transferred from more highly heated matter, situated at a much greater depth, by conduction or by convection through gaseous or liquid matter, or by both, is only the old notion of a thin crust and liquid nucleus in disguise, and if that be, so *cadit questio* as to my having misrepresented Mr. Scrope's views. His views are by his own statement (GEOL. MAG. May, page 237–8) entirely different from mine, and it is wholly unimportant to my views what his may be. I have already declined, for want of definition, further dis-

[1] This letter is inserted at Mr. R. Mallet's earnest request. But it is hoped that the discussion will now be allowed to terminate.—EDIT. GEOL. MAG.

cussion as to the nature and origin of volcanic heat. I now decline further discussion as to the charge of misrepresentation. I can afford to leave that, as well as the truth of my own views, to "time, the revealer."

LONDON, 24*th August*, 1874. ROBERT MALLET.

ON THE ANTIQUITY OF THE WORKED FLINT FROM THE BRICK-EARTH OF CRAYFORD.

I am not surprised that a doubt should be thrown upon the antiquity of the worked flint, which I found at Crayford in 1872.[1] It usually happens so when anything unexpected is discovered. It appears to me, however, that there is but one escape from the admission that the implement is as old as the Thames valley brick-earth, and that is to show that the entire deposit at Slades-green pit at Crayford is re-assorted. The lines of bedding there are continuous along the pit, and it was from one of these, about twelve feet from the surface and six from the floor of the pit, that the flake was extracted. It was a layer of rounded pebbles, about five inches deep, lying below the band with *Cyrena trigonula*, and above the bone bed.

I was struck by seeing the edge of a flat piece of flint protruding from a layer of rounded pebbles, and therefore picked it out and found it to be a "scraper." I instantly called Mr. Dawkins's attention to it, and pointed out the hole I had made in extracting it. He said, "Show it to Mr. Evans." I did so the next day, and Mr. Evans pronounced it undoubtedly a worked flint. In the note (p. 391) where this find is referred to, Mr. Woodward also quotes Mr. Boyd Dawkins's published mention of it, and then adds: "These may, however, and probably did, belong to a later date," etc. I do not understand why he says "these," for only *one* was found.

O. FISHER.

GYROGONITES, ETC., IN THE LONDON CLAY.

SIR,—Believing that *Gyrogonites* (fossil seed-vessels of *Chara*) have not been hitherto noticed in the London Clay, I beg to mention that Mr. Joseph Wright, F.G.S., of Belfast, has lately favoured me with some specimens found in the London Clay of Copenhagen Fields, Islington, by Mr. John Purdue, when the Great Northern Railway cuttings were being made. These *Gyrogonites*, obtained by washing the clay, were associated with thousands of Foraminifera and many Entomostraca (see *Geologist*, vol. vii. p. 85; Monogr. Tert. Entom., Pal. Soc. p. viii). They are referable to two species: one is dark brown, ovoidal, and like *Chara helicteres*, Brongniart, as figured in the Memoirs Geol. Surv. Gt. Britain, Isle of Wight, etc., 1856, pl. 7, figs. 3, 4, but relatively longer; the other is light brown, spherical, and like *Chara Lyellii*, ibid. fig. 7, but rather more globular. There are five or six specimens of each species.

From the same source, and by the kindness also of Mr. Wright, I have *Cythere plicata*, Münster, to add to the known fauna of the London Clay.

September 25, 1874. T. RUPERT JONES.

[1] GEOL. MAG. Dec. II. Vol. I. p. 391.