

THE GUTHRIE MEMORIAL FUND

A COMMITTEE has been formed, under the presidency of Prof. Huxley, to raise a memorial fund in honour of the late Prof. Guthrie, F.R.S. Prof. Guthrie endeared himself to a large circle of friends by his simple character and wide sympathies. Unfortunately, as his time was exclusively devoted to teaching and to scientific research, the provision for his family is far from adequate. A slender income is furnished for his widow by a policy of insurance settled upon herself, but this will not enable her to provide for the education and maintenance of her step-children. The ages of the children dependent upon her are twelve, fourteen, and seventeen years respectively, and their case is the more sad because, until a late period of his life, Dr. Guthrie had every reason to be satisfied that they were sufficiently provided for.

Under these circumstances it will be felt by all who value his memory, as well as by those who only knew him through his scientific labours, that any sum which is gathered as a memorial of his life must necessarily be devoted to placing his children as nearly as may be possible in the position they would have occupied but for his untimely death.

Subscriptions may be sent to the Honorary Treasurer, Major Macgregor, R.E., Science Schools, South Kensington Museum, London, S.W.; or to the Honorary Secretary of the fund, Mr. C. Vernon Boys, at the same address. Cheques to be crossed "Messrs. Cox and Co."

In addition to the gentlemen named above, the Executive Committee consists of Capt. Abney, Prof. W. G. Adams, Prof. Roberts-Austen, Walter Besant, Prof. G. Carey Foster, Dr. J. H. Gladstone, W. J. Harrison, J. Power Hicks, Prof. J. W. Judd, Prof. A. W. Reinold, and Prof. Balfour Stewart; besides whom there is a General Committee, comprising Prof. W. E. Ayrton, Shelford Bidwell, Walter Bailey, T. Lauder Brunton, W. H. M. Christie, Prof. Clifton, Conrad Cooke, Prof. Crookes, Warren De La Rue, Prof. Dewar, Colonel Donnelly, General Festing, Prof. G. Forbes, Prof. Fuller, R. T. Glazebrook, Prof. Goodeve, Dr. Hopkinson, J. Norman Lockyer, Sir John Lubbock, Bart., Prof. MacLeod, Prof. J. Perry, Prof. Poynting, Prof. Rücker, Dr. W. J. Russell, Prof. W. A. Tilden, Prof. S. P. Thompson, Prof. Thorpe, and Dr. Alder Wright.

It is satisfactory to hear that already a considerable number of subscriptions have been received, but it is hoped that when the necessity for the existence of such a fund shall become better known there may be a large increase in the number.

VOLCANIC ERUPTION IN NIUA-FU,
FRIENDLY ISLANDS

SIR J. H. LEFROY has forwarded to me a small packet of volcanic dust, together with an extract from a letter written by Mr. Coutts Trotter, F.R.G.S., and has requested me to examine the former and append my remarks upon it to the more important parts of Mr. Trotter's letter. This document is dated on September 24, 1886, "on board the ss. *Sava*, a few miles south of the Island of Niua-foo" (or Niua-fu, one of the Friendly Islands). After speaking of an expedition to Fiji, Mr. Trotter proceeds:—

"Meanwhile I got into a little steamer to visit the windward island of the group, and was persuaded to come on in her to Tonga. There I found that news had just come of an awful volcanic eruption in the Island of Niua-foo above mentioned, and my steamer was chartered to go and make inquiries and give relief. . . . We started at once, and arrived off the island before dark yesterday. No trace of fire or smoke, and I was much chaffed for my 'disappointment.' But on landing this morning we found the damage done was substantial enough, an erup-

tion of dust and stones and water having gone on for eighteen days, and two-thirds of the island smothered or greatly injured. The island is some forty or fifty miles round, all volcanic, no beach anywhere, and landing difficult, and a lake of brackish-bitter water occupying perhaps a fourth or more of its extent. There are at all events three small islands in the lake, one with a lake in its centre. I suspect this lake is the remains of the crater and eruption to which the existence of the island is due, later eruptions being cause for the small island craters. The present eruption began apparently near one end of the lake. I saw three or four craters there—one covered with a green sulphurous scum; and another, just beyond it, which I could not in the time I had actually visit, very deep, and full (a friend tells me) of mud and water. Near it is a little rounded mountain of 'earth,' some 200 feet high, formed by the present eruption, and projecting far into the lake; at the other end of the lake is a fresh accumulation, as I was told, of pumice, but it looked to me from where I stood more like an accumulation of black sand. The whole island has been in a disturbed state for some three months and a half, the dates of the principal disturbances coinciding remarkably with those which are going on in other parts of the world—earthquakes on June 8 and 11, which I think are the dates of the first New Zealand outbreaks,¹ again on August 12, ditto. This of course is not wonderful, but the final catastrophe here took place on August 31, which we understand was the exact date of the recent American earthquake.² It was preceded for twenty-four hours by earthquakes, . . . and went on for ten days, I am told, without intermission, then two days quiet interval, then going on again for nearly a week—terrific thunder and lightning for twenty-four hours incessantly. The column of steam rose, they say, several thousand feet, anyhow immensely higher than a hill 7600 feet high, which I ascended, and whence I had a bird's-eye view of the lake and crater. Showers of stone accompanied it; these fortunately fell straight, or nearly straight, back. They were red-hot, with masses of dust attached, and as they fell left the dust behind, which produced the effect of a fiery tail. The great mischief was done by the dust, which, as the wind shifted, carried destruction in every direction. In one village which I entered, the shower only lasted an hour and a half, but the ground was deeply covered, the blades of grass even now only beginning to peep through, and every coco-palm ruined for the present, the branches hanging withered and almost perpendicular, and the young central shoot sticking out by itself. If they get rain, the trees will recover and bear again in three years, but otherwise are likely to die. But in other districts the houses are buried, and along the coast large extents of forest, scrub, or bush, and, what is more immediately serious, the yam beds. They have just been planted, and any that were above ground will be killed, even if the latest planted may push through and flourish. Wonderful to say, no one was killed, although many very old people have died since from fear and exhaustion. They all betook themselves to the upper parts of the island for safety, and perhaps with reason, for the last two volcanic outbursts both took place on the coast-country near the shore. These (respectively nineteen and forty years ago) were both lava eruptions. I saw the craters and the lava-streams from them down to the sea on the west coast as we steamed along to-day; the lava of the earliest being hardly invaded yet by vegetation—not a blade of green on the later, which runs far out into the sea, like the rough substratum for a big embankment or breakwater. According to native tradition, the last eruption of a kind similar to the present took place from very nearly the same spot in the lake seventy-two years ago, the old people having childish recollections yet. The

¹ The first outbreak was early on the morning of June 10. See NATURE, vol. xxxiv p. 301.

² The principal shock was on Tuesday night, August 31. See NATURE, vol. xxxiv. p. 470, and vol. xxxv. p. 31.

lake is a great depth, so that this hill of 200 feet or more rising from the bottom represents a vast amount of solid matter, to say nothing of the thick deposits of dust all over the island. The lake was still bubbling in places, and things are by no means settled down yet. At Vavau, where we touched two days ago, they had just had a very severe earthquake, and shocks are still going on at Niua-foou (vertical, *I was told*, but my informant's wits were much shaken by recent events) daily on the level ground near our landing-place, from which it is inferred that the danger is not over. Strong gases too are perceptible rising from the ground near the coast, which is always where they apprehend most danger, and an outburst of lava. I suppose the solid matter coming up through the deep lake is pulverised into the (to life) comparatively harmless dust. During the earthquake of August 12, the captain of a ship at anchor found that, whereas he had paid out twenty fathoms of chain over-night, he had only eight fathoms under him in the morning. I never saw such big coco-nuts anywhere, though the trees are not exceptionally big, indeed there seem to be no very fine or old trees of any kind on the island, which favours the theory of a modern origin, for the soil is very fertile. The name means New Niua, the Old Niua being probably the neighbouring Keppel Island or Niua-tobu-dabu. I wish I could give you a better or fuller and more interesting account of the whole affair, but the visit was a very hurried one, and, in fact, I had not more than two hours on shore. Still it may interest you, as it is written on the very spot: no other account is likely to reach England. I send a pinch of 'sand' from the crater. "C. T."

This "sand" or "dust" is a very dark-brown—almost black—colour. When examined with a lens it seems composed mainly of fragments of glass, and has a slightly speckled aspect, owing to the mixture of lighter and darker fragments; one or two glassy-white fragments may also be noted. When some of the dust is placed under the microscope, it is seen to consist almost wholly of fragments—some rudely polygonal in shape, others flattish chips—of a brown glass; the former being the commoner. The majority of the bits vary from about .01 inch to .03 inch in diameter, and the latter measurement is but rarely exceeded. Minute chips are also present, but they do not form at all an important constituent in the mass. A conspicuous characteristic is the (apparently) entire absence of the tiny pellets of "cindery" scoria, so frequent a constituent of volcanic dust, and of the fine pulverulent material, the presence of which commonly makes it needful to mount the dust on a slide before it can be properly studied. I have found no difficulty in examining this Niua-fu dust, and even the finer chips—often less than .001 inch in diameter—by simply spreading it over a sheet of glass. The glass fragments, even when very minute, have a tinge of brown: when about .01 inch in thickness, they are fairly translucent, and a rich olive-brown in colour; but as they approach .03 inch in thickness they become opaque, light only passing through the thinner edges. Small cavities, spherical, or egg-shaped, are not infrequent, but the glass is remarkably free from microlithic inclosures. No granulation of the colouring-matter is perceptible, as a rule, with a magnification of 150 diameters; opacite dust and trichites (especially the latter) are very rare; and of other microlithic inclosures I have only seen an occasional lath-shaped crystallite (? feldspar). I have not identified among the fragments either biotite, augite, or hornblende; so that if any of these minerals are present they must be very rare. The clear glassy fragments mentioned above are feldspar—probably labradorite. They do not in number exceed about 2 or 3 per cent. of the whole. Many of the flatter brown-glass fragments exhibit rosy folds or the remains of a cellular structure, evidencing that they are due to the destruction of a very vesicular glass, while the more solid polygonal

fragments may be the detritus of the thicker parts of the same or of a more uniform glass. The strong brown colour of the fragments reminds me of specimens of the more glassy lavas of the Sandwich Islands in my collection; and like them I should, from microscopic examination, consider the rock a basalt-glass (tachylyte) with a silica percentage, which was probably above rather than below 50. This view accords, I find, with Cohen's statement concerning the lava of Niua-fu, which, judging from his description, is very similar to that above described (*Neues Jahrb. für Min.* 1880, vol. ii. pp. 36 and 41); he says that it is almost identical in composition with the "basalt-obsidians" (*i.e.* tachylytes) of the Sandwich Islands. It contains 50.74 of silica; their analyses show from 50.82 to 53.81.

While the above was passing through the press, I received from my friend Dr. S. Rideal a determination of the specific gravity of the volcanic material (powdered to get rid of cavities). The specific gravity is 2.726. As the feldspar is included, and it is slightly the lighter, the specific gravity of the glass itself must be a little higher, about 2.73. Hence we need not hesitate to call it a tachylyte. The average of six Sandwich Island glasses is 2.71 (see Judd, *Q. J. G. S.*, xxxix. 444).

T. G. BONNEY

FOURTH ANNUAL REPORT OF THE FISHERY BOARD FOR SCOTLAND

THE Report of the Fishery Board for Scotland increases each year, not only in size, but in interest for the general public, as well as for those readers whom it specially concerns; and, unlike ordinary Blue-books, its pages are to a large extent devoted to scientific papers which appeal to many not directly concerned with the fishery industry.

The herring-fisheries continue to be most productive. A very striking feature of the summer herring-fishery of 1885 is, that many in-shore grounds, where herrings were previously found in great abundance, but which had recently been all but deserted, were restored to their former fertility. The increase of the herring-fishery in the Shetland district, which now ranks as the most important in the country, still continues, greatly to the improvement of the condition both of the people and of their boats. The fish are of finer quality than those taken on other parts of the east coast. The takes of other sea fish and salmon were also very large. The gross total estimated value of the sea and salmon-fisheries for Scotland was 2,859,822*l.* 1*s.* The Board have already expressed their regret that so many tons of sprats are annually used as manure. Could they be transmitted to populous districts at a reasonable rate, they would be a cheap and valuable addition to the food-supply, or, where this was impracticable, preserved as anchovies as in Norway, or as sardines as in Canada. The importance of utilising the by-products of the fisheries is now widely recognised. Papers by Dr. Stirling and Mr. Haliburton give an account of certain economical products obtained from fish, and experiments are being made on a fairly large scale by Mr. Sahlström at Aberdeen, which may, it is hoped, lead to some practical results. Investigations on whitebait by Prof. Ewart and Mr. Matthews showed it to consist almost entirely, and at all seasons, of young sprats and young herrings, varying according to the season of the year and the place of capture. It might, therefore, be advantageous for the Firth of Forth and other in-shore waters to send supplies of whitebait to the English markets.

The Scientific Committee of the Board had the assistance of Mr. Brook, Prof. Stirling, and Mr. Duncan Matthews, of Aberdeen; Prof. McIntosh, of St. Andrews; Prof. Greenfield and Dr. Gibson, University of Edin-