

so destructive in Nelson and in most parts of the North Island except the Wellington District.

4. "Notes on Te Karamea Bluff," by Captain G. Mair.

ABSTRACT.

Te Karamea Bluff is about a mile and a half south of Motuokura or Bare Island, and south of Cape Kidnappers some ten miles. It projects into the sea about 120 yards, and is joined to the mainland by a razor-back ridge of white marl, some 20ft. or 30ft. high and half the thickness. The highest part of the bluff is close on 100ft. It is formed of crumbling stone of every conceivable colour, red and chrome predominating. The whole mass appears to be resting on and slipping to seaward from a layer of marl. No other similar formation exists in the district, except in a small valley running parallel to the coast about a quarter of a mile west of the bluff, where there is a mound of the same material, about the size of a large haystack, cropping out on the hill-side. This place was formerly a refuge for the native tribes during war-time, as it is almost inaccessible. About 1828-30 a war-party of Ngatihonua, from the Thames, under Takurua, who was afterwards killed at Kaipaki by Te Waharoa, laid siege to Te Karamea. The besieged were unable to lay in a store of food and water, and sustained themselves for a considerable time by occasionally lowering the most venturesome of their number into the sea at the outer end, who would collect limpets and seaweed from the rocks, and be drawn up the cliffs by ropes. Eventually they became so emaciated from want of food that the pa was taken, and a great massacre took place. The spot is now very sacred in the estimation of the natives living in the district. They had a whaling-station near by a few years ago, and a good boat-landing exists on the north or east side, according to the wind.

Mr. McKay said he was pleased that the paper had been read, more especially as it was evident the writer was unaware that a discussion on the true position of the red rocks had taken place; and yet the paper and sketch made it quite clear that these overlie the marl and greensand-beds of the isthmus and mainland. The evidence given in the paper was thus in agreement with what he himself reported in 1875, and again in 1886, and in no sense bore out the contention put forward by Professor Hutton that the rocks of Red Island—Te Karamea Bluff—are of palæozoic age, and are referable to the Rimutaka series.

5. "Remarks on Earthquakes in the Amuri District, South Island," by Alexander McKay, F.G.S.

ABSTRACT.

The author commenced by stating that, for twelve months previous to the end of August last, booming noises, proceeding from the ground, had been heard in the district surrounding the Hanmer Plains, and that towards the end of that month earthquakes began to be experienced; these premonitions were followed by the great shock of the 1st September, which did nearly all the damage that happened to buildings, and opened most of the fissures that are yet to be seen. This was followed by the shock of the 28th September, and, after a like period, by that of the 23rd October, and those of the 26th and 28th of the same month; there being just about a lunar month between the first and second and the second and last series of shocks. Mr. McKay then described the effects the earthquakes had produced, and gave a detailed account descriptive of the fissures opened at many places along the Waiau-ua and Hope Valleys, more especially those seen near the mouth of Gorge Creek near Hopefield, at Hopefield, and at and near Glynn Wye. The present ruined condition of the buildings at Glynn Wye was described, and the manner in which the fences

had been broken and shifted 8 feet 6 inches to the east of the line in which they originally stood. Next it was shown that the evidences consisting of slips and earth-rents are confined to a narrow belt of country extending S.S.W. from the east corner of the Hammer Plain to the Upper Hope Valley, abreast of and about six miles to the north of Lake Sumner, in the Hurunui Valley. Beyond this point to the westward the line of dislocation was not examined. All these rents and fractures lie along a line of previous earthquake disturbance, the old fractures indicating this being traceable on the surface where the line does not run along river-beds, liable to be flooded and leave the surface shingles rearranged. The eastern continuation of this line of old fractures caused by earthquakes was described as extending to the eastern base of Mount Fyffe, near Kaikoura. Glynn Wye was described as being the point on this line at which the most violent disturbance of the surface took place; while Westport, 60 miles to the north, Christchurch, 65 miles to the south, and Kaikoura on the east coast and Hokitika on the west coast, were the limits to which the earthquake extended as a shock violent enough to do damage to buildings, &c. Mr. McKay said that, while not touching the question what the primal cause of earthquakes may be, he felt sure that the Amuri earthquakes, in as far as they were expressed at the surface and had been studied by him, were due to crushing movements along the old earthquake-line; and he went on to show that in the northern part of the South Island, and, indeed, throughout the islands of New Zealand, there are many old faults, showing a great vertical displacement, running coincident with earthquake-rents opened but recently, though not for the first time. The whole of the northern part of the South Island, it was stated, was being elevated, and a series of parallel fractures gave relief to the resulting strain, which relief, at the moment of its happening, produced the earthquake.

Sir James Hector considered that this paper, as a simply-told narrative of the observed facts, would become classical in the literature of earthquakes, and he complimented the author on its excellence. He did not quite agree with all the author's deductions, however. The mere linear extension of fault-lines did not determine a liability to earthquakes. There must be a lateral stress or condition of strain in some part of the fault-line. As he had pointed out last year, a violent concussion might originate from a slickenside surface in a fault. He quite agreed that in this particular case there was nothing to connect this shock with volcanic action, present, past, or future. It seemed to be a localised fault-movement, no doubt produced by the jar of a wide-spreading earthquake-shock of the ordinary mild character.

Mr. McKay, in reply, stated that we could only deal with what was open to observation. The facts went to prove that from some point not far from Glynn Wye the force of the shock diminished in all directions; and practically there or thereabouts, the centre of the disturbance must be placed. As to the influence of the great faults, it mattered little whether the earthquake produced the faults or the faultings were the cause of the earthquake—both were effects of a greater movement behind either or both; but, as the faults and earthquake-rents were in this district on the same lines, the earthquakes were always most severe in the near vicinity of those lines. Mr. McKay said he spoke not of the numerous lesser faults that are to be found all over the country, but of the five or six greater faults whose movements have stamped with peculiarity the physical features of the whole district.

Sir James Hector exhibited a specimen of Alumite from Australia, with the alum obtained from it. He explained that it had been discovered by Mr. J. H. Cox, late Assistant-Geologist.