

Mr. Travers drew Capt. Hutton's attention to the fact that Mr. Rochfort had seen newts in a lake on the top of Mount Arthur; that he had in his garden a carnivorous slug, and he also referred to a red parasite he had seen on a reptile on his station. He thought many distinctive forms of life had been introduced from other countries, but owing to the time required for distribution they were but imperfectly known.

Dr. Haast would like to know if submergence had only been partial. There was no doubt that New Zealand was originally part of a large continent.

Captain Hutton felt doubtful about the newts until he had heard further of the matter.

The President after discussing some of the points raised by Capt. Hutton, said that the Society should be congratulated on the paper, which was a practical application of the Darwinian theory.

2. "On the Birds of the Chatham Islands," by H. H. Travers; "With Introductory Remarks on the Avifauna and Flora of the Islands," by W. T. L. Travers, F.L.S., (See *Transactions*, p. 212.)

Mr. J. D. Enys asked if Mr. Travers could account for the gizzard stones of the kiwi being found in the Chathams, if it did not belong to it.

Mr. Travers said it might have been taken over by the Maoris, but it certainly did not belong to the islands.

A skeleton of a Wallaby, prepared by Dr. Knox, was exhibited.

EIGHTH MEETING. 18th September, 1872.

Dr. Hector, F.R.S., President, in the chair.

New member.—J. B. Bradshaw, M.H.R.

Publications received since last meeting were on the table.

1. The President read a letter from Dr. J. E. Gray, expressing his opinion that the Seal described by Dr. Hector in last year's *Transactions* as the young of the Fur Seal of the West Coast is in reality a different species. Dr. Hector gave reasons why he still adhered to his opinion on the subject, and was supported by Capt. Hutton.

2. "On the Chief Features of the Vegetation of the District between Maketu and Lake Taupo," by T. Kirk, F.L.S.

This paper gave an instructive account of the culture of tobacco by the natives in the vicinity of the Hot Springs, and urged the necessity of preserving the scanty remains of forest in the district, and of extending them by artificial plantation.

The President stated that the defect of the Taupo pumice soil as a pasture land is more a mechanical than a chemical one, and the thorough consolidation of the surface by the trampling of stock would greatly improve it.

Mr. Travers said with reference to a statement that horses in the district feed on cotton-grass in absence of more nutritious food, that even where grass is abundant horses prefer that plant and eat it greedily.

The President pointed out, with respect to the author's statement that the occurrence of the pohutukawa and other littoral plants on the shores of Lake Tarawera affords direct evidence of the former incursion of the sea into the interior, that the fact of the plants thriving in inland positions proves that they are not exclusively maritime, and is therefore of no value as evidence on this point.

3. "On the Date of the Last Great Glacier Period in New Zealand, and the Formation of Lake Wakatipu," by Capt. F. W. Hutton, F.G.S. (See *Transactions*, p. 384.)

Mr. Travers explained that it was a mistake to quote him as saying that the glaciers are now over-riding their terminal moraines. He had mentioned to Capt. Hutton that he found signs of this having occurred at some former time in the Nelson mountains, but the glaciers had now entirely disappeared from that district.

Mr. J. D. Enys considered that the author must have misunderstood the reports he quoted relative to the Canterbury plains. The fan-like shape of the surface, formed by deposits radiating from the gorges of the large rivers, had been clearly proved by levelling; and was shown in the sections referred to.

The President while appreciating the value of the paper as likely to maintain an interest in the subject, could not agree with the conclusions arrived at further than attributing, as he had always done, the erosion of the alpine vallies and the rock-bound lake basins to the scooping of ice. The level at which the water of the sea or lakes now stands in these valleys is, however, quite a different question. He admitted that the former extension of the glaciers may have been greatest in the older-pliocene, and have continued through the pleistocene period, and that he was perhaps wrong in the manner in which he employed the latter term, as it is now frequently used for post-pliocene, and all but the most recent formations. That the area of the mountain tops above the snow line influenced the extension of the glaciers, irrespective of the geological epoch, is proved by the fact that the glaciers from Mount Cook at the present time descend to within 700 feet of the sea level.

The Wakitipu Lake, he explained, occupies portions of two parallel vallies, connected by the middle arm, which intersects the backbone range of the district by a gorge, the sides of which are 6,000 feet above the bottom of

the lake. It could not have been formed by a single continuous scooping process in the present line of the lake, as if a depression had not otherwise existed the upper part of the glacier would have continued its excavation towards the Te Anau Lake, in which direction there is a low saddle. The soundings of the lake, which is fifty miles long, were taken in 1863 under his instructions by Mr. Hacket, and showed that the bottom is flat from side to side, and has an average fall of twelve feet in the mile from both ends towards the middle arm, where the bottom of the lake is 300 feet below the sea-level. The resemblance to the sounds on the west is complete, yet they are only forty miles distant, and are cut to more than 1,800 feet beneath the sea-level, and in hard granite instead of the soft crumbling schists that are found round the Wakitipu. To explain this fact inequality of subsidence is certainly necessary; moreover, the occurrence of marine tertiary limestone on the shore of the lake inclined at 50° , and rising to considerable altitudes in the mountains, indicates movements in the rock masses of the district that must have contributed to determine the direction of the vallies.

The President supported Mr. Enys regarding the reports on the Canterbury plains by Dr. Haast and Mr. Doyne, and from his own knowledge said that nothing was more clearly established than the regularly curved contours of surface deposits concentric to the points where the great rivers emerge from the mountains. The existence of the terraces bounding the rivers as they cross the plains to the sea, he explained as being due to the gradual erosion of a notch in a rocky barrier where they leave the mountains, so that the river flows at a lower level, and cuts through its earlier formed alluvium. So far as the district of the Rakaia is concerned, the statement that the gravel formation wraps round the spurs of the hills at one uniform level is certainly not correct. On the whole, he thought no proof had been advanced of any submergence beneath the sea of the alpine districts since the last excavation of the great vallies by the glaciers. After quoting Sir Charles Lyell, who points out that the time required for similar excavation is so extensive that it covers a period during which we know that greater oscillations of level have taken place than are required to account for such inequalities, the President drew attention to the irregularity in the movement of the land during the earthquakes of 1848 and 1855, which amounted to nine feet elevation at Palliser Bay and was not perceptible at Porirua, while there is good reason to believe that in Blind Bay there was a marked depression. The elevation of the Bally Rock in Wellington harbour and the depression of the Hapuku Rock at the Astrolabe in Blind Bay, since the publication of the Admiralty charts, was also advanced as evidence that unequal movements have taken place on a small scale, and of course such may be cumulative throughout long periods.