

many valleys of Sikkim and eastern Nepal between 7000 and 8000 feet, and even down to 5000 feet, above sea-level. In the western Himalayas perched blocks are found at 3000 feet, and in the Upper Punjab very large erratics have been observed at still lower elevations. No traces of glaciation have been detected in southern India. Besides the physical evidence of refrigeration, the present facies and distribution of the flora and fauna on the south side of the Himalaya chain suggest the influence of a former cold period.⁶¹

Australasia.—The present glaciers of the New Zealand Alps had a much greater extension at a recent geological period. According to Sir J. Haast they descended into the plains, and, on the west side of the island, probably advanced into the sea, for along that coast-line their moraines now reach the sea-margin; huge erratics stand up among the waves, and the surf breaks far outside the shore-line, probably upon a seaward extension of the moraines.⁶² Captain Hutton, however, points out that there is no evidence from the fauna of any general and serious refrigeration of the climate during this glacier period.⁶³ He believes that the principal part of the sub-tropical flora and fauna of New Zealand was introduced before the Miocene period, and has flourished ever since, and that any serious diminution of the temperature of the islands would have exterminated all but the more cold-loving species of plants and animals. He maintains that the cause of the former greater extension of the glaciers is to be sought in the fact, of which there are other independent proofs, that the land then stood at a far higher level than it does at present, an additional 3000 to 4000 feet being estimated to suffice for restoring the glaciers to their former maximum size. He likewise adduces grounds for believing that the glacier epoch (which he declines to regard as a *glacial* epoch) in New Zealand dates back to a much earlier time than the Ice Age of the northern hemisphere, probably to the Pliocene period.

To the Upper Pliocene and Pleistocene periods are assigned the wide terraced gravel-banks and alluvial flats which occur in the main valleys of Australia, and the

⁶¹ Medlicott and Blanford, "Geology of India," p. 586.

⁶² "Geology of Canterbury and Westland," p. 371. This, however, as above stated, is not admitted by Captain Hutton (N. Zealand Journ. Sci. 1884).

⁶³ "Geology of Otago," p. 83. See for a fuller statement of his views on this subject his address on the Origin of the Fauna and Flora of New Zealand, N. Zealand Journ. Sci. 1884; also Proc. Linn. Soc. N. S. Wales, x. part 3.