

included under his second division of the Pliocene, called Newer Pliocene. In 1839, he proposed to substitute Pleistocene for Newer Pliocene, as a fourth division of the Tertiary, characterized by having about 95 per cent of the shells those of living species — a larger proportion, as the name implies, than in the earlier part of the Pliocene. But the new name, as he states, was used by E. Forbes in 1846 and others for the Post-Pliocene instead of the Newer Pliocene, and he withdrew it. The perverted use of the term was partly owing to his retaining Glacial and related topics under the Newer Pliocene — an arrangement which was continued into the 5th edition of his *Manual of Elementary Geology*, published in 1855. This was later changed. But in the 4th edition of the *Antiquity of Man* (1873) Pleistocene was finally adopted as a substitute for Post-Pliocene.

The term *Quaternary* was used by Réboul, of France, in his work *La Géologie de la Période Quaternaire*, 8vo., 1833.

The division of the Post-Tertiary or Quaternary into the three periods mentioned above was presented by the Author in his address on "American Geological History" before the American Association, in August, 1855. (*Amer. Jour. Sc.*, xxii., 305, 1856.) The names for these subdivisions then proposed were the *Glacial*, an epoch of elevation; the *Laurentian*, an epoch of depression; and the *Terrace*, an epoch of moderate elevation. In the first edition of this *Geology* (1863), the terms adopted were *Glacial*, *Champlain*, and *Terrace*.

The two earlier periods, the Glacial and Champlain, have their more prominent characteristics displayed almost solely over high-latitude regions. They are not represented in tropical latitudes, or in warm temperate latitudes south of the parallel of 35°, except locally about regions of lofty mountains. Moreover, deposits, like those of the Champlain period, were forming through the Glacial period along the southern border of the ice-sheet, owing to the melting that was going on, and the streams that were thereby made, especially in the summers, and still more largely during temporary relaxations of the extreme cold. Further, the Mammals of temperate climates that spread northward over the previously glaciated area when the Champlain period opened, probably were all in existence during the middle and later parts of the Glacial period, after the epoch of extremest cold and maximum extension of the ice had passed, if not earlier. Glacial and Champlain phenomena were thus cotemporaneous. Nevertheless the periods stand well apart in the great epeirogenic movement, or change of level, that separates them, and in the continuation of Champlain conditions long after the ice had disappeared.

*Review of modern Glacial phenomena.* — The general phenomena and laws of Glacial Geology have been stated on pages 232-250, and illustrated in part by facts from an existing continental glacier — that of Greenland. As there explained, the glacier moves over hills and ridges, up slopes as well as down, the pitch of its *upper* surface determining its direction and rate of movement. It is greatly aided in excavating work by subglacial streams, that are far more effectual workers than ice; which streams in Greenland, according to H. Rink, probably branch widely over the country, like a regular river-system, and have at times great volume. It gathers stones, gravel, and sand, for transportation, as well as large rock-masses. It abrades, through the stones at bottom, rocky surfaces passed over, and corrades the transported material, making rock-flour, sand, gravel, and smoothed or scratched stones out of the debris taken aboard; and it may convert the finer material into clay. It deposits rock-flour and other debris from subglacial streams