

their relations to those of Keweenaw are not ascertained. Igneous outflows occurred also in the Cambrian areas of southeastern Pennsylvania (G. H. Williams, 1892).

*Foreign.* — As in America, Cambrian beds are found along the borders of the Archæan. They occur at various points in the northern part of the Continent of Europe, from England along Sweden, Norway, Lapland, to Esthonia, in Russia, and also about isolated areas in France, Portugal, and Spain; the areas being the outcropping margins of Cambrian deposits. So large a part of the European continent is under Mesozoic or Cenozoic strata that geology cannot claim to know much about the actual distribution of the Cambrian areas.

*Epochs of upturning in the course of the Cambrian.* — Besides evidence of slow change of level, evidence exists of one or more epochs of disturbance or upturning during the long interval between the Archæan and the close of the Cambrian. The evidence consists of superposition of the horizontal or nearly horizontal beds of the Upper Cambrian on upturned beds of earlier Cambrian in Minnesota, on the St. Croix, in central Texas, and in Arizona in the Grand Cañon of the Colorado. It is not known that any mountains were made at the time in either of the three regions mentioned. In the Eureka district, Nevada, the beds of the Upper and Lower Cambrian are conformable.

*Tide and currents the same essentially as now.* — The beach material of the early and later Cambrian was fine sands and pebbles, as it is now; for these are the materials of the beach-made rocks, — the Potsdam sandstone and other like deposits. They were as quietly belabored by the waves, as the ripple-marks show; as free from extraordinary current movements, as proved by the usual even regularity of the bedding. A reddish variety of these sand-made rocks, spread out and accumulated on Cambrian beaches or sand-flats, is used in American cities as one of the kinds of building-material. The waves and currents were then as quiet in their work about the Adirondack shores as they are now on the New Jersey coast. No evidence exists that the world's tides and currents had greater force than in this modern era of a quiet earth.

*Climate in the Cambrian.* — The evidence as to climate open to the geologist is that based on the kinds of life represented by fossils in the rocks. The Cambrian fossils thus far studied are from temperate latitudes only. Nothing is gathered from them as to different zones of temperature in the ocean, and nothing that proves the temperature of the waters to have been warmer than that of the existing torrid and warm-temperate zone. We have, therefore, to regard the climate, as well as the tides and waves, to have been such as now characterize the warmer portions of the existing world. There was no frigid zone, and there may have been no excessively torrid zone.

*Purity of the air and waters.* — The purification of the air and waters through the making of limestone, which commenced in the later part of Archæan time, continued through the Cambrian; for limestones are common rocks in the series, though far from being the only ones. The degree of