Punchbowl. Porndon is a cone of very light cinder. Leura is a broken crater on the edge of the rises, while Purrumbete is a beautiful sheet of water, a few miles distant, which once, as a crater, discharged vast quantities of ash. The other principal volcanos of Western Victoria are Buninyong, Blowhard, Noorat, Gellibrand, Napier, Franklin, Cavern, Shadwell, Lower Hill, Clay, Elephant, Eckersley. No adequate impression can be formed as to the period of the activity of these cones and craters. There is a freshness in most of them, indicative of a comparatively modern date, and the natives have traditions of the eruptions of several of them.

GLACIAL MOVEMENTS ON THE NORTH-WEST COAST OF AMERICA.

By Sir E. BELCHER, F.G.S.

Sir E. Belcher said that early in September, 1837, his expedition ran down the coast of North America, between Ports Etches and Mulgrave, in order to fix the position and determine the heights of Mount St. Elias. The icebergs which hung about the coast were much larger than those which he had seen in Behring's Strait, or off the mouth of the fiords in the vicinity of Port Etches. He believed that in Icy Bay the lower bodies of the ice were subject to slide, and that the entire substratum, as frequently found within the Arctic Circle, was composed of slippery mud. In Icy Bay the apparently descending ice from the mountains to the base was in irregular broken masses, which tumbled in confusion. The motion was clearly continuous. As to the causes which operated in producing the constant displacements of the glacier, and the protusion of the bergs seaward, many theories had been proposed. His impression was that, whatever was the intensity of cold under which congelation had taken place, the actual temperature due to the ice was merely that of 32 degrees Fahrenheit, and that self-registering thermometers, properly buried in ice or snow, subject even to the very low temperature of 62 degrees, 5 below zero, on the external skin, only indicated the proper temperature of freezing water. In the very high latitudes of 63 degrees to 76 degrees North, the snow on the surface of the snow-clad elevations furnished sufficient water to undermine the lower beds of snow-ice, and bore a passage to the sea. However firm the crust might be in certain positions, a furious torrent had been at work beneath. Was the conclusion to be that the temperature of the earth must aid in keeping up a temperature sufficiently high to prevent the water hidden from light from congealing? The advance of vegetation was another proof; the ground-willow, saxifrages, and many other plants producing their shoots before light caused the immediate expansion and colouring of the leaf. The earth's temperature, acting on the lower portions next to the soil, aided in facilitating the travel of the slip of the snow-ice of which these glaciers were composed to lower levels. In all ice-formations there might be noticed, at the season which followed the period of day-frost or preceded the spring, a peculiar dryness, the result of evaporation of the superfluous water, attended by dense fogs. An ominous cracking was then experienced, which had been misrepresented by some of the first Arctic explorers as the breaking of the bolts of their vessels: no bolt was ever traced to have been so broken. He imagined that the soil on which masses of eternally-shifting ice reposed, must be, from never being exposed to the sun's rays, of a loose, boggy, or muddy nature, which facilitated slipping. The undermining facilitated cracking, and the very action of alternate freezing and thawing between the exposed surfaces, serving

as aqueducts along the upper portions into which water would flow, must produce compact ice; and its power in that very action was quite adequate, by compression, not only to remove ice, but even mountains of earth, provided the *point d'appui* be afforded. It was evident with respect to the lower portions supporting Mount St. Elias, which were subject to a summer-heat which ripened strawberries, and was even more oppressive than we experienced in England, and to rapid thaws of the inferior levels, that repeated fracture and avalanches would occur, and that one must calculate on sudden and tremendous concussive force, by the breaking away of whole ranges and precipitating themselves on the lower strata. His opinion was that the shocks of the avalanches communicated laterally had produced such fractures as had been noticed in those peculiar pyramidal forms near Mount St. Elias. These fractures opened, were filled by water, which probably froze at night or when the sun was absent, and expansion drove the exterior masses, which were termed bergs, into the sea.

DURA DEN.

By the Rev. Dr. ANDERSON, F.G.S.

The Rev. Dr. Anderson stated that last year the Committee of the Association made laborious researches in quest of the long-lost *Pamphractus* of Agassiz, nowhere seen nor heard of in any part of the above-named rocks for a period of twenty-five years. He had now to state that in their latter excavations they had come upon the hidden treasures, and he had the pleasure of laying them upon the table, in a condition of the most perfect preservation. There was a double interest connected with this curious crustacean. First, of a rare discovery; and next, of a successful result in a matter of keen and important controversy. The specimens discovered were five impressions of the *Pamphractus Andersoni*, two of which were perfect in all their plates, whilst the others were more or less mutilated in some of their organisms. Besides this genus, the excavations had revealed at least one other entirely new to science. The specimen of this new fossil, which he laid upon the table, was in a sufficiently good state of preservation for determining all the true characteristics of the genus in scales, fins, plates, and general contour. The caudal and pectoral fins were enormously large, the body short and small, and the head comparatively very large.

SUBTERRANEAN MOVEMENTS.

By Prof. VAUGHAN, F.G.S.

Professor Vaughan, of Cincinnati, stated that the definite relations recently discovered between calorific and mechanical action seemed to have an important bearing on questions relating to the secular refrigeration of the earth and the high temperature of its internal regions, even at the present time. The vast amount of heat supposed to have escaped from our planet during past ages, might be reasonably expected to call into existence forces of much greater efficiency than those indicated by the upheaval of lands, or by the violence of earthquakes and mechanical eruptions. Our terrestrial fabric had a strength too limited for the full development of such great calorific powers by the