

proofs of the river and the sea having successively prevailed on the same spot. At New Charlton, in the suburbs of Woolwich, Mr. De la Condamine discovered in 1849, and pointed out to me, a layer of sand associated with well-rounded flint pebbles in which numerous individuals of the *Cyrena tellinella* were seen standing endwise with both their valves united, the posterior extremity of each shell being uppermost, as would happen if the mollusks had died in their natural position. I have described* a bank of sandy mud, in the delta of the Alabama river at Mobile, on the borders of the Gulf of Mexico, where in 1846 I dug out at low tide specimens of living species of *Cyrena* and of a *Gnathodon*, which were similarly placed with their shells erect, or in a position which enables the animal to protrude its siphon upwards, and draw in or reject water at pleasure. The water at Mobile is usually fresh, but sometimes brackish. At Woolwich a body of river water must have flowed permanently into the sea where the *Cyrenæ* lived, and they may have been killed suddenly by an influx of pure salt water, which invaded the spot when the river was low, or when a subsidence of land took place. Traced in one direction, or eastward towards Herne Bay, the Woolwich beds assume more and more of a marine character; while in an opposite, or southwestern direction, they become, as near Chelsea and other places, more freshwater, and contain *Unio*, *Paludina*, and layers of lignite, so that the land drained by the ancient river seems clearly to have been to the southwest of the present site of the metropolis.

Before the minds of geologists had become familiar with the theory of the gradual sinking of land, and its conversion into sea at different periods, and the consequent change from shallow to deep water, the freshwater and littoral character of this inferior group appeared strange and anomalous. After passing through hundreds of feet of London clay, proved by its fossils to have been deposited in deep salt water, we arrive at beds of fluvial origin, and in the same underlying formation masses of shingle, attaining at Blackheath, near London, a thickness of 50 feet, indicate the proximity of land, where the flints of the chalk were rolled into sand and pebbles, and spread continuously over wide spaces. Such shingle always appears at the bottom of the series, whether in the Isle of Wight, or in the Hampshire or London basins. It may be asked why they did not constitute simply narrow littoral zones, such as we might look for on an ancient sea-shore. In reply, Mr. Prestwich has suggested that such zones of shingle may have been slowly formed on a large scale at the period of the Thanet sands (C. 3, p. 208), and while the land was sinking the well-rolled pebbles may have been dispersed simultaneously over considerable areas, and exposed during gradual submergence to the action of the waves of the sea, aided occasionally by tidal currents and river floods.

Thanet sands (C. 3, p. 208).—The mottled or plastic clay of the

* Second Visit to the United States, vol. ii. p. 104.