Origin of the Earth's Form and Features.

This embraces *first*, the origin of the shape of the earth's mass; *second*, the origin of continental plateaus and oceanic depressions, and of all movements in the earth's crust through geological time not involving orogenic work; and, *third*, the origin of the movements producing the upturning of formations and the making of mountains.

The first of these subjects, *geogenic* work, pertains to astronomy. The movements referred to under the second, by which wide changes of level have occurred without special orogenic results, except displacements along old or new fracture-planes, have been termed by G. K. Gilbert *epeirogenic*, or continent-making (1890). The work included under the third head is *orogenic*.

1. General Considerations Bearing on the Earth's Form.

1. *Solidification of the earth.* — The earth solidified from the center outward. This conclusion is established on the evidence that pressure raises the fusing point of rocks. The globe was, therefore, never in a state of complete liquidity. According to Clarence King, experiments made for him by C. Barus with reference to the question as to the earth's rate of cooling (see page 1026), lead collaterally to the conclusion that the depth of the liquid exterior of the globe has at no time exceeded 50 miles.

The study of meteorites has led some astronomers and writers on the constitution of the globe to the opinion, in view of the iron in these bodies, and the fact that their place in the solar system is to a large extent near that of the earth, that the earth's interior consists, for the greater part, of iron. This view is favored, also, by the high percentage (10 to 14) of iron oxide in most igneous rocks; the existence of much native iron in doleryte at Disco Island, Greenland; and the occurrence of the greatest of iron-ore beds of the world in the oldest rocks, the Archæan. Platinum, gold, silver, and copper are heavier metals; but it is remarkable that they are not brought up among the constituents of eruptive rocks, as iron is, but are obtained from the supercrust and its veins: as if these metals, in consequence of being in vaporizable combinations, or those of comparatively little specific gravity, were near the surface of the fused globe, while below these were the iron and whatever, under the conditions, could form alloys with it. If the earth is two thirds iron, or iron to within 500 miles of the surface (without much increase in the density of the iron downward), and the rest were made chiefly of basaltic, or dolerytic, material, it would have about its present specific gravity, 5·5.

The complete solidification of the earth is held to be its present condition by most physicists who have recently discussed the subject. This implies that the crust that was formed over the surface of the liquid stratum by cooling had continued to thicken until the whole was solid. The evidence favoring the earth's essential solidity has been obtained by investigating mathematically the amount of deformation which the sphere, if a liquid mass enveloped in a thin crust, should undergo during its revolution; and also the effect of such tidal movement in the earth's mass on the height of the oceanic tides. Kelvin concludes, on these grounds, that the earth must have an effective rigidity at least as great as that of steel (1862, 1872). G. H. Darwin has