

crystalline and almost metamorphic aspect, and thus, on lithological grounds, to deserve equally the name of transition. So remarkably was this the case in the Swiss Alps, that certain rocks, which had for years been regarded by some of the most skilful disciples of Werner to be transition, were at last acknowledged, when their relative position and fossils were better understood, to belong to the newest of the secondary groups; nay, some of them have actually been discovered to be members of the lower tertiary series! If, under such circumstances, the name of transition was retained, it is clear that it ought to have been applied without reference to the age of strata, and simply as expressive of a mineral peculiarity. The continued appropriation of the term to formations of a given date, induced geologists to go on believing that the ancient strata so designated bore a less resemblance to the secondary than is really the case, and to imagine that these last never pass, as they frequently do, into metamorphic rocks.

The poet Waller, when lamenting over the antiquated style of Chaucer, complains that—

We write in sand, our language grows,
And, like the tide, our work o'erflows.

But the reverse is true in geology; for here it is our work which continually outgrows the language. The tide of observation advances with such speed that improvements in theory outrun the changes of nomenclature; and the attempt to inculcate new truths by words invented to express a different or opposite opinion, tends constantly, by the force of association to perpetuate error; so that dogmas renounced by the reason still retain a strong hold upon the imagination.

In order to reconcile the old chronological views with the new doctrine of the igneous origin of granite, the following hypothesis was substituted for that of the Neptunists. Instead of beginning with an aqueous menstruum or chaotic fluid, the materials of the present crust of the earth were supposed to have been at first in a state of igneous fusion, until part of the heat having been diffused into surrounding space, the surface of the fluid consolidated, and formed a crust of granite. This covering of crystalline stone, which afterwards grew thicker and thicker as it cooled, was so hot, at first, that no water could exist upon it; but as the refrigeration proceeded, the aqueous vapor in the atmosphere was condensed, and, falling in rain, gave rise to the first *thermal ocean*. So high was the temperature of this boiling sea, that no aquatic beings could inhabit its waters, and its deposits were not only devoid of fossils, but, like those of some hot springs, were highly crystalline. Hence the origin of the primary or crystalline strata,—gneiss, mica-schist, and the rest.

Afterwards, when the granitic crust had been partially broken up, land and mountains began to rise above the waters, and rains and torrents to grind down rock, so that sediment was spread over the bottom of the seas. Yet the heat still remaining in the solid supporting substances was sufficient to increase the chemical action exerted by the water, although not so intense as to prevent the introduction and increase of some