1. Forest-bed on stream-tin gravels = great forest growth: land of wider extent than now.
3. Trees and forest-bed in upper part of stream-tin sections, and, probably, submerged forests on foreshore = elevation of land, and re-advance of trees.
4. Beds above 3 = partial submergence.

In the above synopsis Mr. Geikie advocates a recent oscillation by which the dwindling forest growth gained new strength in a comparatively brief respite prior to its final decay; and is inclined to regard the traces of vegetation on the foreshore as relics of the re-growth of the trees upon sites rendered untenable by the previous subsiding movement.

To this I have no objection whatever to urge: on the contrary, it is in conformity with the oscillation advocated by Mr. Godwin-Austen, to account for planed rock reefs at a little above high-water level (Rep. Brit. Assoc. for 1850, Trans. of Sects. p. 71). "Such an oscillation might serve to explain the river sediments gaining on the marine in estuarine stream-tin sections, and to enable them to continue, pari passu, with a resumption of the subsiding movement," etc., etc. (Pleistocene Geology of Cornwall, Part V. General Notes, Geol. Mag. for July, 1879).

Mr. Geikie's conclusions are based on an extensive knowledge of facts, collated from all quarters, and which, I need hardly say, were beyond my range. I could only advocate the probability of an oscillation of a few feet, as suggested by Mr. Godwin-Austen, so that from so restricted a point of view I could not regard the re-elevated foreshore as favourable to the growth of trees. I do not, however, think, as regards Cornwall, Devon, and Somerset, that the elevation hinted at might not, without militating against facts, be made sufficiently elastic to have converted the shallows of such coasts as Mounts Bay into dry land, and have continued long enough, not only to arrest the decay of the surviving forests in inland localities, but even to permit of their re-growth upon deserted foreshore sites, and to give colour to the tradition of "Caracloowe in Cowse, in English the hoare rock in the wood," as applicable to St. Michael's Mount.

In conclusion, I must plead necessity for recurring at such length to this subject, at the same time expressing my thanks to Mr. Geikie for affording me the opportunity of explaining, more fully, views which the general tenor of my classification, as expressed in my papers on Cornish Post-Tertiary Geology, may have left somewhat ill-defined, as it was foreign to my purpose to discuss at length the changes indicated by the details of individual stream-tin sections.

VI.—LACCOLITES.

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In the Report on the Geology of the Henry Mountains, Rocky Mountain Region, Mr. G. K. Gilbert, of the U.S. Geographical and Geological Survey, points out that many of the intrusions of
eruptive rocks now exposed had a deep-seated origin; the molten rock having filled vacancies in the rocks, and never coming to the surface until they were exposed by denudation or by faults. To quote our author, "The lava . . . instead of rising through all the beds of the earth's crust, stopped at a lower horizon, insinuated itself between two strata, and opened for itself a chamber by lifting all the superior beds. In this it congealed, forming a massive body of trap." For these masses of eruptive rocks, Gilbert proposes the name *laccolite* (Gr. lakkos cistern, and lithos stone). In the Cos. Wexford and Wicklow some of the protrusions of eruptive rocks are entitled to this name, the rocks having congealed in cisterns below the surface of the earth; there are, however, some marked differences between them and the laccolites of the Henry Mountains. The latter were intruded into nearly horizontal strata, the laccolites only consist of one kind of rock, while the adjoining rocks seem to have been very little altered. But the Wexford and Wicklow laccolites, on the other hand, were intruded into highly disturbed strata, they are made up of a variety of rocks, and always the aquo-igneous action due to their intrusion—"baked" or altered, a greater or less thickness of rocks about them.

![Vertical section of a Laccolite in contorted strata.](https://doi.org/10.1017/S0016756800113378)

The distance to which the "baking" has extended is very variable, on account of the ends, not the planes, of the differently composed beds being in contact with the eruptive rocks; rocks of different characters and composition being differently susceptible; consequently, in regard to their composition, some have been more altered in depth and quality,—few apparently being ever changed into gneissoid and granitoid rocks.
The rocks in the more marked laccolites are usually gabbros or allied eurites, that graduate into granitoid, and allied basic elvans; but sometimes there are also folstones with their allied elvans. Associated with these normal intrusive rocks are others of fragmentary character, like agglomerates and other tuffs. Such mechanically formed rocks are usually supposed to be accompaniments of surface accumulations; a little consideration, however, will show that it is not only possible but even highly probable that they accompany the formation of some laccolites.

In order that a laccolite may be formed in a particular place, some favourable conditions must exist at that place. During the disturbances of the strata, such has taken place in the Cambro-Silurian rocks of Wicklow and Wexford, the horizontal jamming of one or more breadths of rock against each other would make them tend to rise and yield more readily to the pressure of the molten mass injected beneath. In some cases they might rise even independently of this pressure, leaving a vacancy under them, inviting the ingress of the lava; such hollows might sometimes be enlarged by the gases being forced into them under high pressure, the gases blowing in, out of the passages, loose fragments of the rocks in addition to those carried in on the molten matter; and all brought into the chamber, either by the force of the gas or by the molten matter, be driven into the cracks or other vacancies, or be lifted up on the surface of the latter.

The general character of the laccolites under consideration seems to be this—their principal mass or nucleus is composed of intrusive rocks, while on these and filling interstices in the "baked rocks" are these fragmentary rocks, while "baked rocks" envelope all. Sometimes, however, these fragmentary rocks extend away into the "baked rocks." An explanation for these also may be suggested; open fissures existed between beds of strata or across them, all of which had to be filled; into those that terminated either upward or lengthways the fragmentary matter was blown and forced to remain in them, while if the fissure led to another cistern or to the surface, the fragmentary matter would be forced through or carried out of it; thus we should have dykes of the normal rocks of the laccolite leading from one to another, while on these normal rocks and in dykes or in apparently interbedded masses leading away from them, we should find their fragmentary adjuncts.1

The fragmentary rocks associated with the gabbros are often highly calcareous. In many cases they are an agglomerate containing limestone concretions; and in some places there are masses of such agglomerates that appear to be independent laccolites, the rocks surrounding them being baked; in some places it is evident that small masses of such fragmentary rocks must have been protruded into their present positions.

1 Gilbert mentions as adjuncts to his laccolites "dykes and sheets"; these, however, are filled with a rock the same as the laccolites, while in Wexford and Wicklow the dykes and sheets often seem to be fragmentary rocks.