sembling the real one; this, apart from errors or transposition of labels, to which accidents all collections are more or less liable, in proportion to their age.

While, therefore, fully admitting the great value of a type, or type-figure, it is necessary to ascertain that it is really the specimen or represents the specimen originally described. If it contradicts the original description in any important respect, and especially if it is an insect known to be from a different locality to that assigned to it by the original describer, it is more than probable that it is not the original type at all, and is worse than misleading. Errors of locality are always possible; but much will depend on the author. Donovan, for instance, was extremely careless about localities, but, as he figured all his species, this matters less; on the other hand, Fabricius was far more careful than later authorities have given him credit for; and an error of this kind in his work was quite exceptional.

THE CONVEX PROFILE OF BAD-LAND DIVIDES.

BY W. M. DAVIS, HARVARD COLLEGE, CAMBRIDGE, MASS.

IN Mr. Gilbert's analysis of land sculpture, constituting chapter V. of his "Geology of the Henry Mountains," he explains why the surface of an eroded region possesses slopes that are concave upwards and steepest near the divides, and shows that it is for the reasons there stated that mountains — that is, mature and well-sculptured mountains, such as are of ordinary occurrence — are steepest at their crests (p. 116). The *arêtes* of the Alps illustrate this perfectly. Gilbert calls this generalization the "law of divides."

But in discussing the forms assumed by eroded bad-lands, or arid regions of weak structure with insignificant variety of texture, he finds an exception to the law of divides. The two lateral concave slopes of a bad-land ridge do not unite upwards at an angle, forming a sharp divide, but are joined in a curve that is convex instead of concave upwards. "Thus in the sculpture of the bad lands there is revealed an exception to the law of divides,— an exception which cannot be referred to accidents of structure, and which is as persistent in its recurrence as are the features which conform to the law,— an exception which in some unexplained way is part of the law. Our analysis of the agencies and conditions of erosion, on the one hand, has led to the conclusion that (where structure does not prevent) the declivities of a continuous drainage-slope increase as the quantities of water flowing over them decrease; and that they are great in proportion as they are near divides. Our observation, on the other hand, shows that the declivities increase as the quantities of water diminish, up to a certain point where the quantity is very small, and then decr ase: and that declivities are great in proportion as they are near divides, unless they are *very* near divides. Evidently some factor has been overlooked in the analysis,— a factor which in the main is less important than the flow of water, but which asserts its existence at those points where the flow of water is exceedingly small, and is there supreme" (pp. 122, 123).

It has for some time seemed to me that the overlooked factor is the creeping of the surface soil; and, as I have not seen mention of this process as bearing on the form of the crest-lines of divides, a brief note on the subject is here offered.

The superficial parts of rock-masses are slowly reduced to rock-waste or soil by the various processes included under the term, *weathering*. Unconsolidated materials are in the same way reduced to finer texture near their surface. The loose and often fine material thus provided at the surface is carried away by various processes, of which the chief are moving water, moving air, and occasionally moving ice; but there is an additional process of importance, involving dilatation and contraction of the soil, and in consequence of which not only the loose particles on the surface are transported, but a considerable thickness of loose material is caused to creep slowly down-hill.

Dilatation is caused by increase of temperature, by increase of moisture, and by freezing. Vegetable growth may probably be added to this list. The movements are minute and slow. They are directed outwards, about normally to the surface. Contraction follows dilatation, when the soil cools or dries, or when its frost melts. The movement of the parts is then not inward at a normal to the surface, but vertically downwards, or even downwards along the slope. As the two motions do not counterbalance each other, a slow down-hill resultant remains. This is greatest near the surface, where the dilatations and contractions are greatest; but it does not cease even at a depth of several feet, perhaps of many feet. Hence the down-hill dragging of old-weathered rock often well shown in fresh railroad cuttings in non-glaciated regions. I presume all this is familiar to most readers; although from the frequent inquiry concerning the means by which valleys are widened it is evident that the creeping process is not so generally borne in mind as that by which running water washes loose material down-hill.

The form assumed by the surface of the land depends largely on the ratio between the processes of washing and creeping. Wherever the concentration of drainage makes transportation by streams effective, the loose material is so generally carried away (except on flood-plains) that the action of creeping is relatively insignificant. But on divides, where drainage is not concentrated but dispersed, the ratio of creeping to washing is large, even though the value of creeping is still small. This is especially the case in regions of loose texture and of moderate rainfall; that is, in typical bad-lands, where the supply of loose surface-material ready to creep is large, and where the loose material is slowly taken away by washing. On the divides of such regions, the surface form is controlled by the creeping process. The sharp-edged divides, that should certainly appear if washing alone were in action, are nicely rounded off by the dilatations and contractions of the soil along the ridge-line. The result thus determined by the slow outward and downward movements of the particles might be imitated in a short time by a succession of light earthquake shocks.

Mr. Gilbert has himself given several beautiful illustrations of the close dependence of sharp or rounded divides on rainfall; structure remaining constant. If the rainfall should increase in bad-land regions, would not all their divides become sharper; and if the rainfall were continuous, so as to carry away every loose particle as soon as it is loosened, would not the divides assume the sharp ridge-line expected from Mr. Gilbert's analysis but not found in the actual arid bad-land climate? In the eastern and well-watered part of our country, I have often seen clay-banks much more sharply cut than the equally barren surface of the western bad lands; but even on clay-banks, the minute divides between the innumerable little valleys are not knife-edge sharp; they are rounded when closely looked at. Perhaps they are sharper in wet weather and duller in dry spells.

If rainfall remain constant and structure vary, then the harder the structure, the less the supply of soil for creeping and the sharper the divides; the weaker the structure, the more plentiful the supply of soil for creeping and the duller the divides. Numerous examples of this variation might be given.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Some Remarks on the Botanic Trinomial.

AN article in *Science* for September 16, signed C. H. Tyler Townsend, contains certain statements which cannot be passed, it seems to me, without some few words of discussion. It is quite evident that this article loses sight entirely of the main purpose of a biological name, and seems to imply that the name of a thing has to do with justice, right, etc. For example, I find therein the following expressions: "In no case can the name of the original erector and describer of a genus be separated therefrom without gross injustice." "There is no necessity whatever for shedding glory upon the one who has made the transfer. . . . He has no right whatever to the species." These words, "injustice," "right," belong to the field of Ethics, not that of Taxonomy.