

advantaged the possessor to such extent that not infrequently life has been preserved by it. It is reasonable to assume that the parts have not become so widely unlike in perceptiveness without some cause, and, if the cause alleged is natural selection, it becomes necessary to show that the greater degree of the power possessed by this part than by that has conduced so much to the maintenance of life that an individual in whom a variation had produced better adjustment to needs, thereby maintained life when some others lost it, and that among the descendants inheriting this variation there was a derived advantage such as enabled them to multiply more than the descendants of individuals not possessing it. Can anything like this be shown?

That the superior perceptiveness of the forefinger-tip has thus arisen, might be contended with some apparent reason, as such perceptiveness is an important aid to manipulation. But how about the back of the trunk and its face, or the tip of the nose, or the thigh? The survival of the fittest cannot explain these differences of perceptiveness. But if there has been in operation a cause which it is now the fashion to deny, the various differences are at once accounted for. This cause is the transmission of inherited traits or characters.

(Here Mr. Spencer records some experiments which show that constant exercise of the tactual nervous structures leads to further development, to greater discriminativeness. The perceptiveness of the finger-ends of the blind who read from raised letters and of compositors is greater than that of the finger-ends of other people.)

Now, if acquired structural traits are inheritable, the gradations in tactual perceptiveness are the result of the gradations in the tactual exercises of the parts. The trunk has but little converse with external bodies, and it has but small discriminative power; what power it has is greater on its face than on its back, corresponding to the fact that the chest and abdomen are more frequently explored by the hands, this difference being probably in part inherited from inferior creatures. The middle of the forearm and the middle of the thigh are obtuse, having rare experience of irregular foreign bodies. The tip of the nose has considerable tactual experience, hence its greater perceptiveness. The inner surfaces of the hands are more constantly occupied in touching than are the back of the hand, breast, forearm, forehead, while the tips of the fingers come into play not only when things are grasped, but when things are felt at or manipulated. If then it be that the extra perceptiveness acquired from extra tactual activities, as in a compositor, is inheritable, the gradations of tactual perceptiveness are explained.

The tip of the tongue exceeds all other parts in power of tactual discrimination; why such perceptiveness? Its functions of moving food during mastication and of making many of the articulations constituting speech, are not materially aided by extreme perceptiveness, and natural selection cannot have caused it. But assume inheritance of acquired traits, and there is no difficulty, for the tongue-tip has, above all other parts of the body, increasing experiences of small irregularities of surface. It is in contact with the teeth, and either consciously or unconsciously is continually exploring them. There is hardly a moment in which impressions of adjacent but different portions are not being yielded to it by either the surfaces of the teeth or their edges. No advantage is gained; it is simply that the tongue's position renders perpetual exploration almost inevitable; and by perpetual exploration is developed this unique power of discrimination.

Thus the law holds throughout, from this highest degree of perceptiveness of the tongue-tip to its lowest degree on the back of the trunk; and no other explanation of the facts seems possible.

But some biologists might contend that *panmixia* affords an adequate explanation of the facts. So Mr. Spencer, after pointing out that the explanation by *panmixia* implies that these gradations of perceptiveness have been arrived at by the dwindling of nervous structures, and hence makes an unproved and improbable assumption the basis of the argument, proceeds to establish that, even with this objection passed over, it may with certainty be denied that *panmixia* can furnish an explanation. As this part of the essay is left unfinished, it would be unwise to attempt an

abstract of the Spencerian criticism of the *panmixia* explanation. We shall return to the subject as soon as Mr. Spencer brings his argument to a close.

FEEDING-LINES OF A LIVING LAND GASTEROPOD ON LICHENED SLATE.

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IN searching for fossils in the Carboniferous rocks of Attleboro, Mass., about three years ago, I found on the surface of a vertical stratum of micaceous slaty sandstone, in an old quarry, what at first glance appeared to be annelid trails resembling the form known as *Nereites* common in the Silurian. Further examination showed me at once, however, that these markings were caused by the gnawing away of a drab-colored crust of lichens and dust which concealed the real appearance of the rock. The trails were in the form of bands about one-quarter of an inch wide, wandering over the surface of the outcrop, or curved back and forth on each other, so as to approach but rarely cross. These bands or trails were made up of a series of crescentic cross-markings united alternately right and left with the next adjacent in the series so as to form a continuous, closely pressed, sigmoid line, which in itself constituted the whole of the trail. The trail was evidently the feeding-line of some animal. Another occurrence which I have more recently observed in Bristol County, Mass., exhibited a trace of slime along the feeding-line, such as is left by slugs or land snails, thus showing that the feeder was probably a gasteropod.

Ebenezer Emmons, in the *Agriculture of New York*, Vol. I., 1846, p. 68, describes a trail found upon the surface of the fine green slate of Salem, Washington Co., N. Y., included in his "Taconic System," to which he gave the name *Nemopodia tenuissima*. The figure of this trail on pl. 14, fig. 1, of that work, agrees closely with the Attleboro trails. In an explanatory note, p. 365, Emmons states that this trail has been shown, he thinks, satisfactorily by his friend Dr. Fitch, "to be formed by some living unknown animal." It seems to me highly probable that the trail observed by Emmons, and shown to be not a fossil by his friend Dr. Fitch, was also that of a gasteropod. Conchologists may be familiar with the animal which makes these tracks, if I am right in thinking that they are made by gasteropods at all. As yet I have been unable to catch the animal at its work.

NOTE ON THE GENERIC NAME CHIROTES.

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THE application of the law of priority necessitates the abolition of Cuvier's name *Chirotes* for the "Two-handed Ground Worm." No less than three generic names, formally proposed and diagnosed, have priority over *Chirotes*, none of which is pre-occupied, and which in turn would have to be adopted, should any of the older ones for some reason become unavailable.

Bonnaterre seems to have been the first to give a Latin name to La Cèpede's Cannelée, and to recognize its generic distinctness. However, by sheer carelessness he neglected to do so and a solitary "B" stands for the generic name he intended to impose. It may be assumed that he meant to call it *Bipes*, but we have nothing to do with assumptions. At the same time he included as the second species of his intended genus, Pallas's *Lacerta apus*, under the name *B. sheltopusik*.

Latreille, however, saw the incongruity of uniting the two in the same genus, and expressly restricted the name *Bipes* to the *B. canaliculatus*. The genus was thus formally established, named, diagnosed and restricted in 1802 as *Bipes*. Bonnaterre's other species he made a separate genus, *Sheltopusik*,² renaming Pallas's species *Sheltopusik didactylus*.³ The latter will therefore stand as *Sheltopusik apus* (Pall.). It will be observed that this

¹ "Nous ne connaissons encore qu'une seule espèce bien distincte de ce genre."

² Latreille, Hist. Nat. Rept., II., 1802, p. 271.

³ Latreille, tom. cit., p. 273.