

LOCAL VARIATIONS.*

Since all structures differing from the average are usually confined to a definite horizon or more or less restricted region, all such differences may be considered local variations. The larger zoogeographical regions or provinces are in this extended sense localities, and the orders, families, or species are the local variations peculiar to the region or province. A somewhat more restricted definition would include such phenomena as are noticed in the peculiar modifications of the fins of Pacific slope fresh-water fish described in the previous chapter. Some *Cyprinidae* of the Colorado basin, for instance, have the anterior dorsal rays strong and spinous, while all the Atlantic slope species have them weak and rudimentary. Another instance is the increased number of rays in the fins of Pacific slope fishes. Still another instance is offered by the *Percopsidae*. *Columbia* has strong spines in both the dorsal and anal fins, while *Percopsis*, the Atlantic slope genus, has none.

For the present purpose I want to restrict the meaning still further. In studying the South American catfishes, I found that all the Amazonian species of the genus *Rhamdia* have 6 dorsal rays, while several of the southern forms have more. One peculiar to the La Plata has 6-9; another from the San Francisco has 10 rays. More remarkable still is the case of *Pseudopimelodus zungaro*. All the specimens taken in the Amazon have 6 dorsal rays, while of a smaller number taken further south several have 7 dorsal rays.

It is to variations like the last, i. e., variations within the species or closely related species found in different localities within a restricted region, that I want to confine my present remarks. Variations within species are a matter of lines and curves, minute measurements, and shades of color: all matters difficult to keep in mind, still more so to represent to others. All naturalists are aware of the existence of slight differences peculiar to different localities, but such variations are usually but vaguely conceived by the observer, and still more vaguely by any one to whom the observer may attempt to explain them.

The past summer I collected a large series of specimens of *Leuciscus* and *Richardsonius*. These were taken in a number of different localities and in two separate river systems, the Columbia and the Fraser. The localities extend from tide water to an elevation of 1,900 feet on the Fraser, and from 300 to 4,700 feet on the Columbia system. I have also examined a number of specimens collected by Dr. Jordan in Utah. There were in all 296 specimens which I was personally able to examine. In these specimens the local variations are so well marked that a graphic method of demonstrating the variations is possible.

Before attempting to explain the charts which illustrate this matter, it is necessary to state that there have been known from the two river systems two groups or genera of *Cyprinidae* having elongate anal fins. These were *Richardsonius* (*baltatus* and *lateralis*) and a section of *Leuciscus* (*montanus*, *hydrophlox*, and *gilli*). There are, first, variations which do away with the genus *Richardsonius*, as distinct from *Leuciscus*; second, a number of variations which, while very striking, need not be taken into consideration, because the variations in a single character are sufficient for our purposes. We shall limit the observation to the variation in the number of anal rays.

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