

form in the various drainage systems; but little attention is paid to matters of synonymy, for these have been elsewhere treated. The main facts in geographic distribution are presented in compact form and then further illustrated by a map of distribution in which the extreme limits of range are shown.

The hypsometric facts are separately presented; the altitudes of various of the forms are given on the authority of the "Dictionary of Elevations" published by the U. S. G. S. The several ranges are compared and the facts are then generalized for the species of each group. Attention is called to the extremely limited range, both geographically and hypsometrically, of the genus *Tulotoma*.

This paper may be found in full in the *American Journal of Science* for August, 1894.

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ON SOME SOUTH AMERICAN CHARACINIDÆ. By A. B. ULREY.

[ABSTRACT.]

A study of the Characinidæ collected by Charles Frederic Hart in Brazil shows that he found 47 species, seven of which are new. Four of the new species belong to the genus *Tetragonopterus*, one to *Mylesinus* and two to *Aphyocorax*. Descriptions of the new species will be published in the annals of the New York Academy of Science, together with notes on the specimens examined and analyses of the species of *Cheirodon*, *Aphyocorax*, and *Tetragonopterus*.

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THE EFFECT OF ENVIRONMENT ON THE MASS OF LOCAL SPECIES. By CARL H. EIGENMANN.

Nearly every family of fishes represented on the Pacific slope of North America has one or more of its representatives modified in a certain direction as compared with its Atlantic slope relatives. The modification consists in the increase of the number of rays of one or more of the fins or in the modification of some of the rays into spines.

In most families the differences between the Atlantic and the Pacific slope representatives are just perceptible, and, were it not for the concensus of differences in all groups would stand for nothing.

The most marked difference is found in those fishes which have been separated from their Atlantic slope relatives long enough to become generically distinct. In several genera, *Meda*, *Lepidomeda*, *Richardsonius* (sub-gen.) *Columbia* the modifications of the fins mark the genus.

The more striking modifications are the following :

In the sub-genus *Richardsonius*, confined to the Columbia and to the Fraser systems, the number of anal rays varies from 12 to 25, which is an increase of from 2 to 15 rays over the species of *Leuciscus*, some of which have also (more recently) entered the head waters of the Columbia but the great bulk of whose species inhabit the Atlantic slope.

The genus of *Oncorhynchus* confined to the Pacific slope has a similar increase of anal rays over *Salmo* and *Salvelinus* which are genera of wider distribution, some of the species entering streams of the Pacific slope.

The above are examples of the addition to the number of rays in the fins.

The modification of some rays into strong spines is seen in the Minnows, *Meda* and *Lepidomeda*. Among the many Atlantic slope Minnows none have spines in their fins while *Meda* and *Lepidomeda*, confined to the Rio Colorado, have two spines to the dorsal fin, the posterior received into a longitudinal groove of the anterior.

The increase of spines is very strikingly illustrated in the Sun Fishes (Centrarchidæ) in which the single Pacific slope species, *Archoplites interruptus* (Girard), has one more dorsal spine than any of the numerous Atlantic slope relatives.

We must either assume that there has been in all the families a fortuitous variation in one direction which has enabled natural selection, which favored larger finned fishes to produce the present results, or we must admit that the environment has affected all species alike and the effect of this action has by heredity become gradually the established order of things. In other words we must either explain the conditions with the Neodarwinians through natural selection or we must with the NeoLamarckians believe in the acquisition of larger fins through greater use of these organs and the subsequent transmission of the modification to the offspring.

These modifications being in one direction are unquestionably due to one definite environmental cause. What that cause is I am unable to say. A comparatively short, swift, water course suggests itself most naturally but the species inhabiting the short, swift, streams of the western

slope of South America show no such variation from their Atlantic slope relatives. They would do so were the shortness and swiftness of the river the cause.

The most striking example is offered by the *Percopsidæ* with a single species on the Atlantic slope and another on the Pacific slope. *Percopsis* on the Atlantic slope has feeble unsegmented rays in front of the dorsal and in front of the anal which in *Columbia* on the Pacific slope are transformed into strong spines.

Similar structural peculiarities are to be observed in other regions. Mr. A. J. Woolman informs me that all the minnows of Mexico have the teeth in one row and four teeth in each row. Such uniformity is not found elsewhere in America. This peculiarity being found in all the species may be explained by the application of natural selection. The peculiarity of the food is probably such as to bar the road to Mexico to all but species with the teeth 4 to 4 or to kill off any that may have entered this region, the minnows of Mexico having all entered from the north.

Lake Titicaca in the high Andes of South America is inhabited by a peculiar genus of Cyprinodontidæ (*Orestias*). The numerous species all lack ventral fins. Perhaps no one would be willing to insist that each of these species formerly possessed ventral fins and lost them through environmental influences independently. The only plausible explanation seems to be that they have diverged from a parent stock which had lost its ventrals before it split into a number of species. But five other genera of freshwater fishes are known to me to lack ventral fins. They are:

*Apua*, a Minnow—Tennaserim.

*Tellia*, a Cyprinodont—Alpine pools of the Atlas.

*Astroblepus*—Rio de Palace near Popayan (in the Andes.)

*Eremophilus*—Bogota (in the Andes.)

*Channa*—Ceylon.

A glance at this list will show that four of these six inhabit high mountain waters. (The character of the water of the Ceylon species is not stated.)

Now, while not all mountain fishes lack ventral fins, the fact that two-thirds of the fishes lacking ventrals inhabit mountain homes, half of them living in the waters of the Andes seems to indicate that here, as in the Pacific slope fishes, we have a case of convergence—that we have to deal with a character several times produced in remote types by the direct influence of the environment. Since the genera lacking ventrals

inhabit Alpine waters in remote parts of the globe the environment which has caused this convergence is limited to the conditions obtaining in Alpine waters. A closer definition of the acting cause in the reduction of the ventrals I am unable to give.

In the last two instances I have but given facts which have forced themselves on my notice. The conditions obtaining on the Pacific slope were determined after a careful comparison of all Pacific and Atlantic slope species and the details of this comparison will appear in the publications of the U. S. Fish Commission.

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ON THE FISHES OF WABASH COUNTY. By A. B. ULREY.

The present paper is presented as a contribution to the biological survey of Indiana. It is apparent that before any complete survey of the fauna and flora of the state can be made there must be a large number of local lists of animals and plants representing the different regions of the state. While the county forms in no sense a faunal area, there are numerous obvious reasons for making county lists. It is perhaps not essential that these local lists should cover faunal areas. When sufficient data are at hand the matter can then be placed in systematic order.

Wabash county is situated in the northern third of the state a little east of a line passing through the centre north and south. The Wabash river, flowing a little south of west, passes through the county near its centre. Eel river flows across the northwestern part and the Mississinewa crosses the southwest corner, both of which finally reach the Wabash.

The list here presented contains most of the fishes that occur in considerable abundance in the county and some that are found only occasionally. It is desired that it may be completed by some one in this region and notes made on the spawning, life-habits and environment, presenting a complete record of the ichthyology of the county.

The collections here represented are a part of more extended collections in other groups of animals and several groups of plants made by different members of the Wabash County Science Club.\* A series of the fishes of the following list has been placed in the museum of Indiana University, one in the museum of North Manchester College and another in the pri-

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\*This material is in preparation for the biological survey of the state.