

On the Origin and Evolution of Catostomid Fishes— A Literature Review

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Abstract

The Catostomidae or sucker family, while largely confined to and distributed over most of the North American continent, seems to have originated in Central Asia some 50-70 million years ago. Evidence suggests that the family descended from the cyprinids rather than the opposite as early workers suggested. Modern taxonomists recognize four subfamilies, three of which occur in North America. The most primitive subfamily is represented by the blue sucker (*Cycleptus*) and followed by the subfamily containing buffalos (*Ictiobus*) and carpsuckers (*Carpiodes*). The remaining subfamily contains the main stock and ranges from the more primitive chubsuckers (*Erimyzon*) through red horses (*Moxostoma*) to suckers (*Catostomus*). Much remains to be learned about the life histories of all species.

Distribution

The family Catostomidae is one of the larger groups of primary division fishes found in North America. Jordan (1878) was the first to give the group family status. Both Berg's (1947) and Nelson's (1976) classification place the catostomids in the order Cypriniformes where together with the loaches and cyprinids they constitute the suborder Cyprinoidei.

Nelson (1976) attributes twelve genera and 58 species to the family. At present, the American Fisheries Society (1970) recognizes eleven genera and 57 species of catostomids in North America. The more familiar members include the suckers, the chubsuckers, the hog suckers, red horses and the buffalos. Two genera, *Catostomus* (suckers) and *Moxostoma* (redhorses) account for 38 species or 67% of the North American catostomid fauna.

The family is distributed over most of the entire continent with the genus *Ictiobus* (buffalos) reaching Rio Usumacinta in northern Guatemala on the Atlantic slope and *Moxostoma* reaching Rio Armeria, Mexico in the west (Miller 1957). In the north, one of the more widely distributed species *Catostomus catostomus* (longnose sucker) occurs from the Atlantic to the Pacific and reaches into northeastern Siberia to the Yana River (Berg, 1949). Except for this species, the only other Old World representative is the ancient, monotypic genus *Myxocyprinus* which occurs in Central China (Nichols, 1943).

Evolution

The earliest known sucker remains were taken from Eocene deposits (SO-70 million years ago) of Central Asia (Hussakof, 1932) and are probably closely related to *Myxocyprinus* (Nelson, 1949). Reliable North American fossils of the catostomid family have been taken from Miocene deposits (23-33 million years ago) in British Columbia, Nevada, and Colorado. They are all placed in the extinct genus *Amyzon* (Miller, 1957). At present it seems uncertain as to whether this genus is more closely related to the present day *Zctiobus* or *Myxocyprinus*.

Several authorities, including Miller (1957) and Darlington (1957) feel that there is **sufficient** evidence to indicate a southeast Asian origin for the Catostomidae. Shortly thereafter, they are presumed to have entered North America by way of a Bering land bridge. For one reason or another, the group became virtually extinct in Asia except for the relict *Myxocyprinus*. That *Catostomus catostomus* represents a recent reinvasion of Siberia seems probable since the same subspecies occurs in both Siberia and western At-tic America (Walters, 1955).

The evolutionary origin of the Catostomidae has been subject to more conjecture than the geographic point of origin. For some considerable length of time, most workers felt that the catostomids were ancestral to or at least more primitive than the cyprinids (minnows). It has long been known that minnows and suckers are closely related and the difficulty in distinguishing between their young attests to this fact. That suckers preceded minnows, however, seems to be a judgment based largely on opinion.

Eaton (1935), in a study of the upper jaw mechanism, concluded instead that the catostomids were descended directly from the cyprinids and, moreover, that the steps of descent are fairly recognizable in living species. On the basis of skeletal features, Ramaswami (1955) also concluded that it was unlikely that the Catostomidae could have given rise to the Cyprinidae. Rather, he suggested a cyprinid prototype as ancestral to the suckers. Fossil evidence is inconclusive as the earliest remains of both groups were taken from Eocene deposits. It does seem likely, however, that Darlington's (1957) conclusion that catostomids were pushed out of Asia by the more advanced cyprinids is open to serious question.

Taxonomy

By and large, the Catostomidae have received relatively little attention. The only extensive taxonomic work since Jordan (1878) is that of Hubbs (1930). Of greater evolutionary significance, however, are the works of Nelson (1948, 1949). Using the Weberian ossicles and the opercular series, he has given us the first real insight into the probable phylogeny of the catostomid fishes. On the basis of his morphological studies, Nelson has divided the group into three rather distinct subfamilies. The most primitive of these is the Cycleptinae containing the American *Cycleptus* (blue suckers) and the Asian *Myxocyprinus*. Nelson (1976) places *Myxocyprinus* in its own subfamily *Myxocyprinidae*. They

are followed by the Ictiobinae also with two genera, *Ictiobus* (buffalos) and *Carpionodes* (carp-suckers). The remaining subfamily Catostominae is further subdivided into three tribes. The first to diverge from the main stock were the Erimyzontini containing the genus *Erimyzon* (chubsucker) and the monotypic genus *Minytrema* (spotted sucker). Next to diverge were the Moxostomatini containing three modern genera *Lagochila* (harelip sucker) regarded as now extinct by Nelson (1976), *Moxostoma* (redhorses) and *Hypentelium* (hogsucker). The tribe Catostominae contains the main stock and is made up of three genera *Catostomus* (suckers), *Chasmistes* (shortnose sucker, June sucker, and Cui-ui), and *Xyrauchen* (humpback sucker).

The widespread distribution of catostomids throughout North America and the relatively large number of individuals of given species frequently present in our area attests to the success of the group. That the group is subject to modern problems, however, is demonstrated by the demise of the harelip sucker. That little work has been done on behavior and life history of the majority of **species** is readily evident from the literature. Both provide ample reason for members of NANFA to **select** catostomid species for observation and study.

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Literature Cited:

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| American Fisheries Society | 1970. A List of Common and Scientific Names of Fishes from the United States and Canada. 3rd edition. American Fisheries Society Spec. Publ. No. 6. |
| Berg, Leo S. | 1947. Classification of Fishes Both Recent and Fossil. J.W. Edwards, Ann Arbor, Michigan. |
| ————— | 1949. Freshwater Fishes of the Union of the Soviet Socialist Republic. Israel Program for Scientific Translations. 3 vols. |
| Darlington, Philip J., Jr. | 1957. Zoogeography: The Geographical Distribution of Animals. John Wiley and Sons. New York. |
| Eaton, Theodore H., Jr. | 1935. Evolution of the upper jaw mechanism in teleost fishes. <i>J. Morph.</i> 58(1):157-172. |
| Hubbs, Carl L. | 1930. Materials for a Revision of the Catostomid Fishes of Eastern North America. University of Michigan Museum of Zoology. Misc. Publ. No. 20. |
| Hussakof, L. | 1932. The fossil fishes collected by the central Asiatic expeditions. <i>Am. Mus. Novitates</i> No. 553. |
| Jordan, David Stan | 1878. Contributions to North American Ichthyology. IIIA: A Synopsis of the Family Catostomidae. Bull. U.S. Nat. Mus. No. i2. |
| Miller, Robert Rush | 1957. Origin and affinities of the freshwater fish fauna of western North America. pp. 187-222 in Hubbs, Carl L. ed. Zoogeography Part I The Origins and Affinities of the Land and Freshwater Fauna of Western North America. Amer. Assoc. Adv. Sci. Publ. No. 51. Washington, D.C. |
| Nelson, Joseph S. | 1976. Fishes of the World. John Wiley and Sons, New York. |
| Nichols, J.T. | 1943. The fresh-water fishes of China. natural History of Central Asia. Vol. 9. <i>Am. Mus. Nat. Hist.</i> , New York. |
| Ramaswami. L.S. | 1955. Skeleton of cyprinoid fishes in relation to phylogenetic studies VI. The skull and Weberian apparatus in the subfamily Gobininae (Cyprinidae). <i>Acta. Zool.</i> 36:127-158. |
| Walters, Vladimir | 1955. Fishes of western Arctic America and eastern Arctic Siberia. Taxonomy and zoogeography. <i>Bull. Am. Mus. Nat. Hist.</i> 106:255-368. |