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AN EOCENE SERRANID FROM PATAGONIA[1]

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INTRODUCTION

The much-discussed problem of the origin or derivation of the fresh-water fish fauna of South America is still by no means solved. The importance of paleontology in this connection is obvious, and therefore any discovery of fossil actinopterygians in lacustrine-fluvial or even estuarine deposits on that continent is of particular interest. With the exception of those described from Brazil, Tertiary fresh-water fishes are virtually unknown from South America. It is hoped that this situation will be remedied by more intensive collecting.

In the spring of 1931 Dr. G. G. Simpson, while on the First Scarritt Patagonian Expedition, found the remains of percoid fishes. All the specimens appear to belong to the same genus and species, and a description of this collection forms the basis for this paper. The writer is greatly indebted to Dr. Simpson for the opportunity to study this material, for the use of his field notes, and for permission to include a sketch map and profile section of the pertinent portion of Cañadón Hondo, in which the fish were found.

The composite restoration was drawn by Mr. John C. Germann, the locating diagram and geologic section by Miss Marie Bohrn, and the photographs were taken by Mr. Elwood Logan.

[1] Publications of the Scarritt Expeditions, No. 36.

GENERALIZED SECTION, CAÑADÓN HONDO

APPROXIMATE THICKNESS	EQUIVALENT IN MEASURED SECTION CF	NATURE	REMARKS
>100′	12, 12[a], 12[b]	Green tuffs and clays. No fossils found	
		—Guide horizon—	
15′	11, top of III	Rather similar to above. No fossils	
15′	Bottom of III, top of 10	Also greenish tuff and clay	
		CASAMAYORAN MAMMALS	
65′	9 and bottom of 10, probably also II and top of I	Mainly bedded greenish clays with some beds of tuff	
10–15′	7 and 8	Rather thin-bedded, somewhat concretionary clays	
16′	6	Clays, thin-bedded below, more massive above	
6″	Bottom of 6, A in Section CF	Laminated shale	Fish are probably about 90′ to 95′ below Casamayoran mammals unless a fault intervenes
		FOSSIL FISH	
17′	5	Variegated clays	
5′±	4	Indurated tuff	
		—FAULT[2]—	All beds above here in this section are probably Casamayoran
		—Gap, relations uncertain[3]—	
50′+	1	Sand and clays	Probably Riochican

[2] It is assumed that no considerable faulting exists above this level.
[3] Very dubious distorted glauconitic beds (3 in Section CF; see fig. 2) omitted.

DETAILS OF SECTION CF, CAÑADÓN HONDO

Bed	Thickness	Nature	Remarks
1	50′+	Pale clays and soft, reddish, cross-bedded sandstones	Probably Riochican, and grades down into thick Riochican series in the lower part of the Cañadón
2	5′±	Greenish sandstone with clay pebbles	
3	50′+	Mostly bright green sandstone and clay, with some bright red patches. Glauconitic	These beds are heavily distorted and slumped. They may be quite out of sequence here. Resembles Salamancan
		—NORMAL FAULT, THROW UNKNOWN—	
4[1]	5′±	Irregular, indurated, pale green to white tuff with pink spots	
5	17′	Irregular varicolored clays	
6	16′	Clays. Thin-bedded, buff or white to greenish at bottom. Becoming more massive and irregular above and green with yellow seams and red spots	The fish are from buff, laminated clay or shale (probably with volcanic ash?) in the lowest 6″ of these beds
7	10′	Clays and concretionary beds weathering brown or yellow	
8	10′	Very thin-bedded greenish and yellow clays, with some hard concretionary layers	This is in part, perhaps wholly, equivalent to 7, but may include some higher strata
9	45′±	Horizontally bedded green clays with some beds of white or greenish tuff	I, a thick series of green clays and tuffs, is probably horizontally equivalent to 9 and the bottom of 10
10	35′	Green clays, in part very thin-bedded and in part more massive. Some, but little, tuff	The lower 25′ seem to be equivalent, at least in part, to the top 25′ of 9. II, a rather massive green concretionary tuff, is probably horizontally equivalent to part of 10
11	15′	Pale green tuff and some green clay, mostly concretionary, weathering brown. At the top is a characteristic blue-green tuff with a basal concretionary layer weathering brown	Top bed is a good horizon marker and reappears in 11[a], above the mammals. III, an irregular course green tuff and tuffaceous clay, is probably equivalent to 11 and the top part of 10 and contains Casamayoran mammals in lower 15′
12	50′	Mostly obscure or unexposed, but some exposures of pale green clay and tuff	
12[a]	20′	Thin-bedded pale green tuff with some green clay	This is simply the top 20′ of 12, better exposed on this side of the hill
12[b]	105′±	Thin-bedded pale greenish tuffs with some green clay. Some of the beds are silicified (opalized?) and sometimes have limonite nodules	
		—TOP OF ROUGHLY CONTINUOUS SECTION FROM 4 TO 12—	

[1] The clays are mostly, if not entirely, bentonitic in beds 4 to 12.

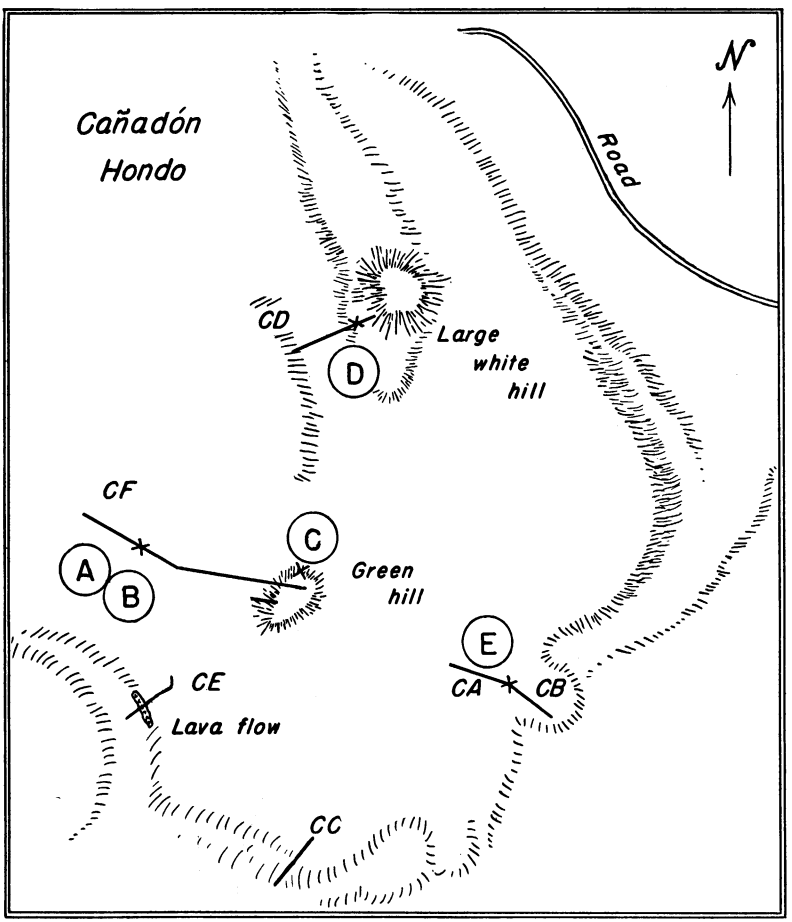

Fig. 1. Locating diagram of Cañadón Hondo. The Cañadón is a semicircular basin several miles across with an elevated rim at plateau level and an irregular floor with numerous ridges and hills, of which the two most prominent are shown. The vertically measured section including the "fish bed" (CF) is reproduced in figure 2. A represents the fish locality; B, an adjacent plant locality; C, Casamayoran mammal locality; D, Riochican mammal locality (Cañadón Hondo or *Kibenikhoria* faunule); and E, "Bird Clay" with anurans, birds, *Crossochelys*, *Sebecus*, and *Coöna* (mammal), believed to be Casamayoran, although the fauna is very distinctive.

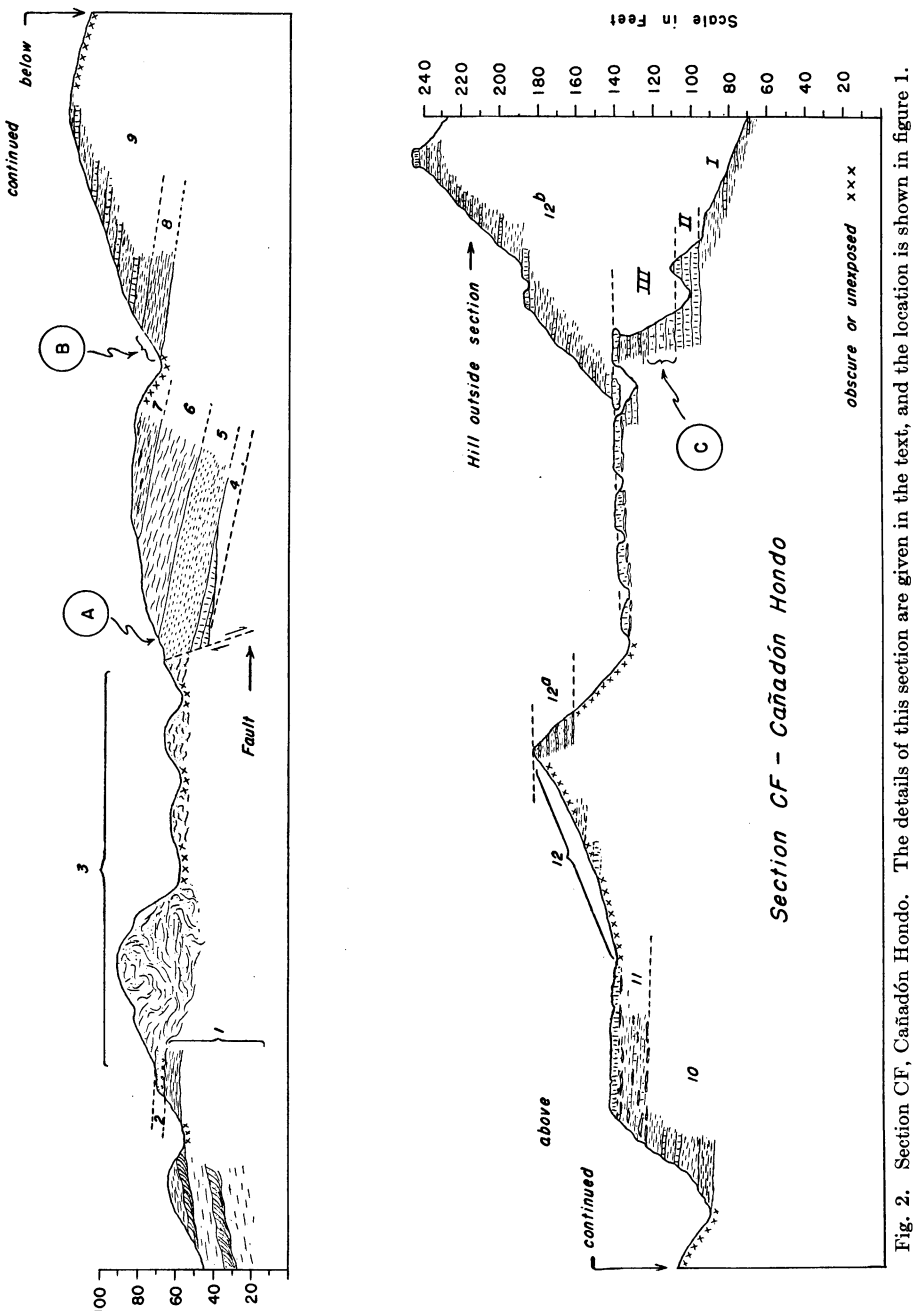

Fig. 2. Section CF, Cañadón Hondo. The details of this section are given in the text, and the location is shown in figure 1.

TAXONOMY AND DESCRIPTION

Family **Serranidae**

Percichthys hondoensis, new species

TYPE: A.M.N.H. No. 10000. Incomplete skeleton with anterior portion of skull and pelvic fin missing. Hypodigm consists of 23 fragmentary specimens from same locality.

HORIZON AND LOCALITY: "Fish bed," in the upper portion of Cañadón Hondo near a small elevation known as Monte Verde. The Cañadón ends at the right bank of the Río Chico near Paso Niemann and is about 65 kilometers northwest of Comodoro Rivadavia on the Golfo de San Jorge, territory of Chubut, Argentina. The Tertiary exposure in the Cañadón in which the fish remains were found is probably Casamayoran (Lower Eocene) in age. The "fish bed," composed of light brown finely laminated shales, probably represents a lacustrine deposit of volcanic ash. The geology of this area will be discussed by Simpson in a monograph now in preparation. It suffices to state here that the structure about Cañadón Hondo is very complex and obscure, with discontinuity of the important exposures, isolated lenticular beds, and a scarcity of mammalian fossils, making correlation practically impossible. There is reason to believe, however, that the beds can be reliably assigned to the Casamayoran.

DIAGNOSIS: Serranids of small size, ranging in the present sample from 2.45 to about 10.0 cm. in standard length. Skull somewhat less than one-third total body length. Mouth moderate, protractile. Posterior border of preopercular serrated. Opercular scaled, with single spine. Branchiostegals 6–7. Vertebrae 24–26: abdominal 10–11, caudal 14–16. Dorsal fin IX–X, 12, apparently not divided; pectoral fin 14; pelvic fin with one spine, number of rays unknown; anal fin III, 7–8. Origin of pelvic fins below and about opposite origin of pectorals, origin of dorsal fin slightly anterior to that of pelvic, origin of anal fin about opposite beginning of rayed portion of dorsal. Scales small, finely ctenoid.

DESCRIPTION: The proportions of the skeleton are very similar to those of the Recent *Percichthys melanops*, an X-ray of which is figured by Eigenmann (1927, pl. 13). Because of the fewer abdominal vertebrae, however, the abdominal region is relatively shorter, causing the dorsal and anal fins to be closer to the skull than in the Recent species. The head is between one-third and one-fourth of the standard length and the greatest depth about one-third of that length. The orbit is relatively large, about one-fourth of the skull length including the opercular.

The skull is poorly preserved in all of the available specimens, and most of the details cannot be determined. The premaxillary and maxillary are typically percoid with the lower end of the maxillary expanded to about the same extent as in *P. trucha*. There is a possible indication of a supplementary maxillary in one specimen, but this is not certain. The posterior border of the dentary is deeply notched as in the Recent species of this genus, with the apex of the notch closer to the dentigerous border than the ventral border. The jaws are definitely protractile and the suspensorium is forwardly directed. The serrations on the vertical limb of the preopercular are very fine, about 25 to 30 in number, while the spines on the horizontal portion are much larger but their number cannot be determined. In agreement with all other members of this genus, the opercular ends in a spine. There is a definite indication of villiform teeth on the jaws, but their presence on the vomer and palatine cannot be ascertained.

The centra are very similar to those of *P. antiquus* (Woodward, 1898, and Schaeffer, in press) from the Tertiary of Brazil, in fact typically percoid. The neurapophyses are delicate, as are also the ribs and haemapophyses.

The spines of the dorsal, pelvic, and anal fins are robust and large, while the rays of these fins are delicate and usually poorly preserved. The second interhaemal is typically heavy and elongate. The first anal

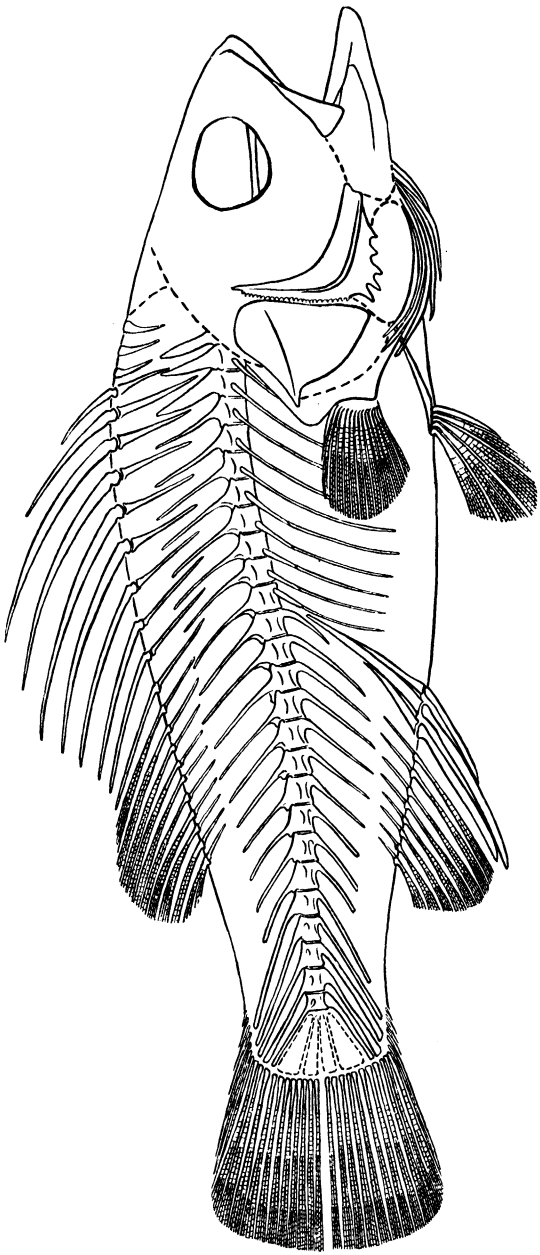

Fig. 3. Composite restoration of *Percichthys hondoensis*, based mainly on the specimens illustrated in the following figure. The outlines of the dermocranial elements cannot be determined.

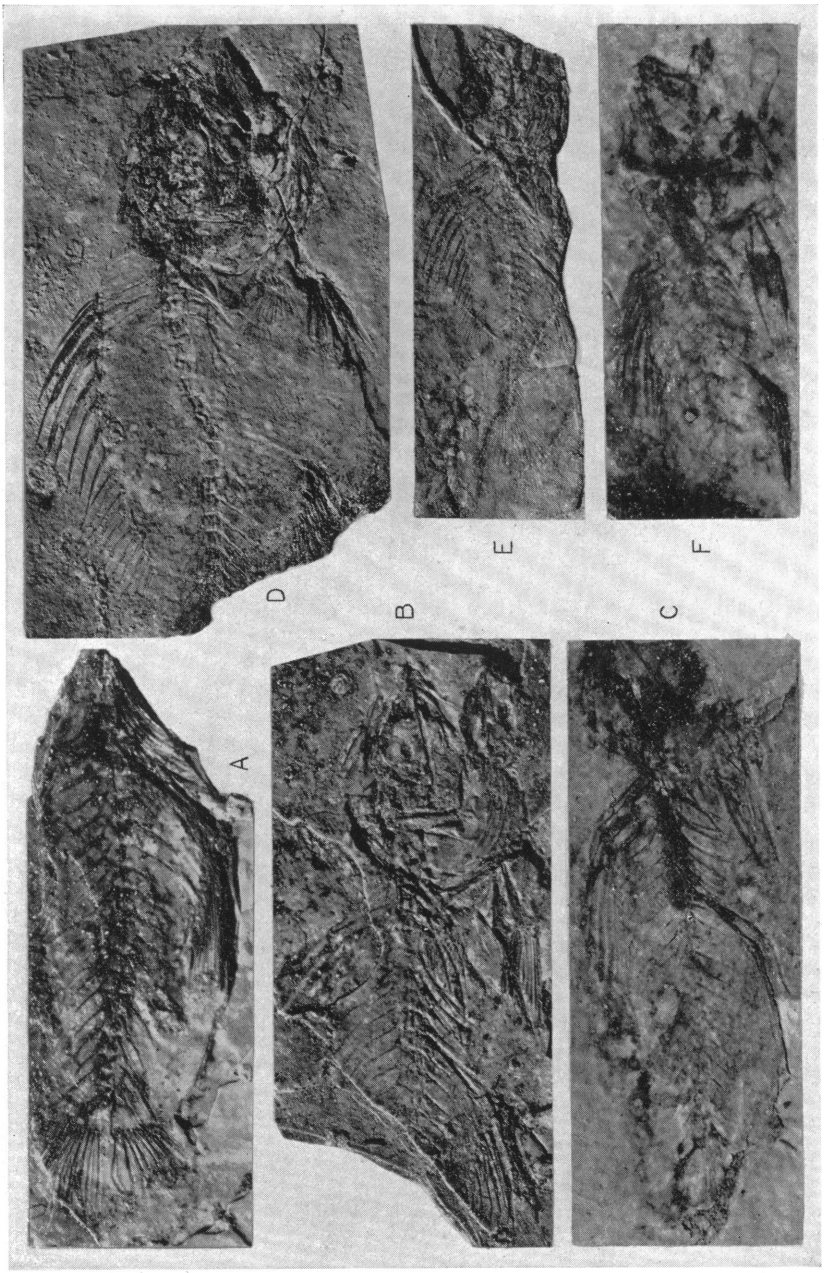

Fig. 4. *Percichthys hondoensis*. A, A.M.N.H. No. 10002, anal spines and caudal fin completely preserved, × 3/2. B, A.M.N.H. No. 10003, × 3/2. C, A.M.N.H. No. 10001, × 3/2. D, A.M.N.H. No. 10005, opercular spine and serrated preopercular are present in this specimen, × 1. E, Type, A.M.N.H. No. 10000, × 1. F, A.M.N.H. No. 10004, showing maxillary and premaxillary in position, × 2.

spine is the shortest of the three; the second and third are about of equal length.

The caudal fin is truncate or slightly rounded. Each lobe has about 12 rays.

DISCUSSION

Two genera of fresh-water serranids are known to occur in South America: *Percichthys* in Chile, Patagonia, and the ?Pliocene of Brazil, and *Percilia*, occurring at the present time only in Chile and unknown in the fossil state. According to Boulenger (1895) and Eigenmann (1927), these genera may be separated by the presence, in *Percichthys*, of a supplementary maxillary, dentigerous palatines, and small scales. *Percilia* lacks the supplementary maxillary, the palatine is smooth, and the scales are large.

It is unfortunately not possible to determine the nature of these differentiating characters in any of the specimens of *Percichthys hondoensis*. Scale impressions are preserved in one specimen, and the scales appear to be relatively smaller than those of *Percilia*. As pointed out above, there is an indication of a supplementary maxillary in another individual. Assignment of this new species to *Percichthys* therefore appears indicated and is further supported by the fact that its previously known geological range runs back at least to the Pliocene and possibly earlier.

The Recent and later Tertiary species of *Percichthys* have between 32 and 35 vertebrae, while *P. hondoensis* has but 24 to 26. The smaller number of vertebrae in this species is the one observable character that distinguishes it from the other members of the genus. Taken by itself, this difference can hardly be considered to be of generic rank, as a variation of 10 in the total number of vertebrae is by no means uncommon in other acanthopterygian genera. From the standpoint of the time factor alone, however, the question arises as to the validity of assigning percoid species ranging from the Lower Eocene to the Recent to the same genus, particularly since the percoids, during this period, were undergoing an accelerated and diversified radiation. The answer to this problem appears to be the paleontological record itself. In spite of the fact that the percoids were evolving very rapidly during the Tertiary, there is ample evidence that a number of genera that appeared in the Eocene have persisted to the present time. *Perca, Centropomus, Lates, Serranus, Labrus,* and others fall into this category.

Woodward states (1901, p. xii) that the Eocene percoids indicate less differentiation than exists in this group at the present time. This opinion, which is certainly justified, is reflected in his broad usage of the family Percidae, including extinct genera now considered to belong to the Percidae, Centropomidae, and Serranidae (see Romer, 1945). Most of the characters that are used to separate, for instance, the Serranidae from the Percidae are very difficult or impossible to observe in fossils, and for this reason the assignment of a fossil form to one or the other family is often quite arbitrary. As *Percichthys* has been placed by various authors in both the Serranidae and the Percidae, a consideration of certain characters which distinguish these families appears desirable. The Percidae, fossil or recent, are unknown in the Southern Hemisphere. To consider *Percichthys* a member of this family (Romer, 1945), even if tenable on the basis of its morphology, would present another very baffling distributional problem as the perches have apparently been a fresh-water group as far back as the Eocene.

All Recent serranids have three anal spines while the percids have but one or two. As the number of these spines can usually be observed in fossil percoids, it has been used extensively in placing fossil forms in one family or the other. The presence or absence of a subocular shelf, occurring only in the serranids, can but very rarely be determined. The supplementary maxillary, absent in the Percidae, may or may not be present in the Serranidae; thus its presence does indicate serranid affinity but its absence means nothing conclusive. The occurrence of one or more spines on the opercular and the serration of the posterior

border of the preopercular are highly variable characters in both families and are hence of little diagnostic value.

In both the Serranidae and Percidae the total number of vertebrae in the Eocene genera is 25 or 26. Most of the Recent basses have 24 to 28 while a few genera have 35. The Recent perches have 30 to 48 vertebrae, representing a definite increase over the primitive number. The presence of 24 to 26 vertebrae in *Percichthys hondoensis* is hence a character shared in common with other Eocene members of both families and further supports the opinion that *Percichthys* is quite generalized and close to the common ancestor of the perches and basses. The primitive percoid formula was probably 10 + 14 to 16 = 24 to 26.

The Eocene serranid types include *Properca* (Sauvage, 1880), *"Labrax," Smerdis* (Agassiz, 1833), and *Cyclopoma* (Agassiz, 1833). These genera have the required three anal spines but are otherwise virtually indistinguishable from the Eocene types referred to the Percidae. *Anthracoperca* (Voigt, 1935) is considered to be a perch, although it has three anal spines and a supplementary maxillary. *Amphiperca* (Weitzel, 1933) was described as a perch but also has three anal spines, and Romer (1945) has included it in the Serranidae. All these genera have seven to nine spines in the dorsal fin with a varying amount of subdivision into a first or second dorsal. The supplementary maxillary is apparently absent in most of them. The preopercular may or may not be serrated, and an opercular spine may or may not be present.

Percichthys hondoensis is obviously very similar to the other Eocene serranids but differs from the Eocene percids such as *Mioplosus* and certain species of *Perca* for the most part only in the number of anal spines.

The presence of *Percichthys* in the Lower Eocene of Patagonia further testifies to the antiquity of the South American freshwater fish fauna and indicates that this serranid gave up its marine habitus very early in its history. That *Percichthys hondoensis* is ancestral to *P. antiquus* and the Recent species of this genus is entirely possible, apparently the only requirement being an increase in the number of vertebrae.

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