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A NEW GENUS AND SPECIES OF ANTHIINE FISH (PISCES: SERRANIDAE) FROM THE EASTERN SOUTH PACIFIC WITH COMMENTS ON ANTHIINE RELATIONSHIPS

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Abstract.—*Anatolanthias apiomycter,* a new genus and species of anthiine fish, is described from two specimens collected in the eastern South Pacific, about 1500 km west of Chile at almost 26°S, near the southwest end of the Nazca Ridge. It is distinguished from all other serranids in having the following combination of characters: maxilla abruptly expanded distally, anterior naris somewhat remote from posterior naris, vomer edentate, vertebrae 26 (10 precaudal + 16 caudal), dorsal fin continuous—not incised between spinous and soft portions, opercle with three well-developed spinous processes, pleural ribs on vertebrae 3 through 11, epipleural ribs associated with first 11 vertebrae, epihaemal ribs on vertebrae 12 through 19, predorsal bones 2, principal caudal-fin rays 15, scales ctenoid with only marginal cteni, maxilla with scales, dorsal and anal fins naked (but each with low scaly sheath as its base), supramaxilla absent, and preopercle without antrorse spines. Characters that may be useful in clarifying relationships within the Anthiinae are discussed.

During a recent cruise in the eastern South Pacific, personnel aboard the Soviet research vessel *Prof. Shtokman* collected two specimens of a new species of anthiine serranid fish. These specimens are so distinctive that they also warrant description as a new genus. The main purpose of this paper is to describe the new genus and species. In addition, because of the inadequately understood relationships of the serranid subfamilies and the chaotic generic classification within the Anthiinae, we discuss characters that appear to be useful in elucidating serranid intrarelationships—particularly those within the Anthiinae.

The Anthiinae include a plethora of brightly colored species of small to medium size that inhabit tropical to temperate seas worldwide at shallow to moderate depths, usually on rocky bottoms or coral reefs which provide shelter. Most species feed on zooplankton a short distance above the bottom to which individuals rapidly retreat when predators approach. These fishes often occur in aggregations, and, as far as known, are protogynous hermaphrodites. The sexes are often colored differently and may exhibit morphological differences, particularly in fin structure; typically males attend large harems.

There are about 165 valid described species of Anthiinae, variously classified in more than 20 genera. A remarkable 73 species of the subfamily were first described between 1975 and 1987—46 of them in the years 1979–1982. At least 14 undescribed species (in addition to the one described herein) are in museum collections, and still more must remain to be discovered. This explosive increase in the number of anthiine species known is due to more intensive collecting. Of particular importance has been the relatively recent advent of SCUBA, which has allowed collecting at previously inaccessible depths.

Because only one genus of anthiines has

been revised since 1975 (*Plectranthias*, Randall 1980), it is not surprising that the generic classification is inadequate. We hope that our comments on relationships will contribute to a better understanding of generic limits and relationships within the Anthiinae.

Materials and Methods

The holotype is deposited in the Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); the paratype, in the Zoological Institute, Academy of Sciences USSR, Leningrad (ZIL).

Counts and measurements follow Anderson & Heemstra (1980), except as indicated below. The first vertebra with a haemal spine was considered the first caudal vertebra; the urostylar vertebra, the last. Mabee (1988) interpreted the predorsal bones of teleosts as the phylogenetic homologues of supraneurals, and because supraneural is the more widely used senior synonym, she recommended its use for those bones in teleosts. We prefer to use the term "predorsal bone" because it is firmly entrenched in the literature of percoid fishes. Gillrakers and pseudobranchial filaments were counted on the right side. Internarial distance was the distance between the posterior border of the anterior naris and anterior border of the posterior naris. Body depth was measured at the dorsal-fin origin and at greatest depth; body width, just posterior to gill opening; and prepelvic length, from premaxillary symphysis to origin of pelvic fin. Caudal concavity was the horizontal distance between verticals at distal tips of longest and shortest caudal-fin rays. The symbol > preceding the measurement of a fin ray indicates that the element measured was slightly damaged. Most measurements are presented as percentages of the standard length (SL), but some are given as quotients of SL, head length, snout length, or orbital diameter. These quotients are rounded to the nearest 0.05.

Anatolanthias, new genus

Diagnosis.—A genus of Anthiinae distinguishable from all other genera of Serranidae by the following combination of characters. Maxilla abruptly expanded distally, particularly on labial border, where a shelf or rostrally directed hook is present at point of expansion. Anterior naris located rather far anteriorly on snout, somewhat remote from posterior naris. Vomer edentate. Vertebrae 26 (10 precaudal + 16 caudal). Dorsal fin single, not incised between spinous and soft portions. Posterior margin of bony opercle with three well-developed spinous processes, middle one largest. Pleural ribs on vertebrae 3 through 11. Epipleural ribs associated with first 11 vertebrae. Epihaemal ribs (bones in the same series as the epipleural ribs which appear to be modified intermuscular bones; see Stiassny & Jensen 1987:300) on vertebrae 12 through 19. Formula for configuration of predorsal bones, anterior neural spines, and anterior dorsal pterygiophores 0/0/2/1+1/1/ (using symbolization of Ahlstrom et al. 1976). Caudal fin forked; principal rays 15 (8 + 7); branched rays 13 (7 + 6). Scales ctenoid, with only marginal cteni (i.e., no ctenial bases present proximal to marginal cteni; see Hughes 1981); no secondary squamation. Scales present on maxilla and in interorbital region. Well-developed axillary process of modified scales at pelvic-fin base. Dorsal and anal fins without scales, but each with low scaly sheath at its base. No supramaxilla. Preopercle without antrorse spines.

Description.—Characters included in the generic diagnosis form part of the generic description and are not repeated. Mouth terminal; upper and lower jaws about equal. Premaxillae protrusile. Posterodorsal border of maxilla not covered by elements of circumorbital series when mouth closed. Palatine with teeth. Pterygoids and tongue edentate. Fleshy papillae on posterior half of orbital border. Posterior margin of preopercle serrate; ventral margin of preopercle essentially smooth. Branchiostegals 7. Pseu-

dobranch present. Gill arches 4, with slit behind fourth. Longest gillrakers longer than longest gill filaments. Lateral line complete, extending to base of caudal fin (running parallel to dorsal body contour below dorsal fin, curving gently to near mid-lateral axis of body on caudal peduncle). Squamation well developed on bases of pectoral, pelvic, and caudal fins and continuing onto fins. Pelvic-fin rays I, 5; pelvic fin inserted slightly posterior to vertical through pectoral-fin base. Procurrent spur (Johnson 1975) absent; penultimate ventral procurrent caudal-fin ray not shortened basally. Parhypural with well-developed hypurapophysis. Autogenous hypurals 5. Epurals 3. Uroneurals 1 pair (posterior pair absent). No trisegmental pterygiophores associated with dorsal and anal fins. Other characters are those of the single species.

Etymology.—*Anatolanthias* (anatole, east; anthias, a seafish) is from the Greek, referring to the occurrence of the genus in the eastern Pacific. The gender is masculine.

Type species.—*Anatolanthias apiomycter,* new species.

Anatolanthias apiomycter,
new species
Figs. 1, 2

Holotype: USNM 309202, 93.9 mm SL; 25°41.7′S, 85°23.7′W; 160–168 m; R/V *Prof. Shtokman* cruise 18, station 1922; 26 April 1987; bottom otter trawl.

Paratype: ZIL 49471, 89.0 mm SL; same data as for holotype.

Description.—Characters presented in the generic diagnosis and description form part of the species description and are not repeated unless necessary for clarification. Most of the scales have been lost from the paratype; as a consequence it is impossible to enumerate or accurately estimate most of its scale counts. Data for the holotype are followed, in parentheses, by those for the paratype, when different. Dorsal-fin rays X,16. Anal-fin rays III, 7. Pectoral-fin rays 21, both sides (22 both sides); dorsalmost pectoral-fin ray unbranched on both sides (right ventralmost unbranched), other rays branched. Procurrent caudal-fin rays 14, both dorsally and ventrally. Gillrakers on first arch 10 + 27 (11 + 26), no rudimentary rakers. Pseudobranchial filaments 18 (16). Fleshy papillae on posterior half of orbital border 22 left, ca. 20 right (20 left, 21 right). Tubed lateral-line scales 63 left, ca. 62 right (estimated ca. 62 left). Rows of cheek scales ca. 8 left, ca. 9 right. Scale rows between lateral line and mid-base of spinous dorsal fin 3. Scales from dorsal-fin origin to lateral line 5. Scales from anal-fin origin to lateral line ca. 17. Serrae on posterior margin of preopercle ca. 19 left, ca. 20 right (16 left, ca. 14 right); serrae enlarged into bifurcate spinous process at angle on right side (blunt process at angle), not enlarged on left side; ventral margin of preopercle essentially smooth.

Body depth (at dorsal-fin origin) 3.95 (4.15), head length 3.75 (3.60) in SL. Bony orbital diameter 3.05 (3.40) in head length. Bony interorbital width 3.75 (4.50) in head length, 1.20 (1.35) in bony orbital diameter. Snout length 1.60 (1.50) in bony orbital diameter. Internarial distance 3.05 (2.80) in snout length. The following morphometric data are in percentages of SL. Head length 26.7 (27.9). Snout length 5.5 (5.4). Bony orbital diameter 8.7 (8.2). Postorbital head length 12.9 (13.7). Upper jaw length 12.5. Maxilla width 4.2 (4.3). Internarial distance 1.8 (1.9). Least bony interorbital width 7.1 (6.2). Body depth at dorsal-fin origin 25.3 (24.0). Greatest body depth 26.9 (24.0). Body width 16.4 (14.4). Predorsal length 28.8 (28.5). Prepelvic length 35.0 (32.0). Preanal length 64.9 (63.9). Caudal-peduncle length 21.7. Least caudal-peduncle depth 11.1 (10.6). Pectoral-fin length 29.8 (28.4). Pelvic-fin length 23.6 (21.9). Pelvic spine 13.0 (13.1). Dorsal-fin base 56.7 (58.2). First dorsal spine >3.7 (4.4). Second dorsal spine 8.1 (8.4). Third dorsal spine 10.1 (>9.1). Fourth dorsal spine 10.8 (11.3). Longest

dorsal spine 11.8, fifth (11.6, sixth). Tenth dorsal spine >7.8 (9.3). Longest dorsal soft ray ca. 14.0, tenth (broken). Anal-fin base 17.5 (17.8). Depressed anal-fin length 28.6 (27.9). First anal spine 4.3 (5.1). Second anal spine >9.2 (10.2). Third anal spine >8.3 (9.2). Longest anal soft ray ca. 14.1, second (ca. 15.2, fourth). Upper caudal-fin lobe ca. 33.8 (broken). Lower caudal-fin lobe ca. 31.9 (broken). Caudal concavity ca. 20.7 (fin damaged).

Premaxilla with lateral row of conical teeth and medial series of much smaller conical teeth; one or two small canines at anterior end of lateral row; medial series with one to a few small posteriorly directed canines adjacent to symphysis; no teeth at symphysis. Dentary with row of conical teeth, teeth smaller near symphysis; one to a few teeth enlarged into small canines about 30 to 35 percent of distance from anterior end of jaw to posterior end of row of teeth; exserted canine at anterior end of jaw; no teeth at symphysis. Vomer edentate, but with several fleshy papillae. Palatine with band of small conical teeth.

Maxilla reaching just posterior to vertical through middle of eye. Posterior border of anterior naris produced into flap which falls well short of posterior naris when reflected. Free margins of interopercle and subopercle somewhat irregular, but not serrate. Maxilla, interorbital region, lachrymal, cheek, preopercle, interopercle, opercle, and subopercle densely covered with scales; scales on dorsum of snout not reaching anterior end of snout—leaving considerable area scaleless (anteriormost scales on dorsum of snout very small); most of lateral aspect of snout naked; no scales on lower jaw, gular region, branchiostegals, and branchiostegal membranes. Modified scales (interpelvic process) overlapping pelvic fin bases along mid-ventral line. Tubes in lateral-line scales simple.

Distal margin of anal fin rounded. Second anal spine more robust than first or third, about twice as long as first, slightly longer

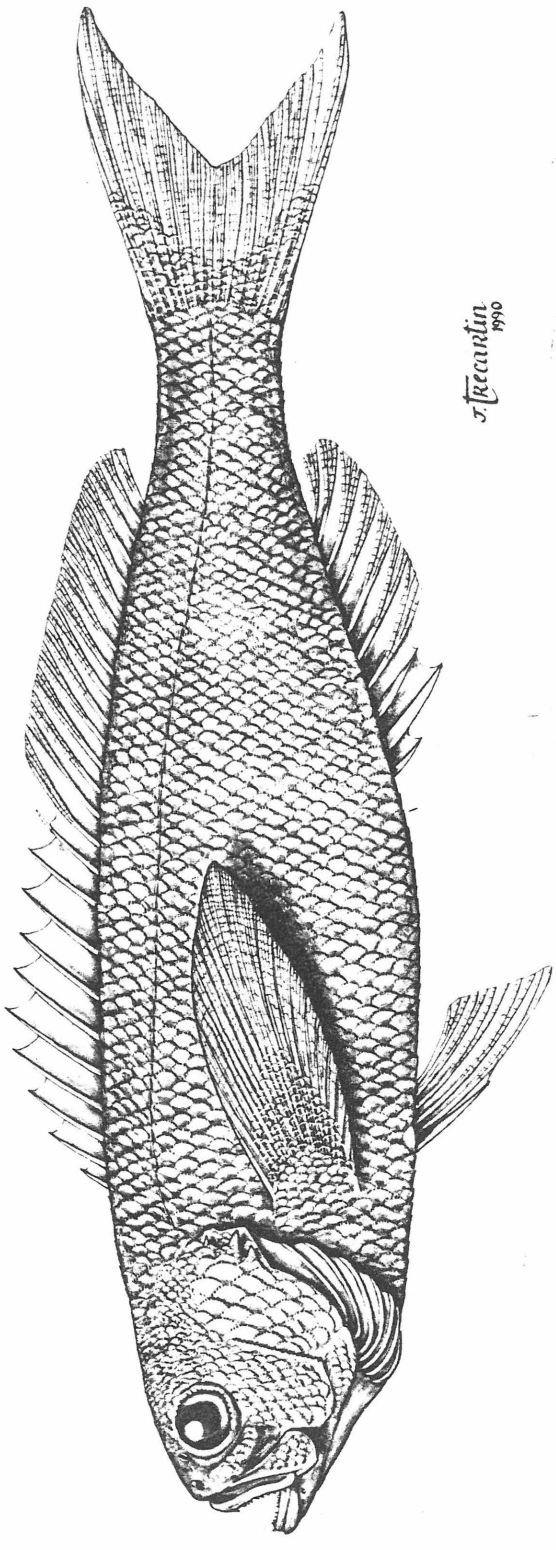

Fig. 1. Holotype of *Anatolanthias apiomycter*, USNM 309202, 93.9 mm SL; eastern South Pacific.

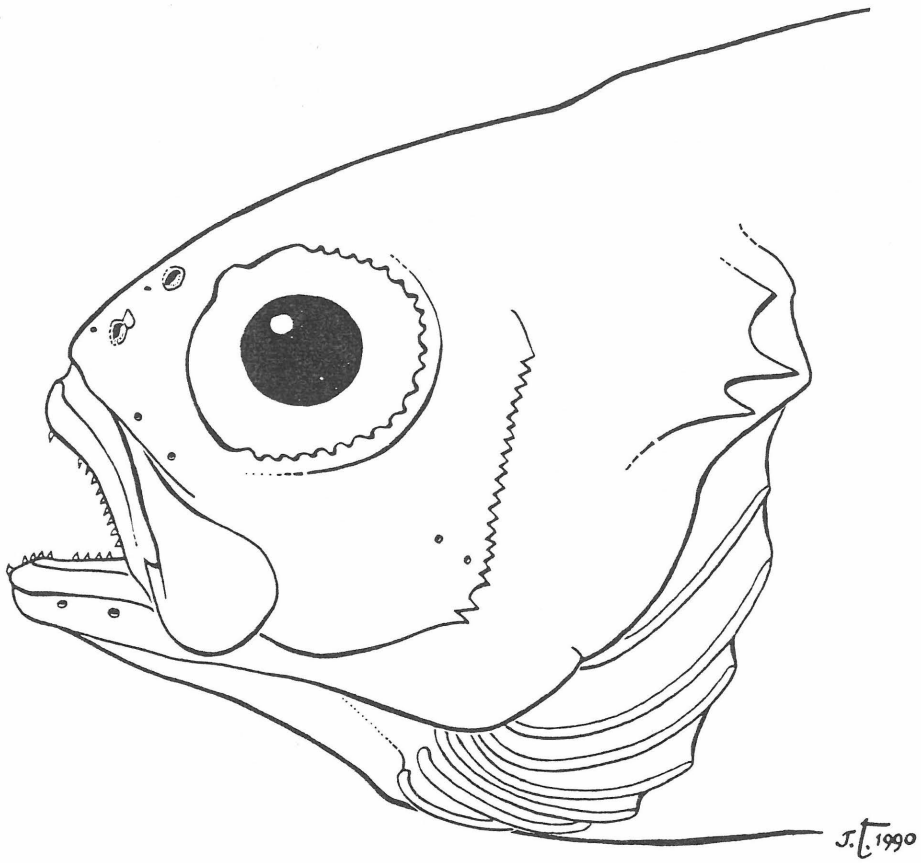

Fig. 2. Head of holotype of *Anatolanthias apiomycter,* USNM 309202, 93.9 mm SL; eastern South Pacific.

than third. Pectoral fin symmetrical, middle rays longest. Pectoral fin reaching vertical between bases of first and second dorsal soft rays (vertical through base of first dorsal soft ray), falling short of vertical through vent. Pelvic fin reaching vertical through base of ninth dorsal spine (vertical between bases of eighth and ninth dorsal spines), falling short of vent.

Coloration.—In alcohol the types are straw-colored with no distinctive pigmentation. A color transparency of the holotype, taken shortly after capture, shows: body uniformly red, iris red, dorsal and caudal fins red, anal fin paler, paired fins not clearly visible.

Distribution.—*Anatolanthias apiomycter* is known only from the type-locality in the eastern South Pacific, about 1500 km off the coast of Chile, near the southwest end of the Nazca Ridge.

Etymology.—The name *apiomycter* (apios, far away; mykter, nostril) is from the Greek and is an allusion to the unusual position of the anterior nostril. The new name is a masculine noun in apposition to *Anatolanthias.*

Relationships

Johnson (1983) defined the Serranidae with respect to the Percichthyidae (sensu Gosline 1966) on the basis of three reductive specializations (absence of the posterior uroneural, procurrent spur, and third preural radial cartilages), and showed that

members of the Serranidae share at least one innovative specialization (the presence of three spines on the opercle)—thus supporting the hypothesis of monophyly for the family. Following Gosline (1966), Johnson (1983, 1988) recognized three subfamilies in the Serranidae: the Serraninae, Epinephelinae, and Anthiinae, but identified an autapomorphy for only the Epinephelinae. Anderson & Heemstra (1989) mentioned two characters (one reductive, the other innovative) that may prove useful in defining the Anthiinae. The reductive character, absence of a tooth plate on the second epibranchial, was discussed by Baldwin (1990) and interpreted as an autapomorphy of the Anthiinae.

As noted by Johnson (1983), it is difficult to evaluate the significance of vertebral number in determining relationships among the Percoidei; nevertheless, this character may be of value in delimiting the boundaries of the Anthiinae. Species of Serraninae and Epinephelinae almost always have 24 vertebrae, but species of Anthiinae have 25 to 28, usually 26. (*Acanthistius,* a serranine, has 26 vertebrae, and *Niphon,* a primitive epinepheline, has 30 [Johnson 1983]. *Pseudogramma* has 26 vertebrae; *Suttonia* has 26 or 27; and *Aporops* has 27 or 28 [Leis & Rennis 1983; Carole C. Baldwin, pers. comm.]. These last three genera are highly derived grammistin epinephelines, whose progenitors presumably acquired additional vertebrae subsequent to the divergence of the grammistins from the main line of epinepheline evolution.) Anderson & Heemstra (1989) presented an analysis of vertebral number as a character in the Serranidae; they considered 24 or 25 as the most primitive state in the Serranidae and 26, 27, and 28 as progressively more derived states.

Realizing that additional study is needed before the Anthiinae can be definitively defined, we accept, at present, the absence of the second epibranchial tooth plate and high vertebral number (26 to 28, usually 26) as autapomorphies delimiting this subfamily. Recognition of the Anthiinae as a distinct taxon is of considerable practical value because the concept anthiine unites a large number of look-alike species that share uniquely derived characters at some level within the Serranidae.

According to Johnson (1984), the primitive and most common number of principal caudal-fin rays (branched rays + 2) in percoids is 17 (9 + 8), and the most common and presumably primitive number of predorsal bones is three. Johnson (1984) noted that most percoids (59 groups) have ctenoid scales in which the cteni are discrete bony plates that are added continually to the posterior field as the scale grows, and that in most of these the posterior field is filled with the remains of old cteni (ctenial bases of Hughes 1981). The retention of ctenial bases in the posterior field is presumably more primitive in the Percoidei than the condition in which only primary and secondary rows of marginal cteni are present (i.e., no ctenial bases remaining in the posterior field) because, according to Johnson (1984), only a few groups (including the Anthiinae) have species lacking ctenial bases in the posterior field. If, in the Serranidae, 15 principal caudal-fin rays, one or two predorsal bones, and absence of ctenial bases in the posterior field are derived states, as they appear to be, they may be helpful in clarifying the generic classification of the Anthiinae.[1]

Baldwin (1990) found that all of the species of Anthiinae that she examined that have 17 principal caudal-fin rays also have three predorsal bones, whereas those with 15 principal rays have either two or three predorsal bones (all Atlantic and eastern Pacific species with 15 principal rays have only two predorsal bones). Our data corroborate

[1] We realize that the argument common equals plesiomorphous is logically flawed, but, because the sister group of the Serranidae has not been identified and because there are no other pertinent data, it is the only argument available.

Baldwin's with the exceptions of *Giganthias immaculatus* (if it is an anthiine) from Japanese waters and *Plectranthias vexillarius* from the Gulf of Oman, which have 17 principal rays and two predorsal bones, and *Plectranthias japonicus* from the western Pacific, which has 16 or 17 principal rays and two predorsal bones (also see Randall & Heemstra 1978, Randall 1980). Randall (1980) reported five other species of *Plectranthias* that have variable or unusual numbers of principal caudal-fin rays (one species with 15 to 17, two with 16, one with 15 or 16, and one with 14 to 16), but he did not give counts of predorsal bones. Randall & Lubbock (1981) reported that four species of *Pseudanthias,* of the Indo-Pacific subgenus *Mirolabrichthys,* have 15 principal rays but only one predorsal bone and that one other *Mirolabrichthys* has 15 principal rays and either one or two predorsal bones.

Among anthiines there is a strong correlation in number of principal caudal-fin rays, number of predorsal bones, and type of ctenoid scale. Species with 17 principal rays and three predorsal bones usually have scales in which ctenial bases have been retained in the posterior field, but among those with 15 principle rays apparently all lack ctenial bases in the posterior field (Anderson, unpublished data). Although all three of the presumed derived states (15 principal caudal-fin rays, one or two predorsal bones, and absence of ctenial bases in the posterior field) are reductive, the shared possession of all three may be indicative of propinquity of descent. (Based on our incomplete data we speculate that the sequence of appearance of these derived characters in the main line of anthiine evolution was: loss of ctenial bases in the posterior field, reduction in number of principal caudal-fin rays, and reduction in number of predorsal bones.) *Anatolanthias* belongs to a large group of anthiines (which includes, e.g., species of *Anthias, Hemanthias, Holanthias, Luzonichthys, Pronotogrammus,* and *Rabaulichthys*) that displays all three derived traits.

Anatolanthias shares the following apparently derived traits with species of the Indo-Pacific genera *Luzonichthys* (six nominal species) and *Rabaulichthys* (two species): anterior naris rather remote from posterior naris (nares usually close together in anthiines; in the above genera internarial distance 2.45–4.35 times in snout length, other anthiines for which data are available—with the exception of *Anthias tenuis*—5.10–14.00 [usually 6.00–11.00], *A. tenuis* 4.30–4.95), vomerine dentition absent or extremely reduced (vomerine dentition usually well developed in anthiines, *Pseudanthias fucinus* being the only other anthiine known to lack vomerine teeth; see Randall 1981, Allen 1984, Randall & Ralston 1984, Randall & Pyle 1989), and the sum of numbers of pairs of epipleural and epihaemal ribs 16 to 19 (specimens of about 60 species of anthiines representing 14 other genera with 8–15 [usually 9–13], *Nemanthias carberryi* with 16 and one species of *Pseudanthias* with 17). In addition, another character state that may be a synapomorphy for *Anatolanthias, Luzonichthys,* and *Rabaulichthys* is the number of pleural ribs; these genera have nine pairs, but anthiines usually have eight (about three-fourths of the species for which data are available with eight). Based on these characters we hypothesize that the genera *Luzonichthys, Rabaulichthys,* and *Anatolanthias* constitute a monophyletic assemblage. We recognize three genera for this assemblage because all three possess characteristics that can be interpreted as autapomorphies and no two of the genera bear identified synapomorphies.

Luzonichthys is quite distinctive (Randall 1981); species of this genus have two dorsal fins (other anthiines have a single dorsal fin) and have the third or ventralmost opercular spine greatly reduced—apparently absent in some specimens (other anthiines have three well developed opercular spines). Also *Luzonichthys* has 11 precaudal and 15 caudal vertebrae; among anthiines with 26 vertebrae the vast majority (including *Anatolan-*

thias and *Rabaulichthys*) have 10 and 16, respectively. *Rabaulichthys* (Allen 1984, Randall & Pyle 1989) is characterized by the possession of a high sail-like spinous dorsal fin in males (no other anthiines have a dorsal fin with this shape) and the absence of palatine dentition (other anthiines have teeth on the palatine). In *Anatolanthias* the maxilla is abruptly expanded distally, particularly so on the labial border where a shelf or a rostrally directed hook is present at the point of expansion (the shelf or hook is absent in *Luzonichthys* and *Rabaulichthys* and the distal expansion of the maxilla is not particularly abrupt). This configuration of the maxilla has, to our knowledge, not been reported in the literature for any anthiine, although Phillip C. Heemstra informed us (pers. comm.) that he has observed it in several species, including *Anthias nicholsi, A. salmopunctatus, A. tenuis, Hemanthias vivanus,* and *Sacura parva*; we have observed it in a number of other species, e.g., *Anthias anthias, A. asperilinguis, Hemanthias peruanus,* and *Holanthias martinicensis.* The abrupt expansion of (or shelf or hook on) the maxilla is easily overlooked because it is usually hidden by the lip. Despite the fact that other anthiine species (apparently not closely related to *Anatolanthias*) have the abruptly expanded maxilla, this trait may have been independently derived in *Anatolanthias* and thus be an autapomorphy for this genus.

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