

REVISION OF THE EASTERN NORTH PACIFIC ANTHIIN BASSES (PISCES: SERRANIDAE)¹

John E. Fitch²

ABSTRACT: Four species of anthiin basses inhabit eastern North Pacific waters: *Pronotogrammus multifasciatus* Gill, 1863; *P. eos* Gilbert, 1890; *Hemanthias peruanus* Steindachner, 1874; and *H. signifer* (Garman, 1899).

Anthias gordensis Wade, 1946, and *Holanthias sechurae* Barton, 1947, are relegated to the synonymy of *Pronotogrammus multifasciatus*. *Pronotogrammus* Gill, 1863, has priority over *Holanthias* Günther, 1868. *P. eos* should be generically reassigned.

Centristhnus Garman, 1899, is relegated to the synonymy of *Hemanthias* Steindachner, 1874. *H. delsolari* is a *nomen nudum* that has been applied to specimens of *H. signifer* in Peruvian waters (Chirichigno, 1974).

Two of the four species occur in Californian waters: *Pronotogrammus multifasciatus* (Hobson, 1975, as *Anthias gordensis*), and *Hemanthias signifer* (misidentified as *H. peruanus* by Wales [1932]).

An identification key is presented; the key utilizes facial scalation, pored lateral-line scale counts, eye diameter, finray counts, and other easily observed characters for differentiating the four eastern North Pacific anthiins. Otoliths (sagittae) of these species are illustrated because of their occurrence as remnants of prey in food habit studies.

INTRODUCTION

An attempt to identify an anthiin that had been caught around 3 February 1977 in 192 meters of water off San Onofre, California, revealed considerable taxonomic confusion and contradiction among accounts of eastern North Pacific Anthiinae. Although an abundance of literature, including original descriptions (Gill, 1863; Steindachner, 1874; Gilbert, 1890; Garman, 1899; Wade, 1946; and Barton, 1947), was available for anthiins in the eastern North Pacific, few faunal reports and identification keys included more than one or two species (Jordan and Evermann, 1896; Hiyama, 1937; Hildebrand, 1946; Hildebrand and Barton, 1949; Berdegue, 1956; Chirichigno, 1974; Walford, 1974; Miller and Lea, 1976; Ramirez and Gonzales, 1976; and Thomson, Findley, and Kerstitch, 1979). In addition, characters given in these publications often were incorrect or inadequate, making it impossible to compare the same features on different species. As a result, numerous anthiins in collections at the California Academy of Sciences (CAS, or SU-CAS), Natural History Museum of Los Angeles County (LACM), Scripps Institution of Oceanography (SIO), and University of California at Los Angeles (UCLA) were misidentified. Obviously, a critical review of eastern North Pacific anthiins was sorely needed.

During the past several years, all eastern Pacific anthiins in the CAS, Cabrillo Marine Museum (CMM), LACM, SIO and

UCLA collections were examined, as was selected material in the University of Costa Rica (UCR) collection.

Proportional measurements in thousandths of standard length (SL), were made on 147 of these specimens representing the known size ranges for the four anthiins that inhabit eastern North Pacific waters (Table 1). The data were used to construct the following key and species accounts. Only primary synonymies have been included in the species accounts.

Otoliths (sagittae) of the four species are illustrated because these frequently occur in digestive tracts and scats of various predators, and might be found in coastal Indian camp sites or in fossil deposits.

Although a new generic name is needed for *Pronotogrammus eos*, such action is being deferred to Phillip C. Heemstra, who is in the process of revising the subfamily for the entire eastern Pacific.

Larvae of three of the four eastern North Pacific anthiins have been described and illustrated (Kendall, 1979), but those of *Hemanthias signifer* have yet to be recognized.

KEY TO THE ANTHIINS OF THE EASTERN NORTH PACIFIC

- 1a. Pored scales in lateral line 36 to 40; eye large, 12 to 16 percent of SL..... *Pronotogrammus eos*
- 1b. Pored scales in lateral line 45 or more; eye smaller, less than 11 percent of SL 2
- 2a. Maxillary, mandible, and anterior part of face and head completely scaled; third dorsal spine only slightly longer than second, about equal to fourth; elongate oval patch of teeth on tongue (often difficult to find); vertebrae 10 + 16...
..... *Pronotogrammus multifasciatus*
- 2b. Maxillary, mandible, and anterior part of face and head without scales; third dorsal spine about three times as long as second, twice as long as fourth; no teeth on tongue; vertebrae 11 + 15 3
- 3a. Margin of urohyal smooth at all sizes; pored scales in lateral line 52 to 59; pectoral rays 16 to 18 (usually 17); total gill rakers 31 to 34 (rarely 34); in fish over 100 mm SL,

1. Review committee for this Contribution: John E. Graves, Robert J. Lavenberg, and C. Richard Robins.

2. Research Associate in Ichthyology and Paleontology, Natural History Museum of Los Angeles County, Los Angeles, California 90007.

Table 1. Comparative measurements, in thousandths of standard length, for the four eastern North Pacific anthiins

Measurement	Species and Number of Specimens Measured			
	<i>P. eos</i>	<i>P. multifasciatus</i>	<i>H. peruanus</i>	<i>H. signifer</i>
Number of specimens	30	27	55	35
Standard lengths (mm)	29–153	66.5–205	71.5–267	60–279
Head length	361–422	322–354	326–385	328–405
Horizontal eye diameter	120–159	081–105	073–102	080–110
Snout length	054–079	064–085	065–088	078–104
Maxillary length	152–183	135–151	139–160	137–161
Bony interorbital width	060–087	065–080	063–078	061–075
Length of first gill raker below angle	060–080	052–071	045–062	044–061
Snout to first D insertion	303–345	283–323	289–329	293–341
Snout to A insertion	610–656	604–695	587–656	587–646
Snout to pectoral insertion	341–382	331–378	316–361	306–380
Snout to pelvic insertion	345–397	350–439	353–417	355–412
Length of anal. fin base	167–199	164–199	179–219	175–208
Length of dorsal fin base	476–561	548–622	509–579	488–557
Dorsal peduncle length	168–199	154–189	184–215	177–201
Ventral peduncle length	231–258	221–256	214–252	217–258
Dorsal fin insertion to pelvic insertion	306–369	303–354	300–341	272–344
Caudal peduncle depth	111–128	091–119	124–148	101–134
Height of first D spine	041–062	046–073	039–056	031–054
Height of second D spine	073–092	063–114	067–090	061–088
Height of third D spine	094–124	105–147	199–352	176–553
Height of fourth D spine	115–155	107–150	086–136	097–138
Height of fifth D spine	118–158	104–150	086–130	096–128
Longest ray in second D fin	190–220	129–173	176–219	127–197
Longest ray in anal fin	196–230	137–190	176–250	137–187
Length of second A spine	115–150	096–147	069–122	066–113
Length of third A spine	115–149	102–140	092–127	092–120
Pectoral fin length	295–339	262–315	226–274	208–254
Pelvic fin length	310–374	301–466	266–536	229–319

middle rays of both upper and lower lobes of caudal fin longest. *Hemanthias peruanus*

- 3b. A sharp, anteriorly projecting spine (visible without dissection) on ventral edge of urohyal in fish longer than about 70 mm SL; pored scales in lateral line 59 to 69; pectoral rays 18 to 20 (mostly 19); total gill rakers 33 to 38 (rarely 33); outermost rays of both lobes of caudal fin longest. *Hemanthias signifer*

SPECIES ACCOUNTS

Pronotogrammus multifasciatus Gill, 1863

Figure 1

Pronotogrammus multifasciatus Gill, 1863:84 (original description, type locality: Cape San Lucas, Mexico).

Anthias multifasciatus (Gill). Jordan and Gilbert, 1882:360 (generic reassignment, redescription).

Anthias gordensis Wade, 1946:225 (original description, type

locality: Inner Gorda Bank, Baja California, Mexico, 70 to 78 fathoms).

Holanthias sechurae Barton, 1947:2 (original description, type locality: Talara, Peru, exact location uncertain).

Holanthias gordensis (Wade). Hubbs, Follett, and Dempster, 1979:21 (checklist of Californian fishes).

MERISTIC DATA. D. X–XI, 14–15; A. III, 7–8; P. 18–20; GR 10–12 + 26–30 = 37–42; pored lateral line scales 45–51; vertebrae 10 + 16.

Twenty-six of the 27 *P. multifasciatus* from which I obtained meristic data had dorsal finray counts of X, 15 and anal finray counts of III, 7.

DIAGNOSTIC CHARACTERS. *Pronotogrammus multifasciatus* is the only eastern North Pacific anthiin with completely scaled maxillary, mandible, and anterior part of the face and head. It also differs from the other three species in having 45 to 51 pored lateral-line scales and an elongate, oval patch of granular teeth on the tongue. It is similar to *P. eos* in lacking an elongate,

filamentous third dorsal spine but differs in having a shorter maxillary and shorter rays in the second dorsal and anal fins (Table 1). *P. multifasciatus* also has a greater number of pectoral rays than *P. eos*, although one of the 27 specimens (LACM 8836) had 18 rays in the left pectoral and 19 in the right.

MAXIMUM SIZE. The largest individual I could find was 205 mm SL (262 mm total length [TL]).

RANGE. Portuguese Bend, Los Angeles Co., California (34° N), to the region off Talara in northern Peru (4° S); 40 to 205 meters.

DISCUSSION. Gill's (1863) description of *P. multifasciatus*, based on a 50-mm (2-inch) specimen collected by John Xantus at Cape San Lucas, contained very little information that could be used to distinguish this species from other eastern North Pacific anthiins. He did note that none of the dorsal spines was especially elongate or filamentous, but this would also be true for a 50-mm long *Hemanthias* and was not of diagnostic value. His pored lateral-line scale count (45) was the only character that could be used to separate this fish from other eastern North Pacific anthiins.

Jordan and Evermann (1896) apparently based their generic description on *P. eos* because they reported that *Pronotogrammus* lacks teeth on the tongue and has a "naked top of head and maxillary." Their account of the species duplicates Gill's (1863) description of the holotype, which—until then (1896)—was the only known specimen. Three years later, Garman (1899) listed three *Albatross* stations where *P. multifasciatus* had been taken and noted (for the first time) that the entire head and maxillary were covered with scales and that the tongue had a group of teeth on it.

Walford (1974) reported that *P. multifasciatus* was known from "Cape San Lucas to the Galapagos Islands," but I have been unable to locate a single specimen in a west coast collection that had been identified as *P. multifasciatus*.

An inquiry to the National Museum of Natural History regarding the holotype of *P. multifasciatus* (USNM 2762) brought the reply that "the brown body, without skin, scales, head or tail is about 30 mm long" (Bruce B. Collette, pers. commun.). A radiograph of this fragment revealed 16 caudal vertebrae, which eliminated both species of *Hemanthias* but not *P. eos*. Gill's (1863) pored lateral-line scale count eliminated *P. eos*, however.

Anthias gordensis Wade, 1946, and *Holanthias sechurae* Barton, 1947, can not be distinguished and are here considered junior synonyms of *Pronotogrammus multifasciatus*. *Pronotogrammus* Gill, 1863, has priority over *Holanthias* Günther, 1868.

Pronotogrammus eos Gilbert, 1890

Figure 2

Pronotogrammus eos Gilbert, 1890:100 (original description, type locality: Panama).

Anthias eos (Gilbert). Boulenger, 1895 (generic reassignment, list).

MERISTIC DATA. D. X, 14–15; A. III, 7–8; P. 17–18; GR 11–13 + 27–30 = 38–43; pored lateral-line scales 36–40; vertebrae 10 + 16.

Three of the 30 individuals I examined to obtain meristic data

had dorsal finray counts of X, 14, and one had an anal finray count of III, 7.

DIAGNOSTIC CHARACTERS. *Pronotogrammus eos* differs from the other three eastern North Pacific anthiins in having only 36 to 40 pored lateral-line scales and by its large eye, comprising 12.0 to 15.9 percent of SL.

MAXIMUM SIZE: The largest individual I examined was 153 mm SL (207 mm TL).

RANGE. Mid-Gulf of California (28° N) to Panama (7° N); 115 to 325 meters.

DISCUSSION. This species lacks several characters that are of generic magnitude and diagnostic for *Pronotogrammus* (e.g., fully scaled maxillary, mandible, and anterior face and head; patch of granular teeth on tongue; and salient features on its otoliths). Its proper generic assignment must await a revision of eastern Pacific Anthiinae that currently is in progress (Phillip C. Heemstra, pers. commun.).

Hemanthias peruanus (Steindachner, 1874)

Figure 3

Anthias (Hemanthias) peruanus Steindachner, 1874:378 (original description, type locality: Paita, Peru).

Pronotogrammus peruanus (Steindachner). Jordan and Eigenmann, 1890:413 (generic reassignment, redescription).

Hemianthias peruanus Steindachner. Jordan and Evermann, 1896:1222 (subgenus to generic rank, spelling variant).

MERISTIC DATA. D. IX–X, 13–15; A. III, 7–9; P. 16–18; GR 9–10 + 22–24 = 31–34; pored lateral-line scales 52–59; vertebrae 11 + 15.

One of the 55 specimens from which I obtained meristic data had nine dorsal spines, the rest had ten. Forty-eight of these specimens had 14 dorsal soft rays, four had 13, and three had 15. Fifty of the 55 had anal finray counts of III, 8, two had counts of III, 7, and three had III, 9.

DIAGNOSTIC CHARACTERS. *Hemanthias peruanus* is the only eastern North Pacific anthiin in which the middle rays of each lobe of the caudal fin are the longest (not readily visible in specimens smaller than about 90 mm SL). It shares with *H. signifer* an elongate, filamentous third dorsal spine but lacks the antrorse spine that is found on the urohyal of *H. signifer* longer than about 70 mm SL. It also can be distinguished from *H. signifer* by gill raker, pectoral ray, and pored lateral-line scale counts, except at overlap numbers (Table 2).

MAXIMUM SIZE. The largest individual I examined was 305 mm SL (442 mm TL).

RANGE. Hipolito Bank, Baja California Sur (27° N), to Trujillo, Peru (8° S); 10 to 117 meters. Hildebrand (1946) reported the southern range as "Chile," but I could not verify any records south of Trujillo, Peru.

Hemanthias signifer (Garman, 1899)

Figure 4

Centristhmus signifer Garman, 1899:48 (original description, type locality: off Panama at 7° 33' N, 78° 34' 20" W).

Hemianthias peruanus (non Steindachner). Wales, 1932:106 (first California record, misidentified, spelling variant).

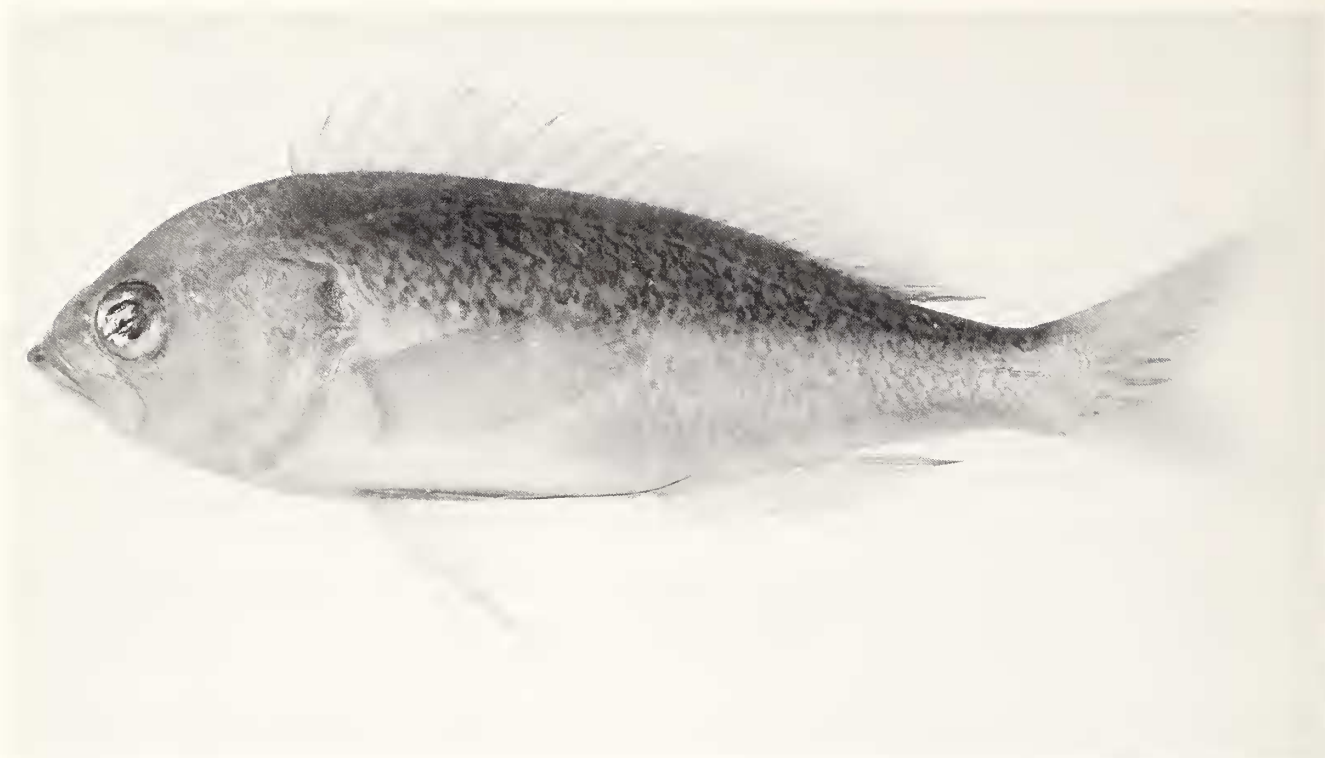


Figure 1. *Pronotogrammus multifasciatus*, 176 mm SL, Uncle Sam Bank, Baja California (LACM 38671). Photograph by Paul Gregory.



Figure 2. *Pronotogrammus eos*, 129 mm SL, middle of mouth of Gulf of Nicoya, Costa Rica (LACM 33827). Photograph by Richard Meier.

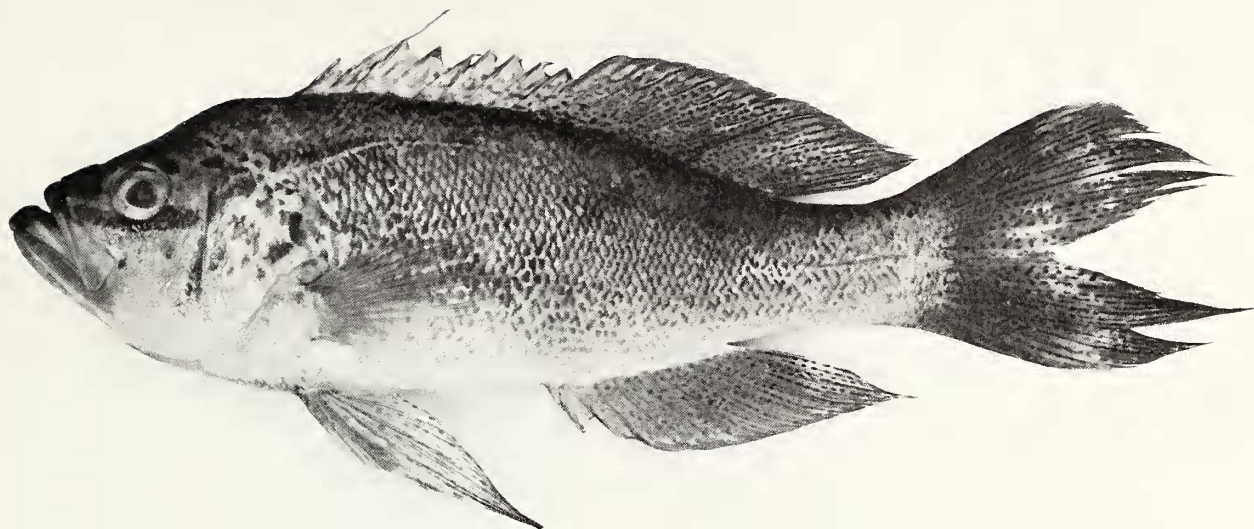


Figure 3. *Hemanthias peruanus*, 267 mm SL, Hipolito Bank, Baja California (LACM W61-124). Photograph by Jack W. Schott.

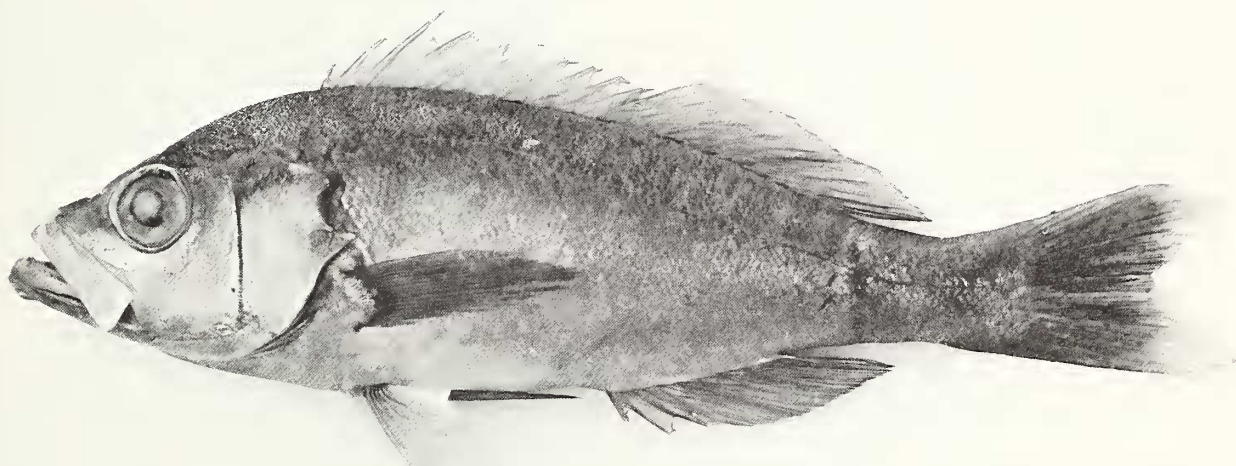


Figure 4. *Hemanthias signifer*, 201 mm SL, off San Onofre, California (LACM 36401). Photograph by Jack W. Schott.

Table 2. Comparison of pectoral rays, gill rakers and pored lateral-line scales for *Hemanthias peruanus* and *Hemanthias signifer*.

	<i>H. peruanus</i>	<i>H. signifer</i>
Pectoral rays		
16	1	—
17	27	—
18	23	11
19	—	22
20	—	2
Total gill rakers		
31	13	—
32	19	—
33	17	1
34	2	14
35	—	9
36	—	10
37	—	0
38	—	1
Pored lateral-line scales		
52	11	—
53	15	—
54	11	—
55	8	—
56	2	—
57	2	—
58	1	—
59	1	2
60	—	2
61	—	3
62	—	0
63	—	7
64	—	2
65	—	5
66	—	7
67	—	3
68	—	3
69	—	1

MERISTIC DATA. D. X, 13–14; A. III, 7–9; P. 18–20; GR 9–11 + 24–27 = 33–38; pored lateral-line scales 59–69; vertebrae 11 + 15.

One of the 35 specimens from which I obtained meristics had a dorsal finray count of X, 13; all others had X, 14. Except for one individual with seven anal soft rays, and one with nine, this count invariably was eight.

DIAGNOSTIC CHARACTERS. *Hemanthias signifer* longer than about 70mm SL have an anteriorly projecting spine on the urohyal (easily observed by lifting either gill cover) that is unique among anthiins. In the eastern North Pacific, it shares with *H. peruanus* an elongate, filamentous third dorsal spine, but most individuals can be distinguished by counting pored lateral-line scales, pectoral rays, and gill rakers (Table 2). In addition, the outermost rays of both lobes of the caudal fin are the longest—at

all sizes for *H. signifer*, but only for specimens smaller than about 90 mm SL for *H. peruanus*.

MAXIMUM SIZE. The largest individual I examined was 296 mm SL (385 mm TL).

RANGE. Playa del Rey, California (34° N), to off Paita, in northern Peru (5° S); 23 to 306 meters.

DISCUSSION. The unique antrorse spine on the urohyal of this species appears to have been Garman's (1899) primary reason for establishing the genus *Centristhmus*. His *C. signifer*, however, is so closely similar to *Hemanthias peruanus* that, until the spine first appears on the urohyal (at about 70 mm SL), one must count pectoral fin rays, gill rakers, and pored lateral-line scales to determine which of the two species is at hand. In fact, juveniles of both species often have been taken in the same trawl haul, but until now, *H. signifer* seldom was recognized (e.g., SIO 68–66 from La Paz Bay, Gulf of California, in 32 to 42 fathoms [58–77 meters] contained 158 fish labeled *H. peruanus*, but critical examination revealed that only 89 were *H. peruanus* whereas the other 69 were *H. signifer*, none of which had an antrorse spine on the urohyal). Obviously, *Centristhmus* must be considered a junior synonym of *Hemanthias*.

Norma Chirichigno (pers. commun.) described *Hemanthias delsolari* n. sp. in her unpublished thesis (1970), and subsequently (Chirichigno, 1974:289) used the name in her "Clave para identificar los peces marinos del Peru." While her paper was in press, she learned that her *H. delsolari* was a synonym of *Centristhmus signifer* (see last page of "addenda" in Chirichigno, 1974), so the name does not appear elsewhere in reports on the marine fish fauna of Peru. Thus, because *H. delsolari* fails to meet requirements of establishing a new species as spelled out in the International Code of Zoological Nomenclature, it has no status in taxonomic literature.

Wales (1932) reported *Hemianthias* [sic] *peruanus* from Californian waters (based upon a specimen caught off Redondo Beach), but the reported pored lateral-line scale count was diagnostic for *H. signifer*, and examination of the fish in the CAS collection (SU-CAS 24812) revealed the antrorse spine on the urohyal. In February 1977, two additional specimens of *H. signifer* were caught off California: one off San Onofre (LACM 36401) and the other off Playa del Rey (LACM 36944).

OTOLITHS

In the eastern North Pacific, anthiins apparently are a choice prey for many predators. At least two specimens of *Pronotogrammus multifasciatus* in west coast collections came from stomachs of larger fish. One (SIO 59–326) came from the stomach of a yellowtail, *Seriola lalandi lalandi*, and the other (LACM W53–313) from a spotted cabrilla, *Epinephelus analogus*. Otoliths of all four species commonly are found in scats of sea lions, *Zalophus californianus*, that haul out on Islotes Island (north of La Paz), Gulf of California (unpublished data in my files).

When conventional identification characters have disappeared from prey species because of digestive action of the predator, otoliths (sagittae) usually can be found and offer an excellent opportunity to identify the prey to genus or species. Because of this, and the apparent importance of anthiins in the food web,

sagittae of the four eastern North Pacific anthiins are illustrated (Fig. 5).

In identifying otoliths, characters on the inner faces (grooved side) are extremely important for determining family and genus. Overall otolith shape, ratio of height into length, marginal ornamentation, and similar characters are of importance primarily at species level. The illustrated otoliths (Fig. 5) are all inner faces,

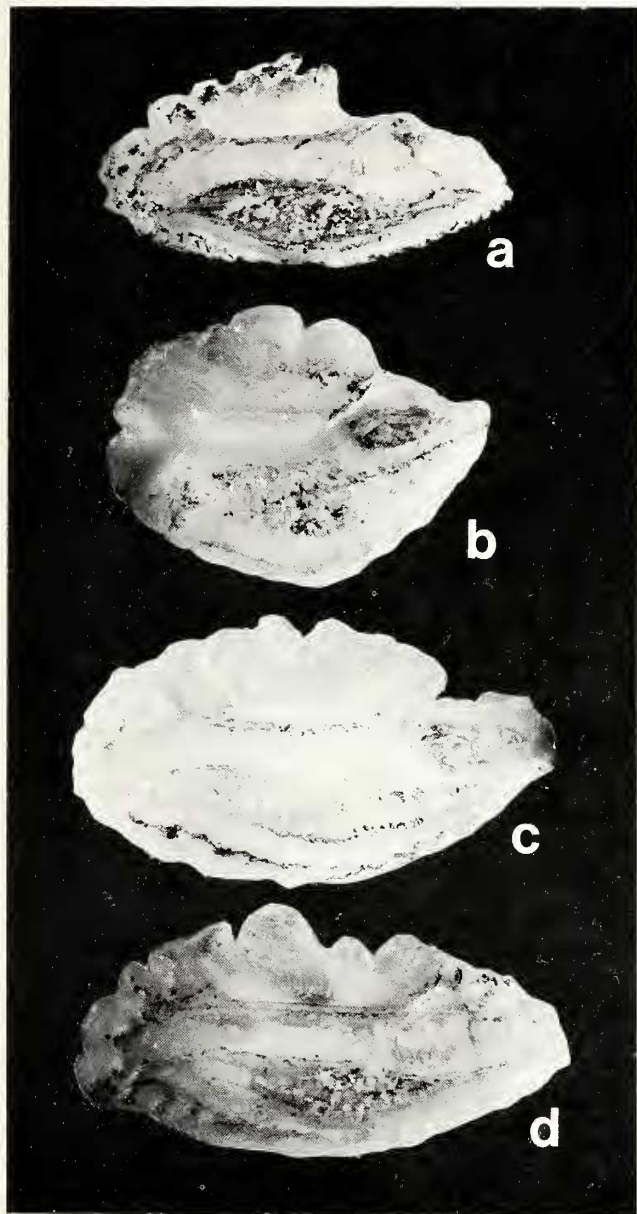


Figure 5. Inner faces of left otoliths (sagittae) of the four eastern North Pacific anthiins: **Part a**, *Pronotogrammus multifasciatus*, 9.1 by 4.6 mm (length and height), from fish 205 mm SL; **Part b**, *Pronotogrammus eos*, 8.7 by 6.3 mm, from fish 130 mm SL; **Part c**, *Hemanthias peruanus*, 10.9 by 6.0 mm, from fish 213 mm SL; **Part d**, *Hemanthias signifer*, 11.0 by 5.5 mm, from fish 256 mm SL. Photographs by Richard Meier.

and all visible features are quite typical of sagittae for other individuals of the same species.

Sagittae of all four anthiins have a "channel" just above the ventral margin and roughly parallel to it; the channel is deepest in *P. multifasciatus* and least developed in *H. signifer*.

In all but *P. eos*, the cauda (posterior portion of sulcus or central groove) flexes slightly downward at its posterior end, and the ostium (anterior portion of sulcus) comprises about 37 to 38 percent of the otolith length. In *P. eos*, the cauda is expanded and indistinct posteriorly, and the ostium comprises slightly more than 40 percent of otolith length. Also, in *P. eos*, otolith height comprises more than 70 percent of otolith length, compared with 50 to 55 percent in the other three species.

In all four species, the crista superior (ridge bordering the sulcus dorsally) is extremely strong and distinct, and the area of the otolith dorsal to it is shallowly to deeply concave. The rostrum (anteroventral projecting portion of the otolith) is least distinct on sagittae of *H. signifer*. When placed outer face down on a flat surface, otoliths of *Hemanthias* are more bowed than those of *Pronotogrammus*; *P. eos* sagittae are the least convex when viewed in this aspect. Otoliths from juveniles usually have margins that are much more lobular, incised, or frilly than is indicated on the illustrated sagittae, which are all from adults.

Sagittae of *P. eos* (five pairs measured) comprise about 6.5 to 7 percent of fish SL, whereas those of the other three species (five pairs of each measured) comprise between about 4 and 5.3 percent.

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