

A Revision of the Labrid Fish Genus *Pseudojuloides*, with Descriptions of Five New Species¹

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ABSTRACT: The Indo-Pacific labrid fish genus *Pseudojuloides* Fowler is characterized chiefly by a slender body (depth usually 4–5 in standard length), IX, 11 or 12 dorsal rays, a single pair of canine teeth anteriorly in jaws followed by incisiform teeth, and a small truncate or near-truncate caudal fin. Eight species are recognized: *P. cerasinus* (Snyder), ranging widely from East Africa to eastern Polynesia; *P. argyreogaster* (Günther) from the western Indian Ocean; the related *P. elongatus* Ayling and Russell, which exhibits an antitropical distribution in the western Pacific (Japan, Australia, and New Zealand); and the five new species *P. atavai* from southeast Oceania, *P. pyrius* from the Marquesas Islands, *P. mesostigma* from the Philippine Islands, and *P. xanthomos* and *P. erythrops* from Mauritius. These fishes are small (only two species are known to exceed 100 mm standard length), bottom-dwelling (frequently on rubble or weedy substrata), and most often found at depths of about 10 to 60 m. All appear to be sexually dichromatic (*xanthomos* is known only from a single male specimen); the females of five of the species are uniform light red and difficult to distinguish from one another.

THE INDO-PACIFIC LABRID GENUS *Pseudojuloides* was established by Fowler (1949) for a slender, colorful wrasse described from a single specimen from the Hawaiian Islands as *Pseudojulis cerasina* by Snyder (1904). In their *Handbook of Hawaiian Fishes*, Gosline and Brock (1960:230) reported four specimens of this species which were speared in about 100 feet of water. The two larger specimens were slaty blue with stripes on the side, and the two smaller ones were red with a yellowish tail. Of the latter two they wrote, "It is quite possible that these represent a different species, although we can find no morphological differences between them." Randall (1973) included the species in a checklist of fishes of the Society Islands, and Allen et al. (1976) recorded it from Lord Howe Island.

Ayling and Russell (1977) reviewed *Pseudojuloides*, extended the range of *P. cerasinus* to the Loyalty Islands, Great Barrier Reef, southern Japan, and the Ryukyu Islands (the last two localities via communication from John W. Shepard), and described a second species, *P. elongatus*, from New Zealand, Australia, and southern Japan. They showed that both species are sexually dichromatic. In their review they overlooked a third species which belongs in the genus, *P. argyreogaster* (Günther in Playfair and Günther 1866), described from Zanzibar in 1866.

Collections of reef fishes in the Indo-Pacific region by the senior author and associates have resulted in specimens of five new species of *Pseudojuloides*, thus bringing to eight the total number of fishes in this genus.

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METHODS

Standard length (SL) is measured from the most anterior end of the snout (either upper lip or upper canines, whichever is more an-

terior) to the base of the caudal fin. Head length is measured from the same anterior point to the end of the opercular flap. Body depth is the greatest depth taken from the base of the dorsal spines to the ventral margin of the abdomen (though correcting for any obvious malformation of preservation). Width of body is measured immediately posterior to the gill opening. Orbit diameter is the greatest fleshy diameter. Interorbital width is the least bony width. Depth of caudal peduncle is the least depth; length of caudal peduncle is the horizontal distance between verticals at the rear base of the anal fin and base of caudal fin. The length of the fin spines and rays are measured from their distal tips to the extreme bases (from X rays or by transmitting bright light through bases of fins). Pectoral fin length is taken from the distal tip of the longest ray to the extreme base of that ray.

The upper rudimentary pectoral ray is included in the count of this fin. Gill-raker counts include all rudiments. Scales above the lateral line are counted above the first pored scale diagonally upward and posterior to the base of the first dorsal spine. Median predorsal scale counts for species of *Pseudojuloides* are only approximate counts because these scales are not in a regular series.

Type specimens have been variously deposited in the following institutions: Australian Museum, Sydney (AMS); Bernice P. Bishop Museum, Honolulu (BPBM); British Museum (Natural History), London [BM(NH)]; California Academy of Sciences, San Francisco (CAS); Museum National d'Histoire Naturelle, Paris (MNHN); and U.S. National Museum of Natural History, Washington, D.C. (USNM). Specimens have also been examined from the J. L. B. Smith Institute of Ichthyology, Rhodes University, Grahamstown, South Africa (RUSI) and the Tanaka Memorial Biological Station, Miyake-jima, Izu Islands, Japan (TMBS).

In the descriptions of the new species, data in parentheses refer to paratypes. Characters given in the description of the genus which are common to all species are generally not repeated in the individual species descriptions or diagnoses. More measurement data are

presented in Tables 2–6 than are summarized in the species descriptions. Proportional measurements in the text are rounded to the nearest .05.

GENUS *Pseudojuloides*

Pseudojuloides Fowler, 1949:119 (type species, *Pseudojulis cerasina* Snyder, by original designation and monotypy)

Description

Dorsal rays IX, 11 or 12 (last branched to base); anal rays III, 12 (last branched to base); pectoral rays 12 or 13 (upper ray rudimentary, second unbranched); pelvic rays I, 5; principal caudal rays 14, the median 12 branched; upper procurent caudal rays 6; lower procurent caudal rays 6 (except *P. argyreogaster* with 5); lateral-line scales 27, plus 1 enlarged pored scale posterior to hypural plate; scales above lateral line to origin of dorsal fin 3–5; scales below lateral line to origin of anal fin 7–9; circumpeduncular scales 16; gill rakers 14–19 (see Table 1); branchiostegal rays 6; vertebrae 15; predorsal bones 1.

Body elongate, the depth 3.8–5.6 in SL, and slightly to moderately compressed, the width 1.5–2.5 in depth; head pointed, the length 2.85–3.35 in SL; dorsal profile of head slightly to moderately convex in a smooth curve; snout moderately long, 2.5–3.55 in head; depth of caudal peduncle

TABLE 1
GILL-RAKER COUNTS OF SPECIES OF *Pseudojuloides*

	GILL RAKERS					
	14	15	16	17	18	19
<i>P. cerasinus</i>		3	9	12	6	1
<i>P. elongatus</i>				3	3	2
<i>P. argyreogaster</i>				1	2	1
<i>P. atavai</i>			5	5	3	
<i>P. xanthomos</i>				1		
<i>P. pyrius</i>	1	5	1	1		
<i>P. erythrops</i>			3	2		
<i>P. mesostigma</i>			2	3		

varying from slightly greater than peduncle length to about equal to peduncle length, the least depth 2.4–3.65 in head.

Mouth small, terminal or nearly so, the gape horizontal to slightly oblique; a pair of strongly projecting canine teeth anteriorly in jaws, the uppers slightly outcurved, the lowers fitting inside uppers when mouth closed; side of jaws with chisel-like incisiform teeth (except males of *P. mesostigma*, which have small conical teeth); a canine tooth at corner of mouth only of large adults of *P. argyreogaster* and *P. elongatus*. Paired upper pharyngeal plates triangular with teeth in 4 or 5 anterior to posterior rows, those along the anterolateral side bluntly conical, the remaining teeth molariform (none notably enlarged); slender median anterior limb of T-shaped lower pharyngeal plate with a single (sometimes irregular) row of conical teeth; broad transverse limb with numerous teeth in about three rows, the median tooth in the posterior row a slightly enlarged oval-shaped molar, the adjacent teeth also oval-shaped molars but slightly smaller, the more lateral teeth of last row bluntly conical; remaining teeth small molars except those laterally in anterior row, which are bluntly conical (pharyngeal dentition of *P. cerasinus* and *P. elongatus* illustrated by Ayling and Russell 1977: figs. 1–6).

Preopercular margin smooth, the upper part usually free to between level of corner of mouth and lower edge of orbit, and the lower part usually free to or anterior to front edge of orbit. Gill membranes broadly attached to isthmus with a free fold across it.

Nostrils small, in front of upper part of eye, the anterior in a short membranous tube, the posterior nearly covered by a dermal flap from anterior edge.

Lateral line continuous, angling sharply downward beneath soft portion of dorsal fin

to straight peduncular portion; lateral-line scales with a single pore.

Scales cycloid, moderately large except those on thorax and nape, which are much smaller (particularly anteriorly on nape and ventroanteriorly on thorax); head naked; fins naked except basal portion of caudal fin and two scales midventrally at base of pelvic fins.

Dorsal and anal spines progressively longer posteriorly, the ninth dorsal spine 2.65–3.55 in head and the third anal spine 2.9–4.6 in head; longest dorsal and anal soft rays not much longer than longest spines; caudal fin truncate to slightly rounded in females, slightly rounded to slightly emarginate or double emarginate in males; caudal fin relatively small, 1.3–1.9 in head; pectoral fins small, 1.6–2.3 in head; origin of pelvic fins below lower base of pectorals, their length varying from 1.45–2.9 in head.

Remarks

The species of *Pseudojuloides* are small fishes; the largest specimen measures 126.5 mm SL. All appear to be protogynous and monadric. The males of *P. cerasinus* and *P. elongatus*, at least, maintain harems (Jack T. Moyer, personal communication).

Of the genera of Labridae, *Pseudojuloides* seems closest to *Stethojulis*, sharing with it the small incisiform teeth on the side of the jaws, a small caudal fin, and nearly the same fin-ray and scale counts. *Stethojulis* differs significantly, however, in lacking anterior canine teeth, in not having small scales on the thorax and nape, and in having a deeper body.

The first species of *Pseudojuloides* to be described, *P. argyreogaster* Günther, was placed in the genus *Pseudojulis* Bleeker. Randall (1978), however, has shown that *Pseudojulis* is a probable synonym of *Halichoeres*.

KEY TO THE SPECIES OF *Pseudojuloides*

- 1a. Dorsal soft rays 12; pectoral rays 12; no median predorsal scales (4 to 6 diagonal rows of scales on side of nape anterior to a vertical at origin of dorsal fin, but none in median line) 2

- 1b. Dorsal soft rays 11; pectoral rays 13; small median predorsal scales present, extending anteriorly nearly to a vertical at rear edge of orbit 3
- 2a. Suborbital pores from below anterior edge of orbit to midposterior level of orbit 8–12; membranes of spinous portion of dorsal fin about 20% higher than spine tips; females with a small faint dusky spot dorsally on pectoral base and in upper pectoral axil; males with a large, horizontally elongate black patch on midside of body between soft portions of dorsal and anal fins (western Indian Ocean) *argyreogaster*
- 2b. Suborbital pores 5–7; membranes of spinous portion of dorsal fin less than 10% higher than spine tips; females without a dusky spot dorsally on pectoral base and axil; males without an elongate black patch on body between soft portions of dorsal and anal fins (Australia, New Zealand, and southern Japan) *elongatus*
- 3a. Body not very elongate, the depth 3.8–4.7 in SL; body moderately compressed, the width 1.8–2.4 in depth; depth of caudal peduncle greater than length of peduncle (measured horizontally from rear base of anal fin to base of caudal fin); the least depth 2.4–3.2 in head 4
- 3b. Body very elongate, the depth 5.0–5.4 in SL; body slightly compressed, the width 1.5–1.7 in depth; depth of caudal peduncle about equal to length of peduncle, the least depth 3.25–3.65 in head 7
- 4a. Caudal fin very short, its length 1.55–1.9 in head; ninth dorsal soft ray usually longest; snout 2.85–3.3 in head; females entirely pale in preservative (no females of *xanthomos* available, but probably also uniformly pale); males not colored as in 4b 5
- 4b. Caudal fin not very short, its length 1.3–1.5 in head; first dorsal soft ray longest; snout 2.7–2.9 in head; females with a narrow dark brown band (black and bright blue in life) from eye to upper base of caudal fin, the body brown above this band (except pale zone middorsally) and pale below; males dark brown posteriorly (bluish black in life), except for a large triangular pale area posteriorly in caudal fin, the body light brown anteriorly (light red with yellow spots in life); head of male gray with a reticulum of narrow brown bands (orange-yellow with violet bands in life) (S.E. Oceania) *atavai* n. sp.
- 5a. Pelvic fins relatively long, 1.45–2.0 in head, in males extending posterior to origin of anal fin; males pale in preservative (in life bright yellow dorsally on body and nape, bright red ventrally, the head red) with a black area anteriorly in dorsal fin, a black submarginal line in dorsal and anal fins, and a blackish line forming an arc posteriorly in caudal fin (Marquesas Islands) *pyrius* n. sp.
- 5b. Pelvic fins not long, 1.8–2.3 in head, rarely reaching anus; males not colored as in 5a ... 6
- 6a. Caudal fin slightly rounded to slightly double emarginate; series of pores along free margin of preopercle 10–13; median predorsal scales about 8–11; males brown in preservative, darker dorsally (olive green in life) than ventrally (blue in life), with a midlateral double-colored stripe (bright blue and yellow in life); posterior part of caudal fin black (edged in pale blue in life) (Indo-Pacific) *cerasinus*
- 6b. Caudal fin truncate; series of pores along free margin of preopercle 9; median predorsal scales about 12; male uniformly pale except for a black area on first interspinous membrane of dorsal fin (in life orangish gray, shading to yellowish ventrally, with a yellow band in shoulder region (Mauritius) *xanthomos* n. sp.
- 7a. Snout 3.25–3.55 in head; pelvic fins 2.25–2.4 in head; males with conical teeth along side of jaws; males with a large black area on upper side of middle of body, extending into dorsal fin; caudal fin of males black with a broad whitish posterior border (Philippine Islands) *mesostigma* n. sp.
- 7b. Snout 3.0–3.15 in head; pelvic fins 2.05–2.15 in head; males with incisiform teeth along side of jaws; males without a large black area in middle of body and dorsal fin; caudal fin of males blackish on margins (broader basally) with a large subtriangular pale area in center of fin (Mauritius) *erythropros* n. sp.

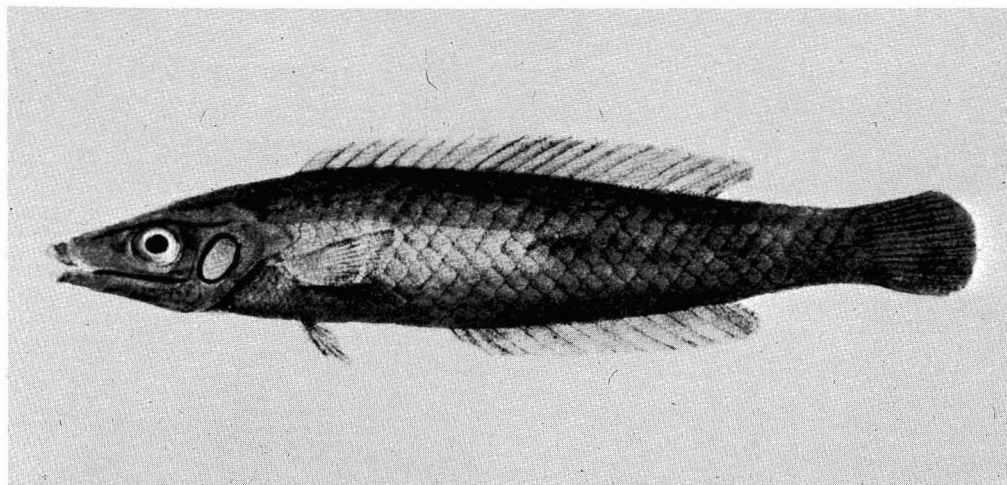


FIGURE 1. *Pseudojuloides argyreogaster*, lectotype, 74.8 mm SL, BM(NH) 1867.3.7.512–12, Zanzibar (after Playfair and Günther 1866).

Pseudojuloides argyreogaster (Günther)

Figure 1

Pseudojulis argyreogaster Günther in Playfair and Günther, 1866:95, pl. 12, fig. 2 (type locality, Zanzibar)

Material Examined

Zanzibar: BM(NH) 1867.3.7.512–12, syntypes, 3:56.0–74.8 mm SL. Aldabra: BPBM 21078, 4:67.6–87.5 mm SL, West Island.

Diagnosis

Dorsal rays IX,12; anal rays III,12; pectoral rays 12; lower procurent caudal rays 5 (6 in other species); scales above lateral line to origin of dorsal fin 3; scales below lateral line to origin of anal fin $7\frac{1}{2}$ –8; no median predorsal scales (4–6 diagonal rows of small partially embedded scales on side of nape anterior to origin of dorsal fin); gill rakers 17–19; suborbital pores from below anterior edge of orbit to midposterior level of orbit 8–12; 2 or 3 (usually 2) pores nearly directly anterior to anterior nostril (none diagonally

anterior to nostril, either upward or downward).

Body very elongate, the depth 4.7–5.1 in SL, and somewhat compressed, the width 1.95–2.2 in depth; head length 3.0–3.2 in SL; snout moderately long, 2.5–2.7 in head; eye relatively small, the orbit diameter 1.9–2.25 in snout (5.0–5.8 in head); dorsal spines progressively longer, the ninth 2.9–3.5 in head; membranes of spinous portion of dorsal fin extending about 20 percent higher than spine tips; longest dorsal soft ray 2.65–2.75 in head; caudal fin rounded, 1.45–1.6 in head; pectoral fins 1.95–2.25 in head; pelvic fins short, not approaching anus, 2.45–2.9 in head.

Color of females in alcohol: pale, a little darker dorsally than on side or ventrally; a longitudinal series of small faint dusky spots on caudal peduncle, one on each lateral-line scale; a faint dusky spot at upper edge of pectoral base and dorsally in axil.

Color of females from Aldabra in life (from field notes of the collector, D. R. Robertson): dull green; the cheek and ventral part of head paler than body and more yellowish; a few small blackish dots on caudal peduncle; iris orange with a bluish white ring; dorsal fin lime green with an

orange tint; anal fin with orangish rays and hyaline membranes; caudal fin green with an orange tint; pectoral fins hyaline with an orange tint and a faint dark spot at top of base; pelvic fins hyaline with a fleshy pink tint.

Color of males in alcohol: brown on dorsal half of body (the pigment tending to concentrate into indistinct spots, generally one per scale), with a broad horizontally elongate black area on side of body between the soft portions of the dorsal and anal fins (posterior end of black area coinciding with deflected part of the lateral line and the anterior end below base of second or third dorsal soft ray); faint banding on head (see life color note below); fins pale except for a brown submarginal line in dorsal and anal fins and faint diagonal dark bands in the dorsal.

Color of males from Aldabra in life (from field notes of D. R. Robertson): dull green, more brown dorsally and yellowish ventrally on abdomen; scales dorsally on body with pale purplish edges; an elongate black area on side posterior to center of body containing a few purplish pink spots (and more around its edges); a diagonal blue-pink band beneath pectoral fin; head with narrow blue-pink bands as follows: one from anterior interorbital space above eye following a series of pores and ending above first lateral-line scale; a horizontal one passing from upper eye through nostrils to pores anterior to nostrils; one commencing below corner of mouth, passing ventral to eye and ending just in front of upper preopercular margin; one on postorbital head centered behind eye nearly forming an enclosed ellipse (more irregular on some specimens than others), one free end on opercular flap (where slightly expanded) and the other near upper end of gill opening; some specimens with a ventral extension on opercle from the near-ellipse; iris orange with a blue ring; dorsal fin pale orange with diagonal gray lines; anal fin orange-green with small orange spots, an outer pale orange band, and thin blue edging; caudal fin pale orange; pectoral fins hyaline pink with a pink spot at top of base; pelvic fins pink.

Remarks

The three syntypes of *Pseudojuloides argyreogaster* were examined at the British Museum (Natural History). The largest, 74.8 mm SL, seems to be the illustrated specimen and is here designated the lectotype. These specimens have a silvery white area over the cheeks, thorax, and abdomen (perhaps as a result of initial preservation in alcohol); this appears to be the basis for the specific name.

In the color plate of this species in Playfair and Günther (1866) (herein reproduced in black and white as Figure 1), the markings on the head are shown in black whereas they were described by Günther as violet.

The British Museum specimens have no canine at the corner of the mouth, but Bishop Museum specimens of 83 and 87.5 mm in SL from Aldabra have the canine, and it is just developing on an 85-mm specimen; the canine is absent on the fourth specimen of this lot, a female 67.6 mm SL.

These four fish were speared by D. R. Robertson in grass beds on the outer edge of the intertidal seaward reef flat of Aldabra Atoll in front of the Royal Society's Research Station on West Island during the period August–December, 1975. The species was not common at Aldabra; Robertson saw less than 20 during his six months' stay on the atoll.

P. argyreogaster is most closely related to *P. elongatus* (see Remarks for the latter).

Pseudojuloides elongatus Ayling and Russell

Figures 2, 3

Pseudojuloides elongatus Ayling and Russell, 1977:174, figs. 4–6, 8–10 (type locality, Poor Knights Islands, New Zealand)

Material Examined

Australia: BPBM 18022, paratype, 67.0 mm SL, N.S.W., Sydney Harbor, Balmoral Beach; BPBM 18015, 56.5 mm SL, N.S.W., Sydney Harbor, Vacluse Bay. Japan: BPBM 23004, 2:81.5–94.0 mm SL, Izu Islands, Miyake-jima; BPBM 26363, 117.0 mm SL,

Miyake-jima; TMBS 750819-1, paratype, 115 mm SL, Miyake-jima; TMBS 750619, 103.2 mm SL, Miyake-jima; TMBS 760830-1, 67.5 mm SL, Miyake-jima.

Diagnosis

Dorsal rays IX,12; anal rays III,12; pectoral rays 12; scales above lateral line to origin of dorsal fin 3; scales below lateral line to origin of anal fin $7-7\frac{1}{2}$; no median predorsal scales (5 or 6 diagonal rows of small partially embedded scales on side of nape anterior to origin of dorsal fin); gill rakers 17-19 (Ayling and Russell recorded only 16); suborbital pores from below anterior edge of orbit to midposterior level of orbit 5-7; 2-4 pores nearly directly anterior to anterior nostril (none diagonally anterior to nostril, either upward or downward).

Body very elongate, the depth 4.2-5.6 in SL, and somewhat compressed, the width 1.9-2.5 in depth; head length 3.15-3.5 in SL; snout moderately long, 2.55-2.6 in head; eye relatively small, the orbit diameter 1.8-2.5 in snout (4.6-5.9 in head); dorsal spines progressively longer, the ninth 3.2-3.55 in head; membranes of spinous portion of dorsal fin less than 10 percent higher than spine tips; longest dorsal soft ray 2.4-2.7 in head; caudal fin rounded, its length 1.4-1.5 in head; pectoral fins 2.2-2.3 in head; pelvic fins short, not approaching anus, 2.2-2.5 in head.

Color of females in alcohol: uniformly pale except for a few tiny dots of dark pigment dorsally on body.

Color of females in life: varying from olivaceous to dull orange, the fins light yellowish brown to yellowish (the color mainly in the rays); an elongate patch of paler color may be present dorsally on abdomen (yellowish on dull orange individuals).

Color of males in alcohol: pale with a broad longitudinal dark band on upper side containing small pale spots; a large roundish black patch beneath proximal part of pectoral fin and extending dorsal to fin almost to level of upper end of gill opening (usually linking with dark longitudinal band of body); three brown bands radiating anteriorly from eye, the lowermost bifurcating

above corner of mouth, the upper branch extending to front of snout and the lower crossing chin; a near-horizontal brown band above eye which meets its counterpart from other side anteriorly on interorbital; two brown bands extending posteriorly from eye, the uppermost soon bifurcating, the upper branch reaching dorsal end of gill opening and the lower extending to edge of opercle; dorsal and anal fins pale with narrow diagonal transverse dark bands (darker on anal fin) and a submarginal dark line; caudal fin pale with a few brown spots or irregular vertical bands centrobasally in fin and narrow dark upper and lower margins; pectoral fins pale; pelvic fins pale with a faint dark lateral margin, sometimes with a few small brown spots.

Color of males in life from an aquarium photo by Rudie H. Kuiter of an individual from Sydney Harbor: dark olivaceous brown on the back shading on sides to olive (the edges of the scales more green, the centers more greenish yellow) with scattered small irregular blue spots and some small diffuse orange blotches (mainly in scale centers) on upper side; an area of bright orange-yellow containing two elongate bright blue spots beneath proximal part of pectoral fin; head olive brown dorsally, shading on side to orange and ventrally to pale greenish, with irregular, dark-edged, bright blue bands; a blackish smudge on opercular flap; lips dusky olive; iris orange-red with a middle ring of bright blue; dorsal fin rosy red basally, shading to light olive, with diagonal deep red bands, a hyaline margin, and a bright blue submarginal band; anal fin with alternating irregular diagonal bands of blue and red-edged olive, the margin hyaline with a bright blue submarginal band; caudal fin olive with some small bright blue spots basally, the upper and lower margins bright blue with a narrow red submarginal zone, the blue margins becoming submarginal at corners (the margin then hyaline), this marginal pattern faint on posterior border of fin; pectoral fins clear with dusky rays; pelvic fins pale blue with some cojoined orange-red spots centrally.

Color of a freshly caught male specimen

from Japan shown in Figure 3, from a photograph by John W. Shepard.

Remarks

This species occurs in the western Pacific and eastern Indian Ocean; it has an antitropical distribution (Randall, ms). It is known from New South Wales, Western Australia, Norfolk Island, northeastern New Zealand (range of latitude for all these localities, 20°28.5' S to 35°28.5' S) and the Izu Islands, Japan (34°05' N). It is a shallow-water species; the type specimens were all collected in the depth range of 5–15 m. The male specimen photographed by Rudie H. Kuiter (from which the color note in the diagnosis was made) was taken in 3 m. The senior author speared two female specimens at Miyake-jima, Izu Islands, in 15 m (the larger of the two is illustrated in Figure 2). These fish were found on a rocky bottom with a heavy growth of benthic algae and were adept at hiding within and moving through the algae.

The ground color of the Japanese specimens was dull orange and that of Australian and New Zealand specimens olive-green. More collecting is needed to ascertain if this is a north-south difference in coloration.

This is the largest species of the genus based on measurements of available specimens; the largest specimen is a male from New Zealand, 126.5 mm in SL.

Ayling and Russell stated that the posterior canine on the upper jaw (at the corner of the mouth) in *P. elongatus* is developed only in specimens greater than about 100 mm SL. However, the two Bishop Museum specimens from the Izu Islands, which measure 81.5 and 94 mm SL, both have this posterior canine.

P. elongatus is closely related to the allopatric *P. argyreogaster*. These two wrasses are readily distinguished from the remaining species of the genus by several characters as given in the Key. Both are residents of shallow water and seem to prefer substrata dominated by sea grass or algae. The other species are generally found in more than 20 m and are not closely associated with weedy bottoms.

P. elongatus is distinguished from *P. argyreogaster* in color and by having fewer suborbital pores, 5 instead of 6 lower precurrent caudal rays, less elevated spinous dorsal fin membranes.

Moyer (1980) described the reproductive behavior of *P. elongatus* at Miyake-jima, Izu Islands. Males are usually solitary and secretive during morning hours. At spawning time they begin searching for females; they advertise their presence by emerging from the algal cover in early afternoon hours with their heads upward. In midafternoon, ripe females with greatly swollen abdomens show interest in spawning by rising above the algae. A male approaches such a female, hovers above her and rapidly quivers his body; both fish then swim rapidly upward 1 to 1.5 m above the substratum to spawn. Unlike some wrasses for which sex change seems dependent on loss of a male in a harem, sex change in *P. elongatus* is related to age. Newly transformed males attempt to steal spawnings from the harems of dominant males, and fights are common until one of the males (usually the new male) is driven from the territory of the harem.

Pseudojuloides atavai n. sp.

Figures 4, 5; Table 2

Leptojulius sp. Randall, 1973:197 (Society Islands)

Holotype

BPBM 16902, male, 115.8 mm SL, Pitcairn Island, off West Harbor, bottom mainly coral rock and brown algae, 23 m, quinaldine, J. E. Randall, 1 January 1971.

Paratypes

Society Islands: BPBM 9088, 2:62.8–72.7 mm SL, Moorea, north side, outside barrier reef about 300 m E of Tareu Pass (to Papetoai Bay), 18 m, spear, J. E. Randall, 16 March 1957; USNM 222675, 100.5 mm SL, Moorea, outside barrier reef $\frac{1}{2}$ mile W of Tareu Pass, 15 m, spear, J. E. Randall,

TABLE 2

PROPORTIONAL MEASUREMENTS OF TYPE SPECIMENS OF *Pseudojuloides atavai*
EXPRESSED AS A PERCENTAGE OF THE STANDARD LENGTH

	HOLOTYPE			PARATYPES				
	BPBM 16902	BPBM 13527	BPBM 9088	BPBM 6913	BPBM 6913	BPBM 12955	BPBM 13696	USNM 222675
Standard length (mm)	115.8	49.9	62.8	67.2	73.5	77.1	97.4	100.5
Depth of body	25.1	23.0	23.1	24.8	23.0	23.4	24.4	22.6
Width of body	12.1	11.0	9.9	11.9	11.6	11.2	12.1	11.9
Head length	30.7	31.1	32.0	32.7	31.3	30.9	30.0	30.8
Snout length	10.8	11.5	11.0	11.9	11.2	10.6	10.9	11.0
Orbit diameter	4.9	7.5	6.4	6.2	5.9	5.9	5.0	5.5
Bony interorbital width	6.4	6.3	6.4	6.3	6.4	6.2	6.2	6.1
Depth of caudal peduncle	12.1	12.0	11.9	12.2	12.2	12.8	12.1	12.1
Length of caudal peduncle	9.8	9.8	10.4	10.3	10.9	10.4	11.2	11.1
Predorsal length	31.3	31.9	32.8	33.3	32.0	31.3	31.8	32.0
Preanal length	52.8	56.1	51.9	53.6	54.1	53.8	51.8	55.7
Prepelvic length	33.2	34.8	33.4	34.2	34.0	33.7	32.9	34.6
Length of caudal fin	21.6	22.0	22.5	22.2	21.1	23.0	21.8	24.1
Length of first dorsal spine	6.0	6.0	6.7	6.6	6.9	6.7	6.5	6.3
Length of ninth dorsal spine	8.6	11.2	11.1	11.6	11.0	11.7	10.3	broken
Length of longest dorsal ray	11.0	14.0	14.3	13.1	12.9	13.0	12.5	12.3
Length of dorsal fin base	58.4	54.1	54.5	55.1	55.5	57.2	56.5	55.2
Length of first anal spine	3.4	4.0	4.3	4.3	4.4	4.3	3.7	3.7
Length of second anal spine	6.8	7.6	7.5	7.4	8.0	7.7	6.8	7.0
Length of third anal spine	8.5	10.2	10.8	10.3	10.5	10.1	8.7	9.2
Length of longest anal ray	11.0	12.6	14.0	12.5	12.9	13.6	11.8	11.4
Length of anal fin base	38.3	34.1	35.0	36.5	35.4	36.7	34.1	34.3
Length of pectoral fin	17.9	18.0	19.1	18.3	17.7	18.0	17.7	19.1
Length of pelvic spine	9.5	10.2	11.1	11.6	10.9	11.7	10.8	10.2
Length of pelvic fin	14.4	14.6	15.9	14.9	14.7	16.9	15.6	15.2

24 March 1957; BPBM 6913, 2:67.2–73.5 mm SL, Tahiti, Papara, outside barrier reef $\frac{1}{4}$ mile E of Teavaraa Pass, 18.5–30.5 m, spear and rotenone, J. E. Randall and G. R. Allen, 26 February 1969. Tuamotu Archipelago: BPBM 13527, 49.9 mm SL, Gambier Group, Temoe Atoll, N side, outside reef in 12 m, spear, J. E. Randall, 16 December 1970. Pitcairn Group: AMS I.21716–001, 88.9 mm SL, Oeno Atoll, N side, outside reef, coral rubble and coral, 24.5 m, spear, J. E. Randall, 19 December 1970; BM(NH) 1980.9.17.3, 51.0 mm SL, same locality as preceding, 21 m, quinaldine, J. E. Randall, 19 December 1970; USNM 222676, 70.9 mm SL, same locality, off small boat passage, 22–26 m, spear and rotenone, J. E. Randall, D. B. Cannoy, and J. D. Bryant, 19 December 1970; AMS I.21717–001, 67.8 mm SL, Pitcairn, off The Rope, 27.5–30.5 m, rotenone, J. E. Randall, D. B. Cannoy, and

S. R. Christian, 23 December 1970; CAS 46961, 66.7 mm SL, Pitcairn, off Christian's Point, 12–18 m, rotenone, J. E. Randall, D. B. Cannoy, and S. R. Christian, 28 December 1970. Rapa: BPBM 12955, 77.1 mm SL, south side of Ruea Point, 14 m, spear, J. E. Randall and A. Sinoto, 9 February 1971; MNHN 1979–670, 64.0 mm SL, same data as preceding. Austral Islands: BPBM 13696, 97.4 mm SL, Rurutu, NE side off Moerai, 27.5 m, spear, J. E. Randall, 27 February 1971.

Description

Dorsal rays IX,11; anal rays III,12; pectoral rays 13; scales above lateral line to origin of dorsal fin 4 (4–5); scales below lateral line to origin of anal fin 9 (8–9); median predorsal scales about 10–12; gill rakers 18 (16–18).

Body elongate, the depth 4.0 (4.05–4.45)

in SL, and moderately compressed, the width 2.1 (1.9–2.35) in depth; head length 3.25 (3.05–3.35) in SL; snout 2.85 (2.7–2.9) in head; orbit diameter 6.3 (4.15–6.0) in head; interorbital space convex, the bony width 4.8 (4.85–5.2) in head; caudal peduncle deeper than long, the least depth 2.55 (2.4–2.7) in head.

Mouth small, terminal, the gape horizontal, the maxilla nearly reaching or just reaching a vertical through anterior nostril. Lips moderately fleshy, the upper partially overhanging the lower when mouth closed; inner surface of upper lip with 5 longitudinal plicae; lower lip with a prominent ventral-projecting flap along side of jaw. A pair of projecting canine teeth anteriorly in jaws, the upper pair outcurved, the lower pair fitting inside upper when mouth closed; chisel-like incisiform teeth along side of upper jaw 6 (2–6) and on side of lower jaw 8 (4–8); no canine tooth at corner of mouth (but a prominence posteriorly on upper jaw of some specimens appears to contain a developing tooth).

Upper preopercular margin free to between level of corner of mouth and lower edge of orbit; lower margin free anterior to a vertical at front edge of orbit—on some nearly to a vertical through anterior nostril. Gill rakers short, the longest on first arch (at angle) about one-fourth as long as longest gill filament.

Nostrils small, in front of upper fourth of orbit, the anterior in a short membranous tube which is elevated posteriorly; nostrils in alignment with upper edge of orbit and front of snout, the posterior in advance of a vertical through front of orbit by a distance about equal to internarial space; a pore in front of anterior nostril in line with nostrils and front of snout, with another anterior pore diagonally upward from anterior nostril and a third a short distance diagonally downward; suborbital pores from below anterior edge of orbit to midposterior level of orbit 4 (4–6), with another 3 pores of same series anterior to orbit; series of pores along free margin of preopercle 12 (10–12).

Lateral line continuous, nearly following contour of back to below base of eighth to

ninth dorsal soft rays where it is deflected sharply ventrally to straight peduncular portion.

Scales on side of thorax small, the largest about half as high as largest scales on side of body, becoming still smaller ventroanteriorly; head naked except for small scales on nape; median predorsal scales extending anteriorly nearly to a vertical at rear edge of orbit (closer to orbit than upper free end of preopercular margin); fins naked except for about basal two-fifths of caudal fin (scales on fin base progressively smaller posteriorly) and two midventral scales projecting posteriorly from base of pelvic fins (second scale very elongate and pointed).

Origin of dorsal fin above second lateral-line scale; dorsal spines progressively longer, the first 5.1 (4.55–5.2) and the ninth 3.55 (2.65–2.9) in head; first dorsal soft ray longest, 2.8 (2.2–2.5) in head; origin of anal fin below eighth to ninth dorsal spines; first anal spine very short, 9.0 (7.1–8.3) in head; second anal spine 4.5 (3.9–4.4) in head; third anal spine 3.6 (2.95–3.45) in head; second anal soft ray usually longest, 2.8 (2.25–2.7) in head; caudal fin truncate to slightly rounded in females, slightly double emarginate in males, the length 1.4 (1.3–1.5) in head; third pectoral ray usually longest (but second and fourth subequal), the length 1.7 (1.6–1.8) in head; pelvic fins short, not reaching anus, the length 2.15 (1.8–2.2) in head.

Color of holotype (a male) in alcohol: body dark brown (a little paler anterior to a line between bases of seventh dorsal spine and third anal spine, especially middorsally on nape and along base of dorsal fin), except for the pectoral region below level of upper end of gill opening, the abdomen, and the thorax, which are all light brown; head brownish gray with very irregular, narrow purplish brown bands forming a coarse reticulum; lips pale; fleshy rim of orbit narrowly dark brown except dorsoposteriorly; dorsal fin pale with a large blackish spot on each of first two interspinous membranes and a fainter smaller spot anteriorly on third membrane; anal fin dusky yellowish with a pale margin; caudal fin colored like body on basal scaled portion, the unscaled part with

blackish lobes (broad basally, narrowing to corners), leaving a large triangular area (rounded anteriorly) centroposteriorly in fin; paired fins pale.

Color of holotype in life: body, posterior to an approximate line between bases of seventh dorsal and third anal spines, bluish black (centers of scales deep blue, edges blackish); body, anterior to this demarcation, light red and orange-yellow, the red forming horizontal and vertical bands, isolating the yellow as spots; a narrow band of orange-red middorsally on nape extending posteriorly along base of dorsal fin and dorsally on caudal peduncle to upper caudal base; head orange-yellow with narrow dull violet bands forming a reticulum; lips whitish except base of upper lip where crossed by a violet band of reticulum; iris yellow, the edge of orbit narrowly blackish; dorsal fin yellow with a bluish white margin, the spinous portion with a narrow orange-red submarginal line; a black spot suffused with blue on each of first three interspinous membranes of dorsal fin; anal fin blackish, the rays and adjacent part of membranes reddish, the margin narrowly pale bluish; caudal fin blackish with a large triangular centroposterior area which grades from light orange anteriorly to translucent whitish posteriorly; pectoral fins transparent, the rays whitish edged with red; pelvic fins pale orangish.

Color of females in alcohol: a narrow dark brown band from behind orbit (about one-third from lower edge) to upper base of caudal fin; head (including snout above lower third of orbit) and body dorsal to band brown except middorsally where pale; head and body below band pale; orbit narrowly rimmed in dark brown except dorso-posteriorly; fins pale except for a large black spot anteriorly in dorsal fin covering most of first two membranes and part of the third.

Color in life of two female specimens (BPBM 9088, 62.8–72.7 mm SL) from Moorea: a dual-colored narrow band, black above and brilliant blue below, passing from eye to upper base of caudal fin (blue part of this band continuous with a white band which curves under orbit and runs to tip of

snout); body below this band whitish, the centers of scales whiter than edges; head below band also white but with a slight wash of salmon; body above band brownish red, becoming orange-red adjacent to dorsal fin (this region continuous anteriorly with a narrow pale orange-pink band middorsally on snout); dorsal fin pale red with narrow hyaline margin and a large black spot anteriorly, this spot covering most of first two interspinous membranes and part of the third; above this spot in fin a large area of yellow (leaving only a trace of red to separate the yellow from the hyaline margin); second and third dorsal spines blue where they pass through the black spot; anal fin hyaline yellow with a faint pale blue margin; caudal fin hyaline yellow (more yellow evident on lobes than medially in fin); pectoral fins hyaline with pale reddish rays; pelvic fins whitish, pale reddish at tips; iris yellow except dorsally, where reddish brown, and ventrally, where white; edge of orbit narrowly blackish.

Remarks

Named *atavai* from the Tahitian for pretty, in reference to the attractive color pattern of both sexes.

This species was first obtained by the senior author in the Society Islands in 1957 and later in the Tuamotu Archipelago, Pitcairn Group, Rapa, and the Austral Islands. It was observed but not collected at Ducie Atoll in the Pitcairn Group, Tubuai in the Austral Islands, and Takaroa Atoll in the northern Tuamotus in 1971.

Pseudojuloides atavai was collected in the depth range of 12–30.5 m. It was always found in outer reef areas, never in lagoons or sheltered bays.

This wrasse is readily distinguished from *P. argyreogaster* and *P. elongatus* by having one less dorsal ray and one additional pectoral ray. It differs from *P. mesostigma* and *P. erythrops* in having a deeper and less cylindrical body. It is allied to the remaining three species of the genus (*P. cerasinus*, *P. pyrius*, and *P. xanthomos*) but is not closely related to any of them. It has a longer caudal

TABLE 3

PROPORTIONAL MEASUREMENTS OF TYPE SPECIMENS OF *Pseudojuloides pyrius*
EXPRESSED AS A PERCENTAGE OF THE STANDARD LENGTH

	HOLOTYPE		PARATYPES					
	BPBM 8432	BPBM 12602	BPBM 11948	MNHN 1980-1385	BM(NH) 1980.9.17.2	BPBM 11948	USNM 222264	BPBM 11880
Standard length (mm)	58.3	35.0	37.3	51.2	52.8	58.2	63.8	72.3
Depth of body	22.2	22.9	21.4	22.5	21.2	23.4	23.0	24.2
Width of body	11.8	9.4	9.4	10.2	11.4	11.2	11.0	11.8
Head length	32.0	34.3	33.5	33.4	33.7	32.1	32.8	32.6
Snout length	10.3	11.4	10.2	10.7	10.4	11.0	10.7	11.1
Orbit diameter	6.5	8.0	7.6	7.1	7.0	6.5	6.4	5.9
Bony interorbital width	6.4	6.2	6.4	6.2	6.2	6.0	6.3	6.2
Depth of caudal peduncle	10.9	11.7	10.7	11.4	11.2	11.3	10.3	11.3
Length of caudal peduncle	9.7	10.1	9.4	10.0	9.5	9.5	9.6	10.1
Predorsal length	30.1	31.7	31.4	31.3	31.8	30.1	30.7	31.1
Preanal length	54.8	56.9	55.0	56.6	56.8	57.6	54.9	53.9
Prepelvic length	33.4	36.1	34.9	35.2	35.4	34.2	35.3	34.2
Length of caudal fin	20.0	22.3	21.7	21.5	20.8	20.6	20.4	20.1
Length of first dorsal spine	7.1	6.9	6.7	6.8	6.8	6.9	7.5	7.6
Length of ninth dorsal spine	10.6	11.7	10.7	11.7	11.6	10.5	11.1	deformed
Length of longest dorsal ray	12.3	13.7	13.8	13.7	13.7	12.9	13.3	13.4
Length of dorsal fin base	57.5	56.6	57.6	57.6	58.7	57.6	58.8	58.9
Length of first anal spine	3.8	2.9	3.5	3.1	3.2	3.4	3.5	3.9
Length of second anal spine	6.5	7.1	6.7	7.0	6.6	7.0	5.8	6.5
Length of third anal spine	8.8	9.7	9.4	8.8	8.5	8.6	8.0	8.2
Length of longest anal ray	11.5	12.9	12.6	11.7	12.3	11.7	11.1	10.9
Length of anal fin base	37.1	35.7	36.2	33.2	33.1	36.1	34.0	36.7
Length of pectoral fin	16.6	18.3	17.4	17.8	18.0	17.9	17.2	17.8
Length of pelvic spine	11.9	11.4	10.7	10.7	11.0	11.2	11.8	11.8
Length of pelvic fin	21.0	17.1	17.4	17.6	17.8	18.7	21.0	22.1

fin than all three, and both sexes are uniquely colored. The females of *P. cerasinus* and *P. pyrius* are light red to salmon pink in life; the female of *P. xanthomos* is unknown but probably bears no resemblance to the female of *P. atavai*.

P. atavai attains large size for the genus. Our male specimens range from 88.9 to 115.8 mm SL, and females from 49.9 to 77.1 mm SL.

Pseudojuloides pyrius n. sp.

Figures 6, 7; Table 3

Holotype

BPBM 8432, male, 58.3 mm SL, Marquesas Islands, Tahuata, off point at S end of

Vaitahu Bay, sand and rubble bottom with clumps of *Halimeda*, 35-41 m, rotenone, J. E. Randall, D. B. Cannoy, and J. R. Haywood, 23 April 1971.

Paratypes

Marquesas Islands: BPBM 11880, 72.3 mm SL, Fatu Hiva, off point at S end of Eue Bay, rocky bottom, some coral and sand, 24.5 m, spear, J. E. Randall, 22 April 1971; BPBM 11948, 2: 37.3-58.2 mm SL, same data as holotype; CAS 46960, 40.3 mm SL, same locality as holotype, 38 m, spear, J. E. Randall, 23 April 1971; MNHN 1980-1385, 51.2 mm SL, same data as preceding; BPBM 12602, 35.0 mm SL, Nuku Hiva, NW side of Sentinelle de l'Est, 18.5-21.5 m, spear and rotenone, J. E. Randall and J. D. Bryant, 14 May 1971; BM(NH) 1980.9.17.2, 52.8 mm SL,

and USNM 222674, 63.8 mm SL, same data as preceding.

Description

Dorsal rays IX,11; anal rays III,12; pectoral rays 13; scales above lateral line to origin of dorsal fin 4; scales below lateral line to origin of anal fin 8; median predorsal scales about 9 or 10; gill rakers 16 (14–17).

Body elongate, the depth 4.5 (4.15–4.7) in SL, and moderately compressed, the width 1.9 (1.85–2.4) in depth; head length 3.1 (2.9–3.1) in SL; snout length 3.1 (2.9–3.3) in head; orbit diameter 4.9 (4.3–5.5) in head; interorbital space convex, the bony width 5.0 (5.2–5.55) in head; caudal peduncle deeper than long, the least depth 2.95 (2.85–3.2) in head.

Mouth small, terminal, the gape horizontal, the maxilla reaching a vertical at anterior nostril. Lips moderately thick, the upper slightly overhanging the lower; inner surface of upper lip with four longitudinal plicae; lower lip with a ventral-projecting flap along side of jaw. A pair of projecting canine teeth anteriorly in jaws, the upper pair outcurved, the lowers fitting inside uppers when mouth closed; chisel-like incisiform teeth, along side of upper jaw 5 (4–6) and on side of lower jaw 6 (5–7); no exposed canine tooth posteriorly on upper jaw (but adults have a prominence at corner of mouth which appears to contain a small canine tooth).

Upper preopercular margin free to level of corner of mouth (hence below lower edge of orbit); lower margin free about to a vertical at posterior nostril. Gill rakers relatively short, the longest on first arch (on lower limb adjacent to one at angle) about one-third length of longest gill filament.

Nostrils small, in front of upper fifth of eye, the anterior in a short membranous tube which is elevated posteriorly, the posterior diagonally above and behind the anterior (in line with upper edge of orbit and anterior nostril), about half the internarial distance from a vertical at front edge of orbit; anterior nostril with a pore to the front in alignment with the two nostrils, one a short distance ventroanteriorly and sometimes one a short distance dorsoanteriorly; suborbital

pores, from below anterior edge to midposterior level of orbit 5(5 or 6, usually 5), with another 3 of the same series anterior to orbit; series of pores along free margin of preopercle 11 (9–12).

Lateral line continuous, nearly following contour of back to below base of eighth dorsal soft ray where it is deflected sharply ventrally to straight peduncular portion.

Scales on side of thorax slightly more than half height of largest scales on side of body, becoming still smaller ventroanteriorly; head naked except small scales on nape; median predorsal scales extending anteriorly about halfway between verticals at upper end of preopercular margin and posterior edge of orbit; fins naked except for scales on about basal third of caudal fin (scales on fin base progressively smaller posteriorly) and two midventral scales projecting posteriorly from base of pelvic fins (first scale small, the second large and pointed).

Origin of dorsal fin above anterior end of second lateral-line scale; dorsal spines progressively longer, the first 4.5 (4.3–5.0) and the ninth 3.0 (2.85–3.15) in head; second to ninth dorsal soft rays subequal, the longest 2.6 (2.4–2.5) in head; origin of anal fin below base of last dorsal spine; first anal spine short, 8.4 (8.35–12.0) in head; second anal spine 4.9 (4.6–5.65) in head; third anal spine 3.65 (3.55–4.1) in head; second to tenth anal soft rays subequal, the longest 2.8 (2.65–3.0) in head; caudal fin truncate to slightly rounded (more rounded when fully spread), the length 1.6 (1.55–1.6) in head; third pectoral ray longest (but second and fourth nearly as long), the length 1.8 (1.8–1.9) in head; pelvic fins of females not reaching anus, those of males extending beyond origin of anal fin, the length 1.5 (1.45–2.0) in head.

Color of holotype (a male) in alcohol: body pale; head pale except for lips (which are dusky) and ventral region (narrow midventral dusky zone on chin leading to a large dusky area on throat); anterior and ventral edges of orbit narrowly dark brown; dorsal and anal fins nearly transparent except for a blackish submarginal line (better developed on soft portions) and a black area on first 2 interspinous membranes of dorsal fin (more

than basal three-quarters of first membrane and about basal half of second membrane black); caudal fin pale with a blackish line forming an arc posteriorly in fin (the ends of the arc in each corner of fin broad and diffuse); crescentic area of caudal fin posterior to black arc more transparent than rest of fin; pectoral fins pale; pelvic fins pale, becoming dusky distally.

Color of holotype when fresh: upper half of body bright yellow, lower half red; head red except for nape, which is yellow; dorsal and anal fins red with a whitish margin and black submarginal line, the dorsal with a black spot anteriorly; caudal fin red with a whitish crescentic area posteriorly, set off from rest of fin by a black line; upper and lower edges of caudal fin with a very narrow whitish margin and narrow black submarginal line; pectoral fins mainly transparent; pelvic fins light red.

Color of females in alcohol: uniformly pale, devoid of dark pigment except for a narrow dark brown margin anteroventrally on orbit.

Color of females when fresh: body light red, faintly suffused with yellow, shading to white tinged with pink on abdomen and thorax; head light red dorsally, suffused with yellow, becoming yellow anteriorly on snout and upper lip, and whitish tinged with pink ventrally; a ring of yellowish white encircling orbit; dorsal and caudal fins pale yellow, the dorsal tinged with salmon pink basally; anal fin pale whitish, particularly the rays; pectorals largely colorless, with an indistinct red-orange line at base (broader dorsally); pelvic fins with whitish rays and transparent membranes.

Remarks

Named *pyrius* from the Greek *pyrios* 'fiery', in reference to the flamelike colors of both sexes of this fish.

This species has been observed and collected only in the Marquesas Islands. Specimens were taken at the islands of Fatu Hiva, Tahuata, and Nuku Hiva in the depth range of 18.5–41 m. It was most often seen over open rubble and sand substrata.

The two color forms of this species were

linked by the observation of apparent courtship (though at the limit of visibility) at Tahuata on 23 April 1971. The male swam rapidly over the female with its caudal region curved upward.

The type material includes three males, 58.3–72.3 mm SL; the middle-sized male (63.8 mm SL) has not yet developed the black arc posteriorly in the caudal fin, though the more transparent crescentic posterior region is apparent. The remaining type specimens are females, the largest 58.2 mm SL.

P. pyrius seems to be most closely related to *P. cerasinus* and *P. xanthomos*. Other than the distinctive color pattern and longer pelvic fins of the male of *pyrius*, it is difficult to separate this species from the other two.

Pseudojuloides cerasinus (Snyder)

Figures 8, 9

Pseudojulis cerasina Snyder, 1904:528 (type locality, Honolulu)

Material Examined

Hawaiian Islands: BPBM 15243, 88 mm SL, Oahu, Waianae coast; BPBM 6975, 10:53–79 mm SL, Oahu, Waianae coast, Lahilahi Point; BPBM 7962, 4:62–90 mm SL, Oahu, Waikiki; BPBM 10062, 102 mm SL, Hawaii, Kona coast, Honaunau; BPBM 10155, 3:63–77 mm SL, Oahu, Waikiki, off yacht harbor. Society Islands: BPBM 11946, 55 mm SL, Tahiti, Papara, $\frac{1}{4}$ mile E of Teavaraa Pass; BPBM 11614, 2:64–65 mm SL, Huahine, off Teffanao Point; BPBM 11519, 46 mm SL, same locality as preceding; BPBM 11583, 2:49–61 mm SL, Tahiti, Papara, Popote Bay; BPBM 14973, 51 mm SL, Tetiaroa, W side of Rimatuu Islet. Cook Islands: BPBM 13918, 67 mm SL, Rarotonga, NW side off Black Rock. Samoa Islands: BPBM 17541, 62 mm SL, Tutuila, W side of Aunuu Island. Fiji Islands: BPBM 14614, 2:63–72 mm SL, Mbengga Island, outside barrier reef near E end of Frigate Pass. Philippine Islands: BPBM 22260, 67 mm SL, Luzon, E side of Caban Island. Taiwan: BPBM 23217, 49 mm SL, E coast off San-Shien-Tai; BPBM 23414, 58 mm

SL, S end at Nan Wan. Ryukyu Islands: BPBM 19144, 63 mm SL, Okinawa, Sesoko Island; BPBM 22330, 68 mm SL, same locality as preceding. Lord Howe Island: BPBM 14803, 103 mm SL, SE side of North Rock. Mauritius: BPBM 24778, 57 mm SL, W side off Flic en Flac. Madagascar: BPBM 17935, 87 mm SL, outside barrier reef off Tulear; BPBM 17937, 66 mm SL, same locality as preceding. South Africa: RUSI 12740, 70 mm SL, KwaZulu, off Sodwana Bay.

Diagnosis

Dorsal rays IX,11; anal rays III,12; pectoral rays 13; scales above lateral line to origin of dorsal fin 4; scales below lateral line to origin of anal fin 8; 8–11 small median predorsal scales (anterior scales partially embedded); gill rakers 15–19; suborbital pores from below anterior edge of orbit to midposterior level of orbit 5–8; series of pores along free margin of preopercle 10–13; 3 pores in front of anterior nostril, 1 directly anterior, 1 diagonally upward, and 1 a short distance diagonally downward.

Body elongate, the depth 3.8–4.4 in SL, and compressed, the width 1.8–2.2 in depth; head length 2.85–3.2 in SL; snout 2.85–3.15 in head; orbit diameter 1.3–2.4 in snout (4.9–6.9 in head); caudal peduncle deeper than long, the least depth 2.6–3.2 in head; dorsal spines progressively longer posteriorly, the ninth 3.1–3.5 in head; ninth dorsal soft ray longest, 2.3–2.8 in head; caudal fin slightly rounded (slightly double emarginate on some individuals), 1.55–1.9 in head; pectoral fins 1.8–2.1 in head; pelvic fins moderately long, approaching (and rarely reaching) anus, 1.8–2.3 in head.

Color of females in alcohol: uniformly pale with a small dusky spot anterodorsally on snout (often extending onto base of upper lip) and a narrow dark edge anteriorly on orbit (sometimes ventrally as well); fins pale except specimens from the Society Islands and Cook Islands, which have a black blotch on basal half or more of first 2 interspinous membranes of dorsal fin (sometimes extending partially onto third membrane).

Color of a freshly caught 77-mm female specimen from Hawaii from a color photo:

salmon pink on dorsal half of head and body, shading to white on ventral half (side of snout, dorsal to level of lower edge of orbit, more yellow than pink); median fins pale translucent yellow with a pale translucent blue distal margin; first dorsal spine and spinous membrane tips tinged with pink; a small semicircular spot of salmon at base of each spinous membrane of dorsal fin; iris predominately light yellow; pectoral fins transparent, the rays faintly edged with light red, the base with an indistinct orange-pink streak (broader dorsally); pelvic fins whitish. Female specimens from the Society and Cook islands differ in having a large black spot basally on the first 2 interspinous membranes of the dorsal fin, each followed by a vertical blue band (mainly on second and third spines); membrane above each black spot brighter yellow than rest of fin; iris more pink than yellow.

Color of males from Hawaii in alcohol: a midlateral double stripe on body (about as broad as orbit diameter), the upper half dark brown and the lower half pale; body above stripe brown, below stripe light brown (some specimens showing a stripe of darker brown along lower edge of double lateral stripe); head brown, darker dorsally than ventrally, with a narrow dark brown band passing from behind center of eye across operculum, curving ventrally posteriorly nearly to level of dorsal edge of pectoral base; anterior and ventral edge of orbit narrowly dark brown; dorsal fin translucent brown, lighter posteriorly, with a hyaline margin, narrow dark submarginal line, a median longitudinal dark edged narrow pale band, and a large black area basally on first 2 interspinous membranes; anal fin light translucent brown with a hyaline margin and dark submarginal line; caudal fin brown on basal scaled portion of fin, pale on unscaled, with a large, vertically elongate, elliptical blackish area posteriorly in fin, preceded by a pale band set off by a dark line from rest of pale part of fin and followed by a hyaline margin; paired fins pale. Male specimens from the Society and Cook islands also have the dark spot anteriorly in the dorsal fin, but this is lacking on specimens from other localities. Male specimens from Madagascar and Natal have

a broad pale midlateral stripe without the dark brown adjacent stripes.

In life the pale lateral stripe of males is bright yellow and the adjacent dark band above it bright blue; back above double stripe dark olive green, becoming salmon pink along base of dorsal fin, this color continuing onto dorsal part of nape and head; body below double stripe blue, sometimes with a brighter blue stripe ventral and adjacent to yellow stripe; head, dorsal to level of lower edge of orbit, greenish yellow (except pink dorsally) with a faint blue band from upper lip to nostrils and a narrow, bright blue band passing posteriorly from middle of edge of orbit to lower part of opercular flap; head, ventral to lower edge of orbit, bluish white; dorsal fin olive with a blue margin (except filamentous spine tips, which are yellow, and ray tips, which are nearly hyaline), blackish submarginal line, narrow median longitudinal dark-edged blue band (disappearing on last few membranes) and a large spot of bright blue and black on first 2 interspinous membranes, the dorsal part of these membranes bright yellow; anal fin similar to dorsal though a little paler and with median dark-edged blue stripe lower in fin; unscaled part of caudal fin yellow with a large black area edged in pale blue posteriorly in fin, preceded by a blackish line and followed by a hyaline bluish border; pectoral fins transparent, the rays faintly edged in light reddish, the base with a small olivaceous spot dorsally and faint streak of the same color ventral to it; pelvic fins transparent with bluish white rays.

Remarks

Pseudojuloides cerasinus is the most wide-ranging species of the genus. In addition to the localities given by Ayling and Russell (1977) (Hawaiian Islands, Society Islands, Loyalty Islands, Great Barrier Reef, and southern Japan), we have specimens from the Cook Islands, Samoa Islands, Fiji Islands, Philippine Islands, Taiwan, Mauritius, Madagascar, and KwaZulu, South Africa, all of which represent new records. With the

exception of one specimen taken in 2.5 m at Okinawa and one from Taiwan in 17 m, all specimens listed in *Material Examined* were collected at depths greater than 21 m. The deepest station was 61 m from the atoll of Tetiaroa, Society Islands. The most common habitat is coral rubble, but some specimens were taken in areas dominated by live coral.

Two sight records of the unmistakable male of this species were made by the senior author. One fish was observed in 46 m at Tubuai, Austral Islands on 26 February 1971, and the other in 20 m at Alite Reef, Solomon Islands on 26 July 1973.

The males from the Hawaiian Islands, Society Islands, and Cook Islands have a black spot anteriorly in the dorsal fin that is not present on specimens from the other localities. In the Society Islands and Cook Islands the females also have a large black area on the first 2 interspinous membranes of the dorsal fin. At Madagascar and Natal the males differed in having a broader yellow stripe on the side of the body without any bright blue borders. No meristic or measurement data could be correlated with these color differences; we regard these forms as geographical color variants.

Ayling and Russell (1977) gave the number of gill rakers of *P. cerasinus* as 13. Possibly they did not count the rudiments, for we find a range of 15–19 rakers among the 31 specimens of this species from which we have taken meristic data (Table 1).

We have found no specimens of *P. cerasinus* with a canine tooth posteriorly on the upper jaw. On adults of both sexes, however, one can see what appears to be a developing tooth at this location embedded in soft tissue and not yet hardened. It is possible that this canine might emerge in an exceptionally large male.

Our largest male of this species (BPBM 14803), from Lord Howe Island, measures 103 mm SL; another from Hawaii (BPBM 10062) is 102 mm SL. Our smallest male (BPBM 23414), from Taiwan, is 58 mm SL. The largest female specimen (BPBM 7962), from Hawaii, measures 90 mm SL.

The holotype is in the U.S. National Museum of Natural History (USNM 50877).

Pseudojuloides xanthomos n. sp.

Figure 10; Table 4

Holotype

BPBM 21018, male, 64.4 mm SL, Mauritius, Gunner's Quoin, SW side, 25 m, hand net, D. Pelicier, 1974.

Description

Dorsal rays IX,11; anal rays III,12; pectoral rays 13; scales above lateral line to origin of dorsal fin 4; scales below lateral line to origin of anal fin 8; median predorsal scales about 12; gill rakers 17.

Body elongate, the depth 4.15 in SL, and moderately compressed, the width 2.1 in depth; head length 3.15 in SL; snout length 2.9 in head; orbit diameter 5.2 in head;

interorbital space convex, the least bony width 5.1 in head; caudal peduncle deeper than long, the least depth 2.75 in head.

Mouth small, the lower jaw slightly inferior, the gape horizontal, the maxilla nearly reaching a vertical at anterior nostril. Lips moderately thick, the upper overhanging lower; inner surface of upper lip with five longitudinal plicae; lower lip with a ventral-projecting flap along side of jaw. A pair of projecting canine teeth anteriorly in jaws, the upper pair outcurved, the lowers fitting inside uppers when mouth closed; 6 close-set, chisel-like incisiform teeth along sides of jaws; a canine tooth appears to be forming at corner of mouth.

Upper preopercular margin free nearly to level of lower edge of orbit; lower margin free slightly anterior to a vertical at front edge of orbit. Gill rakers relatively short, the longest on first arch (at angle) about one-third length of longest gill filaments.

Nostrils small, in front of upper fourth of eye, the anterior in a short membranous tube which is elevated posteriorly, the posterior diagonally above and behind the anterior (in line with upper edge of orbit and anterior nostril), slightly less than internarial distance from a vertical at front edge of orbit; a pore in front of and in line with nostrils, a second anterior pore diagonally above anterior nostril and a third anterior pore a short distance diagonally below; suborbital pores below anterior edge of orbit to midposterior level of orbit 5 (3 more anterior to eye); series of pores along free edge of preopercle 9.

Lateral line continuous, nearly following contour of back to below base of eighth or ninth dorsal soft rays where it angles sharply ventrally to straight peduncular portion.

Scales on side of thorax about half as high as largest scales on side of body, becoming still smaller ventroanteriorly; head naked except for small scales on nape; median predorsal scales extending anteriorly about halfway between verticals at upper end of preopercular margin and posterior edge of orbit; fins naked except for scales on basal two-fifths of caudal fin (scales on base progressively smaller posteriorly) and 2 midventral scales projecting posteriorly from base

TABLE 4

PROPORTIONAL MEASUREMENTS OF THE HOLOTYPE OF
Pseudojuloides xanthomos EXPRESSED AS A
PERCENTAGE OF THE STANDARD LENGTH

	BPBM 21018
Standard length (mm)	64.4
Depth of body	24.1
Width of body	11.5
Head length	31.6
Snout length	10.9
Orbit diameter	6.1
Bony interorbital width	6.2
Depth of caudal peduncle	11.5
Length of caudal peduncle	9.3
Predorsal length	31.8
Preanal length	54.0
Prepelvic length	33.0
Length of caudal fin	19.4
Length of first dorsal spine	7.0
Length of ninth dorsal spine	10.5
Length of longest dorsal ray	12.6
Length of dorsal fin base	58.7
Length of first anal spine	5.9
Length of second anal spine	6.8
Length of third anal spine	9.1
Length of longest anal ray	10.8
Length of anal fin base	36.0
Length of pectoral fin	17.1
Length of pelvic spine	10.6
Length of pelvic fin	16.6

of pelvic fins (the first scale small, the second large and pointed).

Origin of dorsal fin above second lateral-line scale; dorsal spines progressively longer, the first 4.5 and the ninth 3.0 in head; ninth dorsal soft ray longest, 2.5 in head; origin of anal fin below base of last dorsal spine; first anal spine short, 5.35 in head; second anal spine 4.65 in head; third anal spine 3.5 in head; first and second anal soft rays longest, 2.9 in head; caudal fin truncate (slightly rounded when broadly spread), 1.6 in head; third and fourth pectoral rays longest, 1.85 in head; pelvic fins nearly reaching anus, 1.9 in head.

Color of holotype (a male) in alcohol: uniformly pale except for a large black area on first interspinous membrane of dorsal fin, a narrow dark brown edge anteriorly on orbit, and a small faint dark smudge mid-dorsally on upper lip near base.

Color from a Kodachrome transparency taken by Daniel Pelicier: orangish gray dorsally, shading ventrally to yellowish; a horizontal lemon-yellow band extending posteriorly from upper end of gill opening to end of pectoral fin; a faint yellow band from mouth to eye and two narrower yellow bands passing from eye to opercular flap; fins whitish, the dorsal, anal, and pelvics tinged with pink, the pectorals with yellowish; first interspinous membrane of dorsal fin largely black.

Remarks

Described from a single male specimen taken in 25 m at Mauritius in the western Indian Ocean.

Named *xanthomos* from the Greek (*xanthos* 'yellow'; *omos* 'shoulder') in reference to the yellow band in the humeral region.

This species seems most closely related to *Pseudojuloides cerasinus* and *P. pyrius*. Although it is readily distinguished from these two by its color pattern, the separation on morphological grounds proved difficult. The best distinction from *P. pyrius* is the longer pelvic fins of the male of the latter. Since no females of *P. xanthomos* are

available for study, it is not possible to know if a difference in pelvic fin length would obtain for this sex. As indicated in the Key, *P. xanthomos* is differentiated from *P. cerasinus* by its truncate caudal fin, fewer preopercular pores and an apparent greater number of predorsal scales. Counts of additional specimens of *P. xanthomos*, however, might nullify one or both of these tenuous meristic differences.

Pseudojuloides mesostigma n. sp.

Figures 11, 12; Table 5

Holotype

BPBM 22259, male, 69.2 mm SL, Philippine Islands, Luzon, Batangas Province, Caban Island, east side about 600 m south of Layaglayag Point, coral rubble bottom with small corals, 35–39 m, spear, J. E. Randall, 3 September 1977.

Paratypes

Philippine Islands: BPBM 24781, 2:55.1–69.8 mm SL, same data as holotype; BPBM 22445, 47.5 mm SL, same locality, but southwest side, rubble, *Fungia*, and soft coral bottom, 32 m, spear, J. E. Randall, 28 July 1978; USNM 222677, 68.6 mm SL, same data as preceding.

Description

Dorsal rays IX,11; anal rays III,12; pectoral rays 13; scales above lateral line to origin of dorsal fin 4 (3–4); scales below lateral line to origin of anal fin 8; median predorsal scales about 10 or 11; gill rakers 16 (16–17).

Body very elongate, the depth 5.35 (4.95–5.3) in SL; body only slightly compressed, the width 1.6 (1.5–1.7) in depth; head length 3.05 (2.95–3.05) in SL; snout length 3.25 (3.25–3.4) in head; orbit diameter 4.9 (4.15–5.15) in head; interorbital space broadly convex (the eye near center of head), the bony width 4.9 (4.8–5.1) in head; depth of caudal peduncle about equal to length of

TABLE 5

PROPORTIONAL MEASUREMENTS OF TYPE SPECIMENS OF *Pseudojuloides mesostigma*
EXPRESSED AS A PERCENTAGE OF THE STANDARD LENGTH

	HOLOTYPE	PARATYPES			
	BPBM 22259	BPBM 22445	BPBM 24781	USNM 222677	BPBM 24781
Standard length (mm)	69.2	47.5	55.1	68.6	69.8
Depth of body	18.7	20.2	19.4	18.7	18.8
Width of body	11.8	11.8	11.3	12.4	12.2
Head length	32.7	34.1	33.6	32.8	34.0
Snout length	10.1	10.4	10.3	9.9	10.0
Orbit diameter	6.7	8.2	7.6	6.6	6.6
Bony interorbital width	6.7	7.1	6.9	6.7	6.7
Depth of caudal peduncle	9.4	10.5	10.0	9.2	9.6
Length of caudal peduncle	10.1	9.8	10.0	10.1	9.9
Predorsal length	30.5	31.0	29.9	29.2	29.4
Preanal length	57.1	57.9	57.5	54.8	55.9
Prepelvic length	35.0	35.8	35.8	32.9	35.8
Length of caudal fin	18.7	21.3	20.9	19.0	18.7
Length of first dorsal spine	5.8	6.3	6.5	6.0	6.6
Length of ninth dorsal spine	9.6	10.8	10.9	10.9	10.2
Length of longest dorsal ray	11.5	12.9	13.2	12.8	12.2
Length of dorsal fin base	57.8	57.9	57.0	58.3	57.3
Length of first anal spine	5.2	4.4	4.2	5.1	5.0
Length of second anal spine	broken	6.8	6.7	6.7	6.6
Length of third anal spine		8.4	8.9	8.2	8.4
Length of longest anal ray	10.8	10.7	11.8	10.9	10.7
Length of anal fin base	34.0	34.7	34.3	35.0	35.1
Length of pectoral fin	18.1	19.0	19.1	19.0	18.8
Length of pelvic spine	9.4	10.3	10.3	10.2	9.3
Length of pelvic fin	13.8	14.3	14.5	14.6	14.2

peduncle, the least depth 3.5 (3.25–3.55) in head.

Mouth small, terminal or with upper jaw slightly projecting, the gape slightly oblique, the maxilla nearly reaching a vertical through posterior nostril. Lips slightly thickened, the upper partially overhanging the lower when mouth closed; inner surface of upper lip with 3 or 4 longitudinal plicae; lower lip with a ventral-projecting flap along side of jaw. A pair of projecting canine teeth anteriorly in jaws, the upper pair outcurved, the lowers fitting inside uppers when mouth closed; males with 3 or 4 short conical teeth along side of jaws, the more anterior teeth larger; females with 3 upper and 4 or 5 lower chisel-like incisiform teeth along side of jaws; no canine posteriorly on upper jaw.

Upper preopercular margin free to or nearly to level of lower edge of orbit; lower

margin free about to a vertical through posterior nostril. Gill rakers short, the longest (at angle) on first gill arch less than one-third length of longest gill filament.

Nostrils very small, in front of upper edge of orbit, the anterior in a short membranous tube which is elevated posteriorly; posterior nostril slightly closer to a vertical through front edge of orbit than to anterior nostril; anterior nostril with a pore anterior to it on line projecting to front of snout and a second anterior pore diagonally downward from anterior nostril (an anterior pore diagonally upward present or absent); suborbital pores from below anterior edge of orbit to midposterior level of orbit 6 (6–8), with 3 more of the same series anterior to orbit; series of pores along free margin of preopercle 8 (8–11).

Lateral line continuous, nearly following

contour of back to below base of eighth dorsal soft ray where it angles sharply ventrally to straight peduncular portion.

Scales on side of thorax about half as high as largest scales on side of body, becoming smaller ventroanteriorly; head naked except for small scales on nape; median predorsal scales extending slightly anterior to a vertical at upper free end of preopercle; fins naked except for scales on basal three-tenths of caudal fin (scales on fin base progressively smaller posteriorly) and 2 midventral scales projecting posteriorly from base of pelvic fins (the first small, the second large and pointed).

Origin of dorsal fin over second lateral-line scale; dorsal spines progressively longer posteriorly, the first 5.65 (5.15–5.45) and the ninth 3.4 (3.0–3.35) in head; ninth dorsal soft ray usually longest, 2.85 (2.55–2.8) in head; origin of anal fin at a vertical between base of ninth dorsal spine and first dorsal soft ray; first anal spine short, 6.3 (6.4–8.0) in head; second anal spine broken (4.9–5.15) in head; third anal spine 3.7 (3.8–4.05) in head; fifth anal soft ray longest (but second to fourth subequal), 3.0 (2.85–3.2) in head; third pectoral ray longest (but second nearly as long), 1.8 (1.75–1.8) in head; pelvic fins short, not approaching anus, 2.35 (2.25–2.4) in head.

Color of holotype (a male) in alcohol: brown with a large roundish black spot on upper side in middle of body containing 11th to 13th lateral-line scales and extending into dorsal fin between first and fifth soft rays; upper side of body anterior and posterior to large black spot with dark brown markings, mainly as blotches and dark edges to scales, with a slight concentration to form a midlateral band; some irregular dark brown markings on interorbital and postorbital head; a dark streak midventrally on head; dorsal fin translucent brown with the large black spot as described above and a blackish margin (broader at ray tips); anal fin transparent; caudal fin with basal sixth colored like body, then a broad zone of black ending in an abrupt concave demarcation to transparent whitish posterior part of fin (about one-third length in middle part of fin, less

toward corners of fin); paired fins pale, the pectorals with a dark line at base and dusky in axil.

Color of holotype in life: body orangish brown, shading to whitish ventrally, with a large black spot in middle; side of body with light blue markings, mainly as spots anteriorly and as edges of scales posteriorly, these markings tending to form a diffuse midlateral band; head dark orangish brown, becoming dull violet ventrally, the upper two-thirds with narrow irregular blue and blue-green markings; dorsal fin pale yellowish with a large black area in the middle (continuous with large black spot on side of body), a blackish margin and a narrow blue submarginal band; anal fin pale yellowish with a pale blue margin; caudal fin colored like body basally, with a broad blackish zone over most of middle part of fin and a whitish posterior zone except for a trace of blackish at posterior margin; pectoral fins whitish with faint reddish edges on the rays, the base brown with a narrow blackish band; pelvic fins yellow with pale bluish rays; iris a mixture of red and yellow.

Color in alcohol of females: uniformly pale except for a narrow dark rim anteroventrally on orbit.

Color of females when fresh: salmon pink dorsally, shading to white on head below level of eye, lips, thorax, and abdomen; interorbital and postorbital head above level of lower edge of orbit mainly yellow; dorsal fin spines and rays primarily yellow, with some orange-red near bases, the membranes clear yellow; anal fin transparent pale salmon; caudal fin with light orange-yellow rays (some red pigment as well), the membranes clear; paired fins clear with whitish rays, the pelvic with a faint yellow tinge; iris light yellow.

Remarks

Named *mesostigma* from the Greek *mesos* 'middle' and *stigma* 'spot' in reference to the large black spot in the middle of the body and dorsal fin of the male of the species.

Observed and collected only at Caban Island, Batangas Province, Luzon, Philippines, on open rubble bottom with small

TABLE 6

PROPORTIONAL MEASUREMENTS OF TYPE SPECIMENS OF *Pseudojuloides erythrops*
EXPRESSED AS A PERCENTAGE OF THE STANDARD LENGTH

	HOLOTYPE	PARATYPES			
	BPBM 24772	BPBM 24780	BM(NH) 1980.9.17.4	BPBM 24780	USNM 222671
Standard length (mm)	83.6	41.6	43.3	50.9	71.4
Depth of body	19.1	19.2	18.6	19.4	19.6
Width of body	11.1	11.3	10.6	11.8	12.6
Head length	32.9	33.7	33.3	33.0	33.2
Snout length	11.0	10.8	10.6	10.6	10.9
Orbit diameter	5.9	8.2	8.1	7.3	6.6
Bony interorbital width	6.2	6.3	6.9	6.7	7.0
Depth of caudal peduncle	9.0	10.1	9.2	9.0	9.5
Length of caudal peduncle	10.5	9.6	10.4	10.2	10.6
Predorsal length	30.0	31.7	30.3	31.2	30.8
Preanal length	55.0	55.3	56.4	55.0	55.9
Prepelvic length	35.5	35.6	35.9	33.6	35.0
Length of caudal fin	18.8	22.8	21.9	21.6	20.8
Length of first dorsal spine	6.6	6.8	6.9	broken	6.5
Length of ninth dorsal spine	10.4	11.3	11.5	11.0	10.5
Length of longest dorsal ray	11.7	14.4	13.2	11.8	11.9
Length of dorsal fin base	59.0	55.3	56.6	58.0	58.8
Length of first anal spine	3.8	3.6	3.4	3.9	3.7
Length of second anal spine	6.0	6.0	6.5	6.7	6.4
Length of third anal spine	8.0	8.7	9.0	8.6	8.4
Length of longest anal ray	11.4	13.2	broken	12.5	11.8
Length of anal fin base	35.6	36.0	34.9	35.5	35.7
Length of pectoral fin	17.9	19.2	17.8	18.4	19.2
Length of pelvic spine	10.2	9.6	9.2	10.6	10.5
Length of pelvic fin	15.9	15.8	15.7	15.7	15.9

corals and soft corals in the depth range of 32–39 m.

The male of the species is unusual in the development of conical teeth along the sides of the jaws instead of incisiform teeth as seen in the females and in both sexes of all the other species of the genus. The body of both males and females of *Pseudojuloides mesostigma* is more cylindrical than that of other species.

When viewed underwater, the females may be distinguished from the similar females of *P. cerasinus* by the white lips (particularly the upper lip, since this is not white on *P. cerasinus*, though the lower lip may be).

Of the known species of *Pseudojuloides*, *P. mesostigma* is most closely related to *P. erythrops* (see *Remarks* for the latter species).

Pseudojuloides erythrops n. sp.

Figures 13, 14; Table 6

Holotype

BPBM 24772, male, 83.6 mm SL, Mauritius, W coast off Flic en Flac, reef and rubble, 57 m, net, D. Pelicier, 4 April 1979.

Paratypes

Mauritius: BM(NH) 1980.9.17.4, 43.3 mm SL, net, D. Pelicier, early 1979; BPBM 24780, 2:41.6–50.9 mm SL, same locality as holotype, 52 m, net, D. Pelicier, J. E. Dench, and R. M. Bray, 8 April 1979; USNM 222671, 71.4 mm SL, same data as preceding.

Description

Dorsal rays IX,11; anal rays III,12; pectoral rays 13; scales above lateral line to origin of dorsal fin $3\frac{1}{2}$ (3–4); scales below lateral line to origin of anal fin $8\frac{1}{2}$ (8– $8\frac{1}{2}$); median predorsal scales about 8 or 9; gill rakers 16 (16–17).

Body very elongate, the depth 5.25 (5.1–5.4) in SL, and only slightly compressed, the width 1.7 (1.55–1.75) in depth; head length 3.05 (2.95–3.05) in SL; snout 3.0 (3.05–3.15) in head; orbit diameter 5.6 (4.1–5.05) in head; interorbital space broadly convex (the eye near center of head), the least bony width 5.3 (4.75–5.35); caudal peduncle usually slightly longer than peduncle depth, the least depth 3.65 (3.35–3.65) in head.

Mouth small, terminal, the gape slightly oblique, the maxilla reaching a vertical through anterior nostril. Lips moderately thick, the upper partially overhanging the lower when mouth is closed; inner surface of upper lip with 4 or 5 longitudinal plicae; lower lip with a prominent ventral-projecting flap along side of jaw. A pair of projecting canine teeth anteriorly in jaws, the upper pair outcurved, the lowers fitting inside uppers when mouth closed; chisel-like incisor-form teeth along side of upper jaw 5 (2–6) and on side of lower jaw 6 or 8 (3–6); no canine tooth posteriorly on upper jaw.

Upper preopercular margin free nearly to level of lower edge of orbit; lower margin free anterior to a vertical at front edge of orbit—on some nearly to a vertical through anterior nostril. Gill rakers relatively short, the longest on first arch (at angle) about one-third length of longest gill filament.

Nostrils small, in front of upper edge of orbit, the anterior in a short membranous tube which is elevated posteriorly, the posterior in advance of a vertical through front of orbit by a distance almost equal to internarial space; anterior nostril with a pore directly anterior to it and a second anterior pore a short distance diagonally downward (no pore diagonally upward); suborbital pores from below anterior edge of orbit to midposterior level of orbit 5 (5–7), with

another 3 of the same series anterior to orbit; series of pores along free margin of preopercle 8 (6–8).

Lateral line continuous, nearly following contour of back to below base of eighth dorsal soft ray where it is deflected sharply ventrally to straight peduncular portion.

Scales on side of thorax slightly more than half as high as largest scales on side of body, becoming still smaller ventroanteriorly; head naked except for small partially embedded scales on nape; median predorsal scales extending slightly anterior to a vertical through upper free end of opercular margin; fins naked except for scales on about basal third of caudal fin (scales on fin base progressively smaller posteriorly) and 2 midventral scales projecting posteriorly from base of pelvic fins (second scale larger, usually somewhat pointed).

Origin of dorsal fin above anterior edge of second lateral-line scale; dorsal spines progressively longer, the first 5.0 (4.85–5.1), and the ninth 3.15 (2.9–3.15) in head; eighth or ninth dorsal soft ray longest, 2.8 (2.35–3.0) in head; origin of anal fin below base of last dorsal spine; first anal spine very short, 8.7 (8.5–9.8) in head; second anal spine 5.5 (4.9–5.6) in head; third anal spine 4.1 (3.7–3.95) in head; second or third anal soft ray longest, 2.9 (2.55–2.8) in head; caudal fin rounded in females, slightly emarginate in males, the length 1.75 (1.5–1.6) in head (caudal rays, as well as dorsal and anal soft rays, relatively shorter with age); third or fourth pectoral rays longest, 1.85 (1.75–1.85) in head; pelvic fins moderately long but not reaching anus, 2.05 (2.1–2.15) in head.

Color of holotype (a male) in alcohol: head and body dark brown except for an abrupt demarcation to pale in an elongate triangular region extending posterior to a vertical from midventrally on abdomen to midside of body and ventral to a curved diagonal line passing to lower caudal fin base; some dark brown markings forming an irregular stripe below and adjacent to anterior part of lateral line and continuing to upper caudal base; a fainter dark longitudinal band at the demarcation of the dark upper and pale lower part of body; a narrow

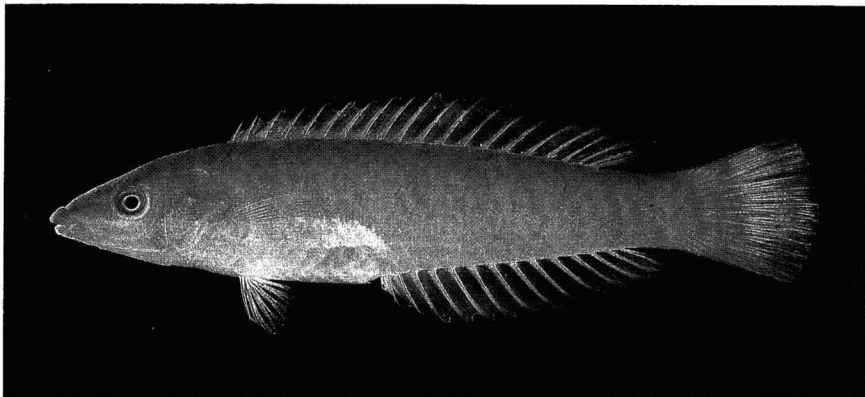


Figure 2. *Pseudojuloides elongatus*, ♀, 94.0 mm SL, BPBM 23004, Izu Islands, Japan.

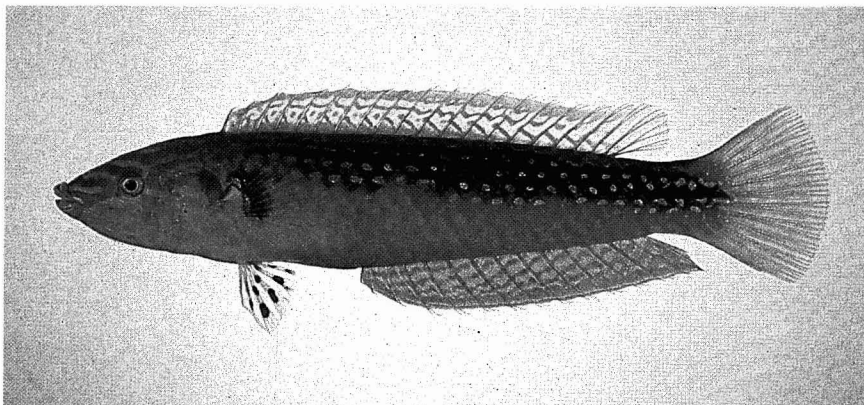


Figure 3. *Pseudojuloides elongatus*, ♂, TMBS 750819-1, 115 mm SL, Izu Islands, Japan.

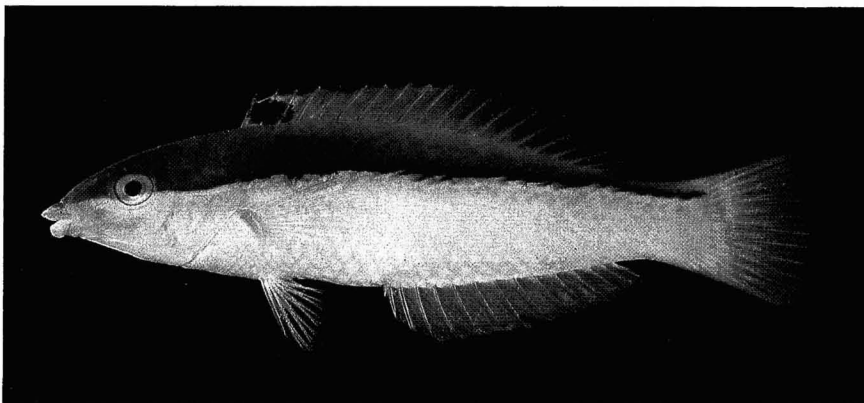


Figure 4. *Pseudojuloides atavai*, paratype, ♀, 67.2 mm SL, BPBM 6913, Tahiti.



Figure 5. *Pseudojuloides atavai*, holotype, ♂, 115.8 mm SL, BPBM 16902, Pitcairn.

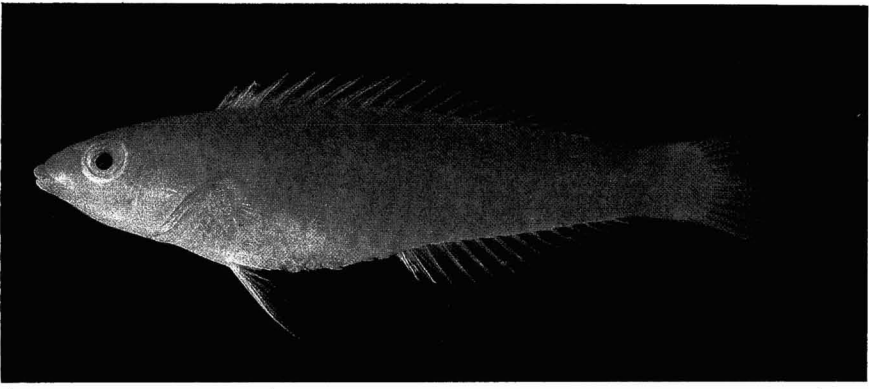


Figure 6. *Pseudojuloides pyrius*, paratype, ♀, 58.2 mm SL, BPBM 11948, Marquesas.



Figure 7. *Pseudojuloides pyrius*, holotype, ♂, 58.3 mm SL, BPBM 8432, Marquesas.

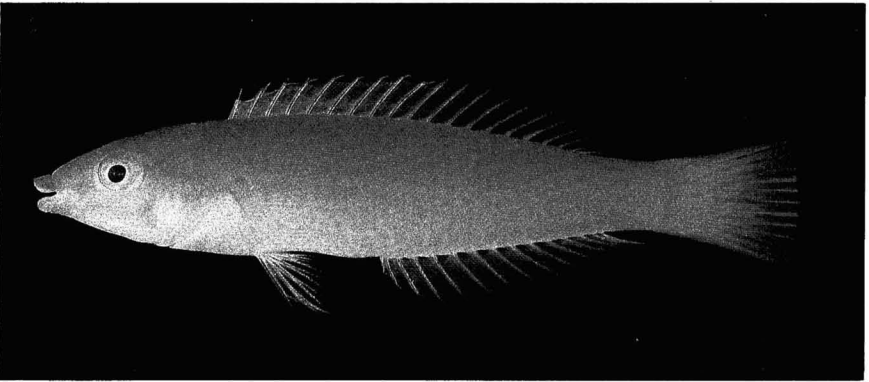


Figure 8. *Pseudojuloides cerasinus*, ♀, 57.0 mm SL, BPBM 24778, Mauritius.



Figure 9. *Pseudojuloides cerasinus*, ♂, 70.0 mm SL, BPBM 6975, Hawaii.

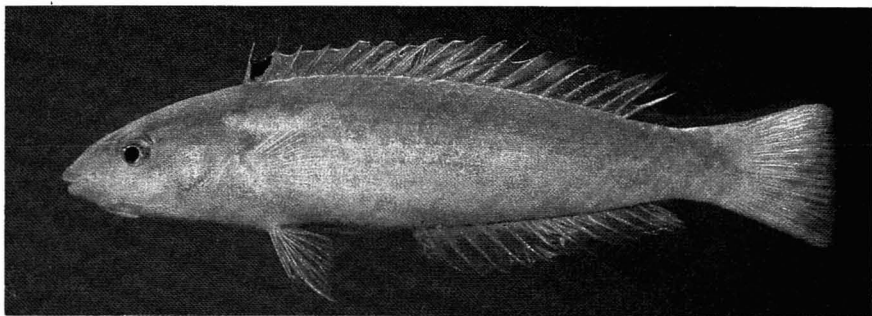


Figure 10. *Pseudojuloides xanthomos*, holotype, ♂, 64.4 mm SL, BPBM 21018, Mauritius.

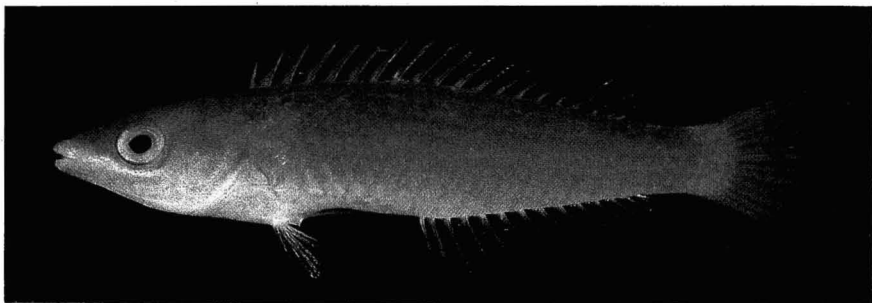


Figure 11. *Pseudojuloides mesostigma*, paratype, ♀, 47.5 mm SL, BPBM 22445, Philippines.

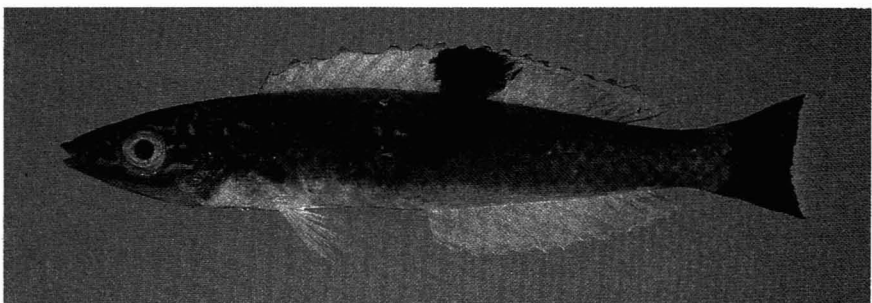


Figure 12. *Pseudojuloides mesostigma*, holotype, ♂, 69.2 mm SL, BPBM 22259, Philippines.

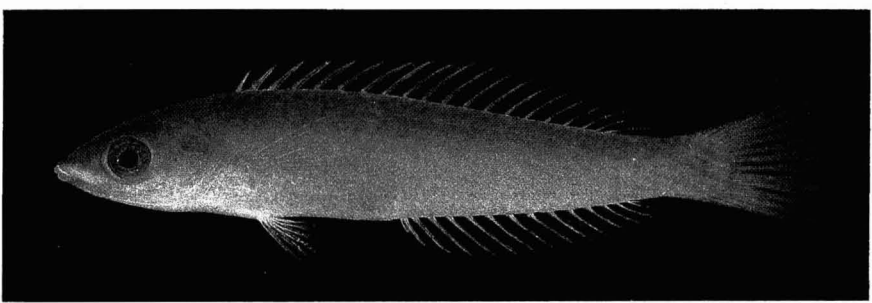


Figure 13. *Pseudojuloides erythroptus*, paratype, ♀, 50.9 mm SL, BPBM 24780, Mauritius.

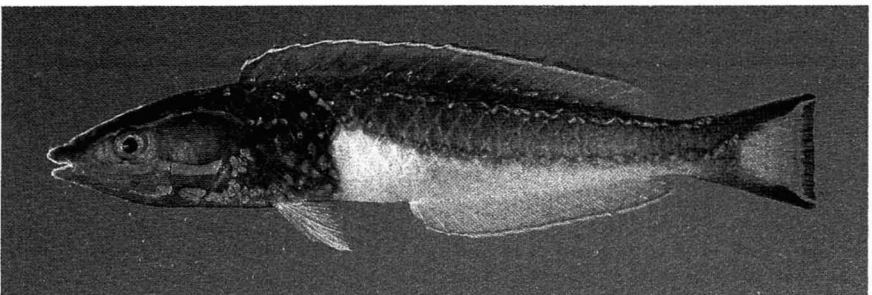


Figure 14. *Pseudojuloides erythroptus*, holotype, ♂, 83.6 mm SL, BPBM 24772, Mauritius.

dark band midventrally on throat; a faint, narrow bluish band passing posteriorly from upper edge of eye and another from behind corner of mouth just under eye to opercle; a slightly paler region around eye (more evident anterior and posterior to orbit); dorsal fin translucent brown, paler posteriorly, with a dusky margin and pale submarginal line; anal fin pale with a dusky submarginal line; caudal fin with a very large nearly semi-circular area of pale yellowish in center of fin, the lobes broadly blackish with narrow pale margins and the posterior margin broadly blackish; pectoral fins pale with a dark brown line at base; pelvic fins with dusky rays, clear membranes.

Color of holotype in life: head and body, anterior to a vertical through middle of abdomen, dark slate blue with two bright blue bands on head (one from corner of mouth over eye to upper end of gill opening and the other from corner of mouth horizontally across head beneath eye to end of operculum); some bright blue spots ventrally on head leading to a broad irregular blue band ventrally on thorax and anterior abdomen; other bright blue spots in pectoral region, above pectoral fin and on nape; posterior abdomen, region above anal fin and lower caudal peduncle white; this region separated from upper green part of body by a bright blue stripe; bright blue spots along anterior lateral line partially coalescing to a stripe which continues to upper caudal fin base; dorsal fin dull green with a deep blue band along base, a dusky margin, and a pale blue submarginal band; anal fin greenish yellow with a pale blue margin and blackish submarginal line; basal scaled part of caudal fin colored like body; unscaled part with narrow pale blue upper and lower margins, broad blackish lobes, and a broad blackish posterior margin preceded by a narrow zone of pale bluish, which interrupts blackish margin near upper and lower corners of fin; broad central region of caudal fin light yellowish; pectoral fins with whitish rays and clear membranes; pelvic fins with yellowish rays and clear membranes; iris red with a narrow dark bluish ring.

Color of females in alcohol: uniformly

pale except for a narrow dark edge antero-ventrally on orbit.

Color of females in life: dorsal part of body light orange-red suffused with yellow, shading to pale yellow on sides and ventrally, tinged with rose over abdomen, and grading to white on thorax; head orange-red dorsally, shading to whitish on ventral half; some purplish color on side of snout and dorsally on head; lips white; dorsal fin with yellow spines and rays, clear pale yellow membranes and hyaline margin; anal fin similar but paler; caudal fin whitish with a bluish cast, the rays narrowly edged with salmon; pectoral fin pale, the rays faintly edged in light red; pelvic fins with bluish white rays, clear membranes; iris mainly red; anteroventral edge of orbit dark purplish red.

Remarks

Named *erythrops* from the Greek *erythros* 'red' and *ops* 'eye', in reference to the red eye of both sexes of this species.

Known only from one locality off the west coast of Mauritius. The bottom was rubble with some rock and coral; the depth was 52–57 m.

Although the blue stripes of the male of *Pseudojuloides erythrops* are reminiscent of the male coloration of *P. cerasinus*, this species is more closely related to *P. mesostigma*. The two share the following characters: a near-cylindrical body, eye near center of head and narrow caudal peduncle (the peduncle depth nearly equal to its length). They differ in color and in the longer snout and pelvic fins of *P. erythrops*, and the more numerous preopercular pores and the conical teeth of the males of *P. mesostigma*.

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of *P. xanthomos* and was the principal collector of *P. erythroptus*; and John W. Shepard, who collected and photographed the male *P. elongatus* of Figure 3. Thanks are also due Rudie H. Kuiter for aquarium photos of *P. elongatus*, and Mireille Harmelin-Vivien and Jack T. Moyer for specimens and pertinent information. Arnold Y. Suzumoto took radiographs of all of the species.

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