

## A New Species of *Psenopsis* (Stromateoidei, Centrolophidae) from Indo-Malayan Seas\*

Richard L. HAEDRICH

(Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, U. S. A.)

and

(Museum of Comparative Zoology, Cambridge, Massachusetts)

In a review of stromateoid families and genera (HAEDRICH, 1967), mention was made (p. 75) of undescribed species of *Psenopsis*. This statement was based on a unique specimen collected by the "Albatross" in the East Indies in 1909. Eleven more specimens, apparently referable to the same species, were taken by the "Anton Bruun" in the Andaman Sea on her first cruise of the International Indian Ocean Expedition in 1963. The twelve specimens differ but little from the four previously described species in *Psenopsis*, yet the differences taken together justify the description of a new species. Environmental data suggest that the new species lives considerably deeper in the water than those already known.

Specimens for this study were obtained through the kind offices of Dr. T. ABE, Tokaiku Fisheries Research Laboratory, Tokyo, and Leslie W. KNAPP, Smithsonian Institution Oceanographic Sorting Center, Washington, D. C. Dr. Robert H. GIBBS, Jr., provided additional data on the USNM specimen. The manuscript has been read by Drs. Richard H. BACKUS, James E. CRADDOCK, and Giles W. MEAD. Financial support has been provided by National Science Foundation grants under the joint U. S.-Japan Cooperative Program in Science (GF-147 to Harvard University), the U. S. Program in Biology of the International Indian Ocean Expedition, and GB-4431 to the Woods Hole Oceanographic Institution. This paper is a result of continuing studies of stromateoid fishes begun at Harvard University and the Woods Hole Oceanographic Institution.

The species described below as new is referable to *Psenopsis* primarily because the specimens have an S-shaped scoop in the opercle immediately below the second opercular spine, an almost equal number of dorsal and anal finrays, the insertion of the pelvic fins immediately under the pectoral fins, 25 vertebrae, and lack a supra-maxillary bone. In reference to its habitat and to the holotype's long, uninterrupted repose on the shelves on the U. S. National Museum, the new species will be known as:

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*Psenopsis obscura* n. sp.

Figs. 1, 2

**Material**

One specimen, HOLOTYPE, U.S. Natl. Mus. No. 98818, 132 mm SL, "Albatross", Molucca Passage, Maren Isl., Dutch East Indies, 0°35'00"N, 127°14'40"E, 27 November 1909, 435 fathoms, bottom fine gray sand and mud, 12' Agassiz trawl.

Eleven specimens, 112-132 mm SL, International Indian Ocean Expedition R/V "Anton Bruun" Cruise I, Station 22A, 10°39'N, 97°06'E, 24 March 1963, 293 meters, 42' Gulf of Mexico shrimp trawl.

**Comparative material**

In addition to those specimens of *Psenopsis anomala* and *Psenopsis cyanea* listed in HAEDRICH 1967 (p. 40), the following, reported here for the first time, were also examined: *Psenopsis anomala* (ALCOCK, 1890), five specimens, 95-119 mm SL, International Indian Ocean Expedition, R/V "Anton Bruun", Cruise 4B, station 245A, 24°55'N, 61°10'E, 28 November 1963, 93 to 105 fathoms, 42' Gulf of shrimp trawl.

**Diagnosis**

*Psenopsis obscura* is a moderately deep-bodied dark-colored *Psenopsis* with a large eye, 18 to 20 pectoral finrays and 25 to 27 anal finrays.

**Description**

The individual counts and proportions of the holotype appear in Table 1. It should be noted that in certain proportions the holotype is outside the range of the 11 other specimens. These discrepancies are attributed to the fairly great distances—geographically, in time, and in period in preservative—between the two collections.

Counts: D V-VII 26-29, A II-III 25-27, P<sub>1</sub> 18-20, P<sub>2</sub> I 5, Gill rakers 5-6+1+14-15, lateral line scales *ca.* 62 (one specimen), vertebrae 10+14+1=25, branchiostegals 7.

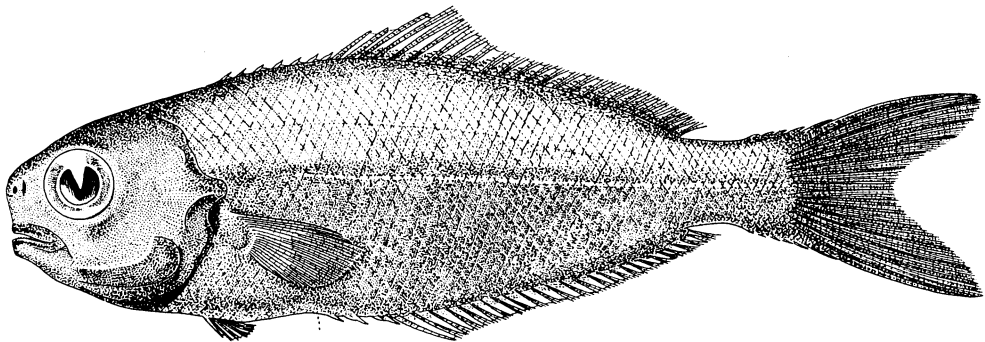


Fig. 1. Holotype of *Psenopsis obscura*, USNM 98818. Smithsonian Institution drawing.

Proportional measurements: (In percent of the standard length). Head length 29-36, pectoral fin length 18-27, pelvic fin length 5-12, predorsal distance 35-39, preanal distance 45-54 maximum depth 31-38, least depth of caudal peduncle 7-9. (In percent of head length). Snout 20-25, eye diameter 27-31, length of upper jaw 26-36, inter-orbital width 32-38.

The body is somewhat elongate to moderately deep and is thickened though laterally compressed; the musculature is firm. The caudal peduncle is short, compressed, and deepens slightly at the caudal fin base. The pelvic fins insert under or just before the insertion of the pectorals. The pelvics reach about three-quarters of the way to the anus and fold into a triangular groove which extends to the anus. The dorsal fin originates slightly behind the insertion of the pectoral fins; the stubby spines graduate evenly to the rayed portion, which commences slightly before the anus. The anal fin originates at or slightly behind midbody, and terminates slightly behind the termination of the dorsal fin. The caudal fin is forked, but not deeply. The lateral line follows a smooth curve, approximating the dorsal profile, halfway up on the back. Tubed scales become difficult to trace on the peduncle. The main subdermal canal along the intermuscular septum and its side branches are well-developed, and could be confused with the lateral line. The scales are fairly small, cycloid, extremely deciduous, and extend onto the bases of the median fins. The head and cheeks are not scaled, and the naked skin, underlain with fine canals, extends backward over the nape.

The head is moderate to small in size and is fairly deep. Adipose tissue is well-developed on the head, surrounding the eyes and extending forward over the snout and upper jaw. The eye is large, but does not come near to entering into the dorsal profile. The sclerotic bones are well-ossified. The opercular and preopercular margins are thin and entire. The opercle has two flat flexible spines; below the second spine there is a broad S-shaped scoop on the surface of the bone. The angle of the preopercle is rounded and bulges backward slightly. The gill opening is wide and cleft well forward; the opercles close tightly against the pectoral girdle. The snout is truncate to bulbous, and protrudes slightly. The nostrils are small—the

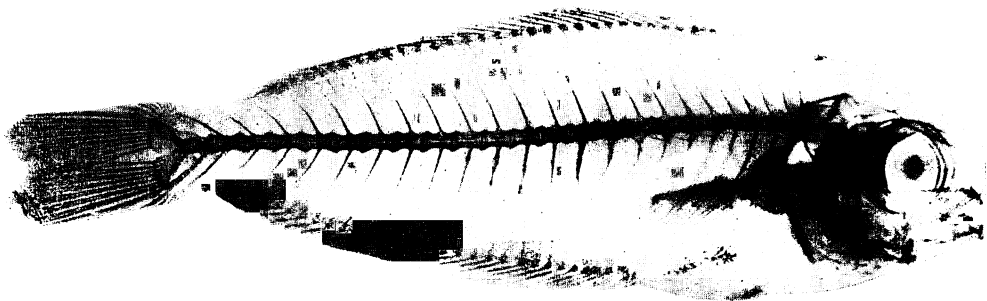


Fig. 2. Radiograph of the holotype of *Psenopsis obscura*.

Table 1. Proportions and counts for the nominal species in *Psenopsis*.

Number of specimens	<i>Ps. humerosa</i>	<i>Ps. shojimai</i>	<i>Ps. anomala</i>		<i>Ps. obscura</i>		<i>Ps. cyanea</i>
	Holotype*	14**	79	12	11	Holotype	6***
Standard length	117	97-141 mm	7-183 mm	90-138 mm	112-132 mm	132 mm	95-120 mm
In per cent of standard length:							
Head length	29%	29-33%	27-43%	30-34%	33-36%	29%	35-38%
Pectoral fin length	29	23-28	18-32	25-29	24-27	18	23-25
Pelvic fin length	—	9-12	10-23	10-15	9-12	5	8-13
Predorsal distance	—	31-36	34-49	36-39	36-39	35	36-39
Preanal distance	—	53-59	50-76	50-58	48-54	45	52-56
Maximum depth	53	43-48	37-52	42-50	35-38	31	28-31
Least depth of caudal peducle	—	9-11	10-14	8-12	7-9	9	6-9
In per cent of head length:							
Snout	20%	17-27%	24-32%	24-27%	20-25%	25%	24-26%
Eye diameter	29	20-30	21-34	21-29	27-29	31	18-21
Length of upper jaw	—	28-31	28-46	30-36	26-30	26	30-34
interorbital width	—	38-45	34-43	34-42	32-37	38	28-33
Counts:							
Dorsal	VII 28	V-VI 27-31	V-VII 27-32	—	V-VII 26-29	VII 27	VI-VII 26-28
Anal	III 25	III 25-28	III 25-29	—	II-III 25-27	III 27	III-IV 21-23
Pectoral	22	20-23	20-23	—	18-20	19	16-20
Gill rakers	12, lower limb first arch	20-22, total first arch	—	—	5-6+1+14-15	5+1+14	5-8+1+14-15
Lateral line scales	55	62-70	65 (one spec.)	—	62 (one spec.)	—	—
Vertebrae	—	—	25	—	25	25	25

\* From MUNRO, 1958, \*\* Including holotype, from OCHIAI and MORI, 1965. \*\*\* Including holotype.

anterior round, the posterior a slit—located nearer to the tip of the snout than to the eye. The mouth is small and underslung. The end of the maxillary, completely covered by the lacrimal bone when the mouth is closed, reaches to under the anterior border of the lens of the eye. The premaxillary is not protractile, and the supra-maxillary is lacking. The lower jaw shuts within the upper. There is a bony

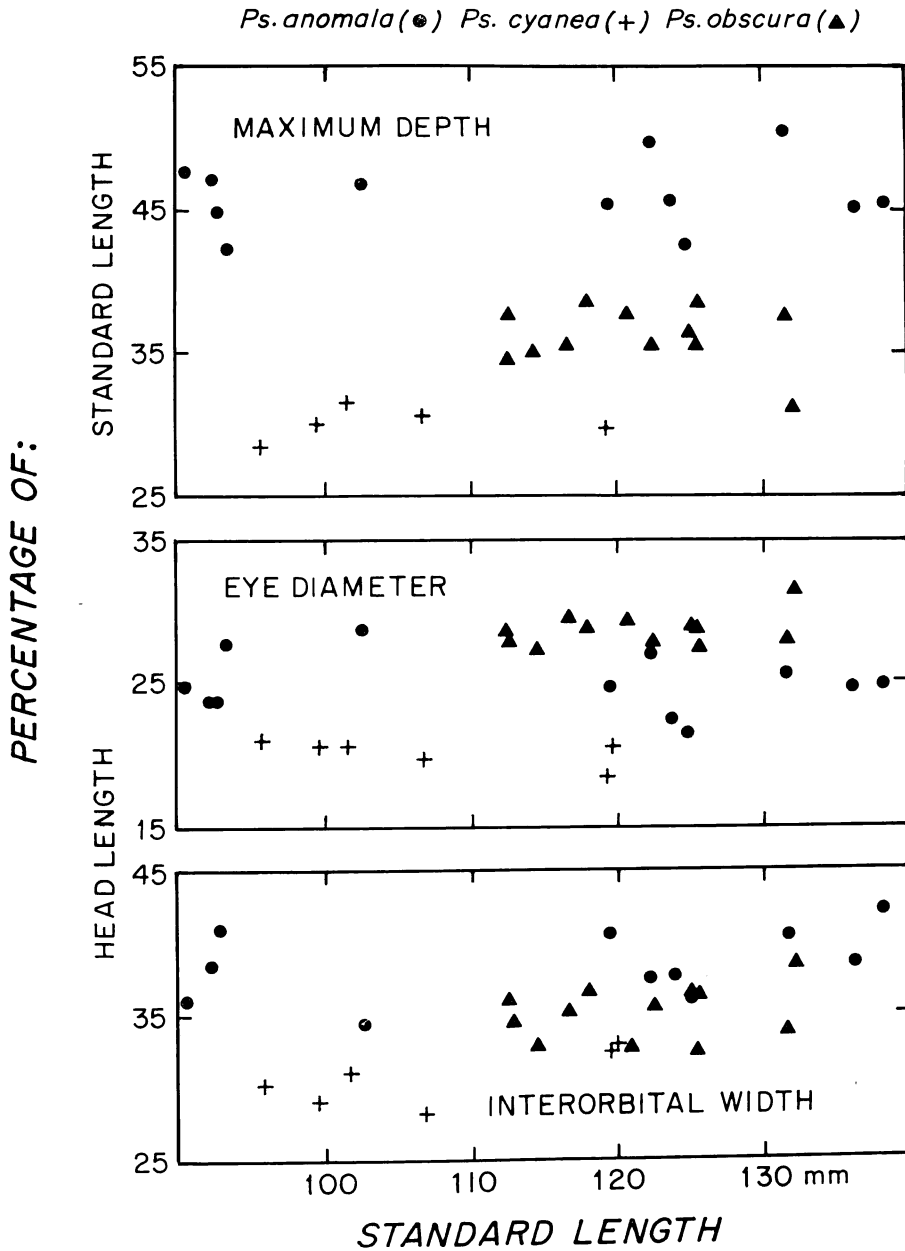


Fig. 3. Comparison of three proportions in *Ps. anomala*, *Ps. cyanea*, and *Ps. obscura*.

downward projection at the symphysis on the dentares. The conical teeth are extremely small, close-set, and uniserial in the jaws. The vomer, palatines, and basibranchials are toothless. The oral valves are moderately well-developed. The gills are four, with a slit behind the fourth. The rakers of the first arch are strong, spaced, about

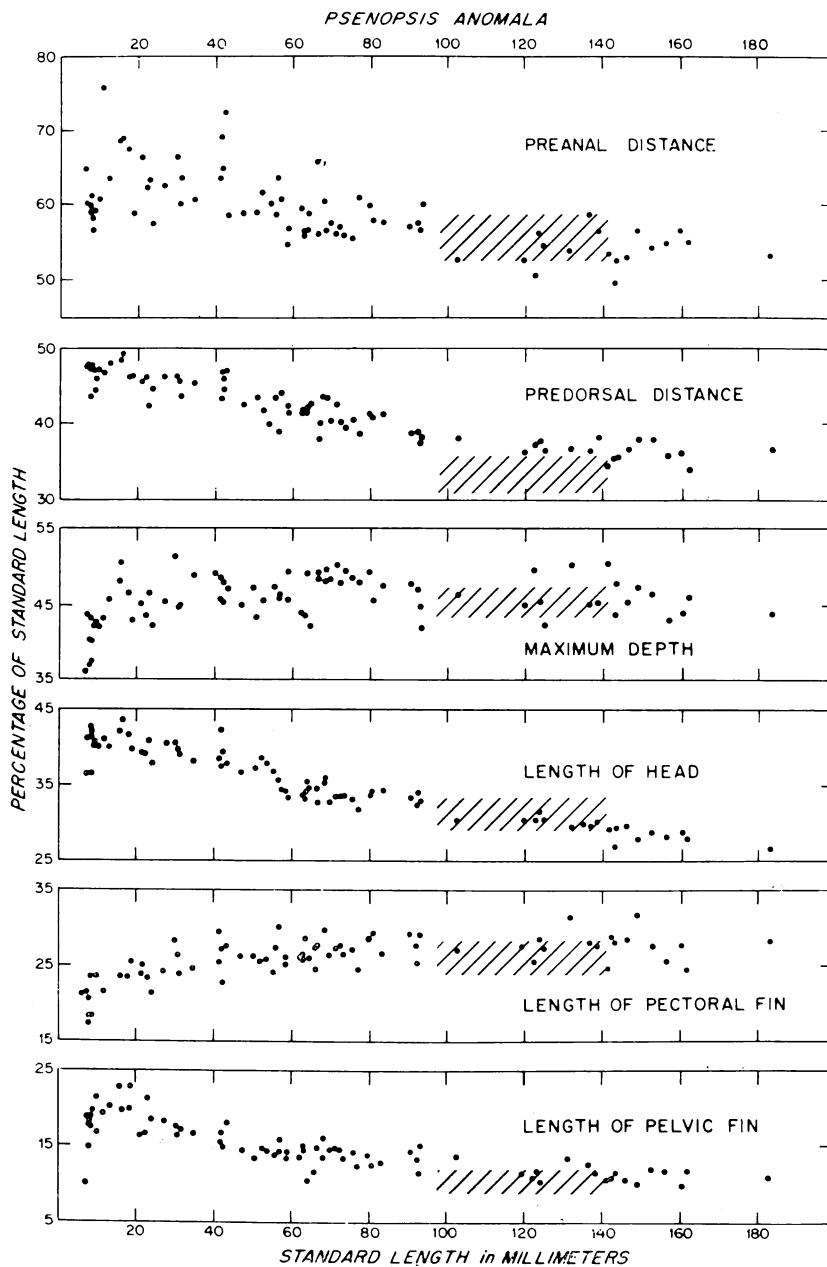


Fig. 4. Scatter diagram of the allometric growth in *Ps. anomala*. Cross-hatchings show the ranges for the nominal *Ps. shojimai*.

2/3 the length of the filaments, and bear thin spiny teeth on their inner edges. The pseudobranch is well-developed.

There are 25 vertebrae, of which ten are precaudal. Three free interneural bones precede the dorsal fin. The first interhaemal is fairly strong, and is inclined forward from the first caudal vertebra. In the tail there are three (in some perhaps two?) epural elements and six hypural elements; hypurals 2 and 3 are closely conjoined as are hypurals 4 and 5. The first hypural bears a strong hypuropophysis. The postcleithra are slender and long, extending almost to the midventral line of the body. The saccular otolith is very large and dense.

The color in alcohol is dark brownish-blue to brown on the back, grading to tan on the flanks. There is a prominent dark blotch on the shoulder at about the beginning of the lateral line. The median fins are yellowish, with a gray-speckled overlay. The head and eye are dark, the snout light, and the dark lining of the gill cavity shows plainly through the thin opercles. The peritoneum is dark.

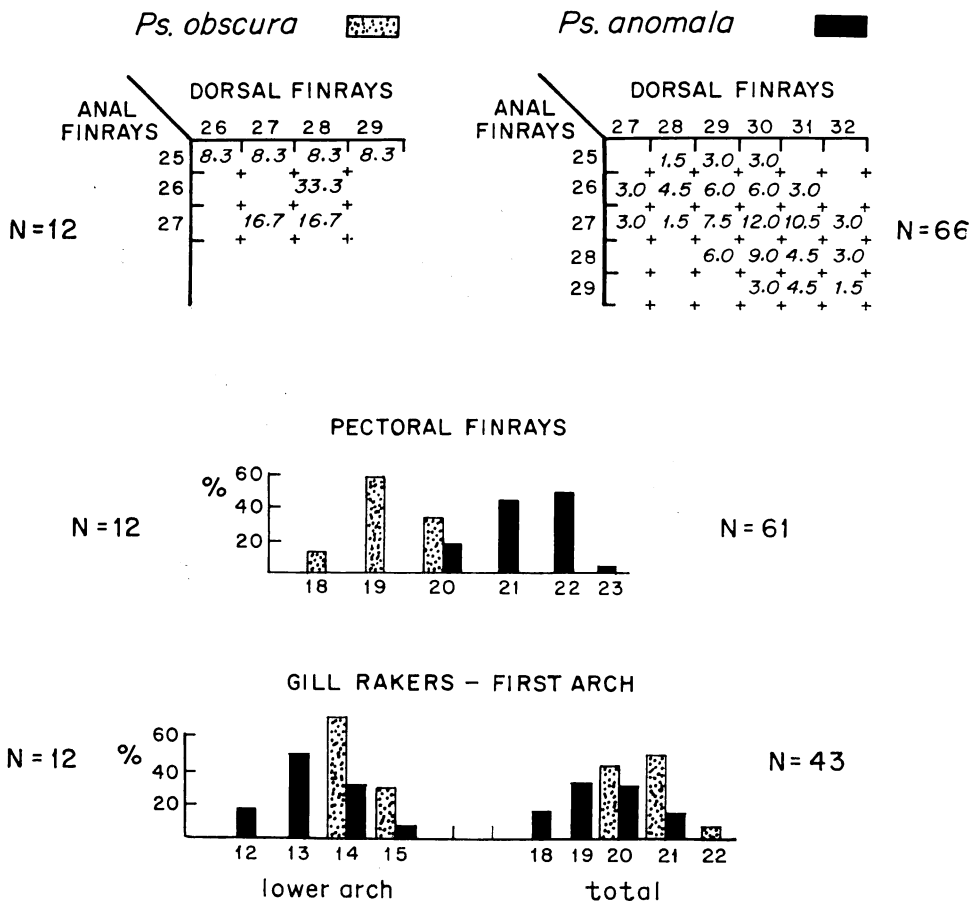


Fig. 5. Variation of some counts in *Ps. anomala* and *Ps. obscura*. Italicized numbers in the upper diagrams are percentages. N is the total number of specimens examined.

### Remarks

Four species have been previously described in the genus *Psenopsis*. *Ps. anomala* (TEMMINCK and SCHLEGEL 1850) and *Ps. shojimai* OCHIAI and MORI 1965 are deep-bodied forms from Japan. A third very deep-bodied form, *Ps. humerosa* MUNRO 1958, has been described from the Dampier Archipelago, northwestern Australia. *Ps. cyanea* (ALCOCK 1890) is an elongate species from the Indian Ocean. Body proportions and counts for these species and for *Ps. obscura* are shown in Table 1.

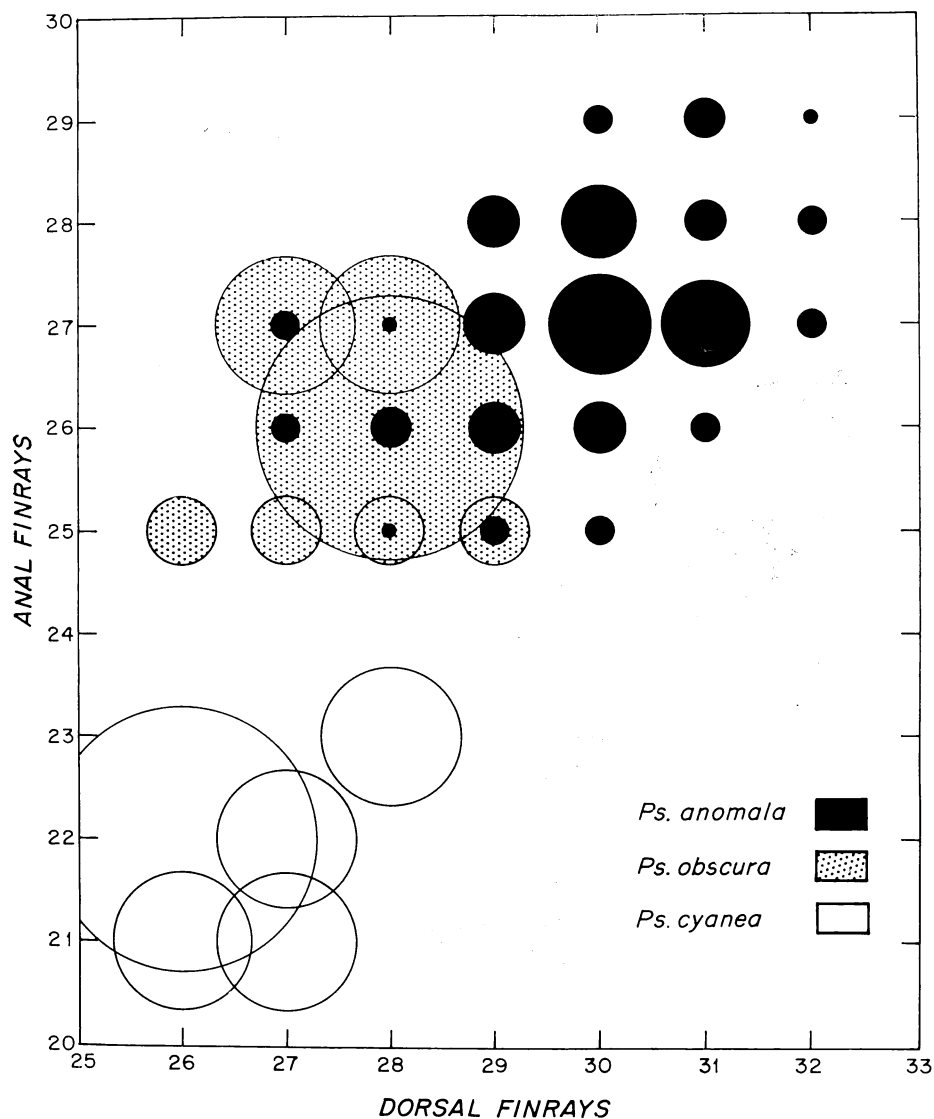


Fig. 6. Simultaneous variation in the number of dorsal and anal finrays in *Ps. anomala*, *Ps. obscura*, and *Ps. cyanea*. The number of specimens examined is 66, 12, and 6, respectively. Size of each circle is proportional to the percent of the sample falling within the circle.



*Psenopsis obscura* is intermediate in body depth between the deep-bodied *Ps. anomala* and the elongate *Ps. cyanea*; partial separation is provided by interorbital width, and *cyanea*, but not *anomala*, can be distinguished from *obscura* with respect to eye diameter (Fig. 3, Table 1). Separation using these proportions is good over the size range of the specimens of *obscura* and *cyanea* at hand (90-140 mm SL) but, because of the allometric growth to be expected in these fishes, such separation is not likely to be valid at all growth stages. The allometry displayed by *Ps. anomala* is shown in Fig. 4. The ranges of proportions for *Ps. shojimai*, hatched in this figure, suggest that *anomala* and *shojimai* may in fact be synonymous. The counts for both are almost identical (Table 1).

*Psenopsis obscura* is further distinguished from *cyanea* in having more anal finrays (25-27 vs. 21-23), and is distinguished from *anomala* in having fewer pectoral finrays (18-20 vs. 20-23). The overall meristic variation in the two species *anomala* and *obscura* is shown in Fig. 5. A comparison between the dorsal and anal finray counts of *anomala*, *cyanea*, and *obscura* is presented in Fig. 6. The relative size of each circle in this figure indicates the percent of the sample falling at that particular locus.

Previous indications are that *Psenopsis* species are in general small, fully mature by the time they are 180 mm in standard length (HAEDRICH, 1967). The specimens of *obscura* and *cyanea* are no exception; all of them are at or approaching maturity. The larger females of *Ps. obscura* from the Andaman Sea may have spawned shortly before capture. The holotype of *Ps. obscura* is a mature male.

The five specimens of *Psenopsis cyanea* taken by the "Anton Bruun" came from 105 fathoms, but this species has also been recorded from as shallow as 1½ fathoms, (HAEDRICH, 1967). The holotype was taken by the "Investigator" in 98 to 102 fathoms (ALCOCK, 1890). In contrast in other *Psenopsis*, in particular *Ps. anomala* (the subject of an inshore trap fishery in Japan), *Ps. obscura* appears to live at considerable depth. The holotype was taken in 435 fathoms over a fine gray sand and mud bottom; the eleven specimens from the "Anton Bruun" were taken in 293 meters (=160 fathoms).

The stomachs of all but one of the eleven "Anton Bruun" specimens of *Psenopsis obscura* contained the remains of small annelid worms, probably errant polychaetes.

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