

# Review of the soles of the genus *Aseraggodes* (Pleuronectiformes: Soleidae) from the Indo-Malayan region, with descriptions of nine new species

by

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**ABSTRACT.** - The following 16 soles of the genus *Aseraggodes* Kaup are reported from the East Indies and southeast Asia: *A. albidus* n. sp., one specimen, Sulawesi; *A. beauforti* Chabanaud, one specimen, Timor Sea, 216 m (a smaller specimen identified as *beauforti* by Chabanaud is *A. kaianus*); *A. chapleaui* n. sp., one specimen, Madang, Papua New Guinea, coral reef, 30 m; *A. dubius* Weber, ten specimens, Gulf of Carpentaria, Arafura Sea, Gulf of Thailand, and South China Sea, 45-82 m; *A. kaianus* (Günther), Arafura Sea, Timor Sea, Taiwan, and southern Japan, 128-236 m; *A. kimurai* n. sp., two market specimens, Negros, Philippines; *A. longipinnis* n. sp., one specimen, Banda Sea, coral reef; *A. matsuurai* n. sp., four specimens, Indonesia and Philippines, coral reefs; *A. microlepidotus* Weber, one specimen, Sumbawa, Indonesia, 274 m; *A. satapoomini* n. sp., one specimen, Similan Islands, Andaman Sea, coral reef; *A. senoui* n. sp., one specimen, Mabul, Malaysia; *A. suzumotoi* n. sp., seven specimens, bays of Indonesia; *A. texturatus* Weber, one specimen, Timor Sea, 216 m; *A. winterbottomi* n. sp., three specimens, Philippines, coral reefs; *A. xenicus* (Matsubara and Ochiai), 16 specimens, Micronesia (*A. smithi* Woods, a synonym) and Indonesia to Taiwan and Ryukyu Islands, coral reefs; *A. zizette* n. sp., one specimen, Mentawai Islands, Indonesia. A lectotype is designated for *A. cyaneus* (Alcock) from eastern India.

**RÉSUMÉ.** - Révision des soles du genre *Aseraggodes* (Pleuronectiformes: Soleidae) de la région indo-malaise avec la description de neuf nouvelles espèces.

Seize espèces de Soleidae appartenant au genre *Aseraggodes* Kaup sont décrites ; elles proviennent de l'océan Indien est et du sud-est asiatique. *A. albidus* n. sp., fondée sur un seul spécimen provenant de Sulawesi ; *A. beauforti* Chabanaud fondée sur un spécimen provenant de la mer de Timor à 216 m de profondeur (un spécimen plus petit, identifié comme *A. beauforti* par Chabanaud, appartient à l'espèce *A. kaianus*) ; *A. chapleaui* n. sp., fondée sur un spécimen provenant des récifs coralliens de Madang, Papouasie Nouvelle-Guinée, à 30 m de profondeur ; *A. dubius* Weber, fondée sur dix spécimens provenant du golfe de Carpentarie, de la mer d'Arafura, du golfe de Thaïlande et de la mer de Chine du Sud, à une profondeur de 45-82 m ; *A. kaianus* (Günther) provenant de la mer d'Arafura, de la mer de Timor et du sud du Japon à une profondeur de 128-236 m ; *A. kimurai* n. sp., fondée sur deux spécimens provenant du marché de Negros, Philippines ; *A. longipinnis* n. sp., fondée sur un spécimen provenant des récifs coralliens de la mer de Banda ; *A. matsuurai* n. sp., fondée sur quatre spécimens provenant des récifs coralliens d'Indonésie et des Philippines ; *A. microlepidotus* Weber fondée sur un exemplaire provenant du Sumbawa, Indonésie, à une profondeur de 274 m ; *A. satapoomini* n. sp., fondée sur un spécimen provenant des récifs coralliens des îles Similan de la mer d'Andaman ; *A. senoui* n. sp., fondée sur un spécimen provenant de Mabul, Malaisie ; *A. suzumotoi* n. sp., fondée sur sept spécimens provenant de la baie d'Indonésie ; *A. texturatus* Weber fondée sur un spécimen provenant de la mer de Timor à une profondeur de 216 m ; *A. winterbottomi* n. sp., fondée sur trois spécimens provenant des récifs coralliens des Philippines ; *A. xenicus* (Matsubara et Ochiai) fondée sur 16 spécimens provenant des récifs coralliens de Micronésie (*A. smithi* Woods est synonyme de *A. xenicus*) et de l'Indonésie jusqu'à Taiwan et aux îles Ryūkyū ; *A. zizette* n. sp., fondée sur un spécimen provenant de l'île Mentawai, Indonésie. Un lectotype de *A. cyaneus* est désigné, espèce provenant de l'est des Indes.

Key words. - Soleidae - *Aseraggodes* - ISW - Indo-Malayan region - New species - Taxonomy.

The flatfish family Soleidae is one of the largest of the order Pleuronectiformes, with 31 genera. Species of the family are found in tropical to temperate seas of all oceans, from nearshore to the deep sea, and several are known from freshwater. The present paper deals with the species of one of the largest genera, *Aseraggodes* Kaup, all of which occur in the tropical and subtropical Indo-Pacific region, except for the southern Australian species *A. haackeanus* (Steindachner) and one eastern Pacific species, *A. herrei* Seale. The listing

of the latter from the western Central Pacific by Munroe in Carpenter and Niem (2001) is an error (T.A. Munroe, pers. comm.).

The genus *Aseraggodes* was described by Kaup (1858) for his new species *A. guttulatus* from the island of Réunion. Only seven species were known in the genus up to 1913. In that year Weber described three new species from Indonesian waters. By 1965, only four more new species were described. Eschmeyer (1998) listed 28 species in the genus.

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Randall and Bartsch (2005) described two new species from Micronesia. Randall (2005) placed *Parachirus* Matsubara and Ochiai, type species *P. xenicus* Matsubara and Ochiai, in the synonymy of *Aseraggodes*, reclassified *Aseraggodes macleayanus* (Ramsay) in *Synclidopus* Chabanaud, referred *Aseraggodes persimilis* (Günther) and *A. ocellatus* Weed to the genus *Pardachirus* Günther, and described seven new species from the South Pacific region. Randall and Gon (2006) reviewed the species of *Aseraggodes* of the western Indian Ocean, describing three as new. In the present paper we review the 16 species from Indonesia, New Guinea, the Philippines, Malaysia, and Thailand, nine of which are described as new. *Aseraggodes melanostictus* (Peters), type locality Bougainville in the Solomon Islands, should be expected from New Guinea and Indonesia. Randall and Bartsch (2005) published two photographs and an X-ray of the holotype, and Randall (2005) provided a detailed diagnosis and identified an 86.5-mm specimen as *A. melanostictus* from 115 m in the Great Barrier Reef.

We follow Chabanaud (1943) in placing *Aseraggodes filiger* Weber in the genus *Coryphillus* Chabanaud because of its filamentous first dorsal ray, contiguous eyes, and slender body. We classify *Aseraggodes abnormis* (Weber and de Beaufort) in the monotypic genus *Beaufortella* Chabanaud, in view of the blind-side pelvic fin joined by membrane to the anal fin, the very acute shape of the urohyal, the dorsal and anal fins linked basally by membrane to the caudal fin, and the very broad interorbital space. The total number of species of the genus *Aseraggodes* now stands at 45, including those described herein.

The genus *Aseraggodes* seems most closely related to *Pardachirus*, and species have at time been misplaced in one or the other. The main difference is the presence of a prominent pore at the base of most dorsal and anal rays in the species of *Pardachirus*. As shown by Clark and George (1979), a powerful toxin is released through these pores from underlying glands when a sole of this genus is threatened.

Randall and Meléndez (1987) discovered that *Aseraggodes bahamondei* of the South Pacific also exudes a strong toxin under stress, visible as a milky secretion on the ocular side near the base of the dorsal and anal rays. No pores were externally visible, but very small pores were detected on the underside of occasional scales. Randall (2002) noted that *A. therese* in the Hawaiian Islands is unpalatable to the jack *Caranx melampygus*. He later found the pores beneath scales, but only by staining. Attempts to find pores in other species have usually been unsuccessful, especially in small specimens or old museum specimens.

As will be noted in tables I-V, the range in counts of fin rays, lateral-line scales, and even the number of vertebrae and anterior dorsal pterygiophores, is often highly variable. Because of this variability and having few specimens of

most species, meristic data may be limiting in the diagnosis of species and can be misleading.

It is expected that more undescribed species of the genus *Aseraggodes* remain to be discovered. The purpose of the present paper is to fully describe the nine new species and to provide a key and diagnoses to all. It would be premature at this time to discuss phylogenetic relationships.

*Aseraggodes normani* Chabanaud (1930b) from Queensland is included in the key to the Indo-Malayan species of the genus because it might be expected from New Guinea.

## MATERIALS AND METHODS

Specimens for this study have been examined at or obtained from the Academy of Natural Sciences of Philadelphia (ANSP); Australian Museum, Sydney (AMS); the Research Center for Biodiversity (formerly Institute of Zoology), Academia Sinica, Taipei (ASIZP); the Natural History Museum, London (BMNH); Bernice P. Bishop Museum, Honolulu (BPBM); Department of Biology, Faculty of Science, Kochi University (BSKU); California Academy of Sciences, San Francisco (CAS); Department of Fisheries, Faculty of Agriculture, Kyoto University, Maizuru (FAKU); Fisheries Research Laboratory, Mie University (FRLM); Kanagawa Prefectural Museum of Natural History, Odawara (KPM-NI); Muséum national d'histoire naturelle, Paris (MNHN); National Museum of Nature and Science, Tokyo (NSMT); Royal Ontario Museum, Toronto (ROM); South African Institute for Aquatic Biodiversity, Grahamstown (SAIAB), U.S. National Museum of Natural History, Washington, D.C. (USNM), and the Zoologisch Museum, Amsterdam (ZMA).

Standard length (SL) is measured horizontally from the front of the upper lip to the base of the caudal fin (end of hypural plate). Body depth is the maximum distance between the bases of the dorsal and anal fins; body width is the maximum thickness midlaterally between the ocular and blind surfaces (discounting abdomen, if distended). Head length is measured from the front of the upper lip to a vertical at the posterior end of the operculum. Preorbital length is the distance from the front edge of the upper eyeball (dark part of the eye, hereafter termed only as the eye) directly forward to the anterior edge of the dorsal fin (but not to tips of cirri). Snout length is taken from the front of the upper lip to the nearest edge of the upper eye. Eye diameter is the greatest diameter of the lower eye (not the fleshy cutaneous part). Interorbital width is the vertical distance between horizontal lines at the lower edge of the upper eye and upper edge of the lower eye. Upper-jaw length is measured on the blind side from the front of the upper lip to the rear edge of the maxilla (often difficult to determine the posterior end of the maxilla on the ocular side). Caudal-peduncle depth is the

least depth (if the caudal peduncle is absent, the depth is measured at the base of the caudal fin). Caudal-peduncle length is the horizontal distance between verticals at the rear base of the anal fin and the base of the lowermost caudal ray. Lengths of fin rays of median fins are measured from the ray base (not where the ray emerges from a basal scaly sheath) in a straight line to the tip. Pelvic-fin length is taken from the base of the first ray to the tip of the longest ray.

Tables I-V provide the counts of the dorsal rays, anal rays, lateral-line scales, vertebrae, and the number of dorsal pterygiophores anterior to the fourth neural spine, respectively. Proportional measurements of the new species are given in tables VI-XVI as percentages of the standard length. Measurements (ratios related to SL, body depth or head length) in the text are rounded to the nearest 0.05. Measurements relating to eye diameter are based on the size of the dark part of the lower eye. Data in parentheses in the descriptions of new species refer to paratypes.

Lateral-line scales are counted only on the ocular side from the base of the caudal fin to the front of the lateral line on the head (therefore including several scales anterior to the upper end of the gill opening). Counts of lateral-line scales of the blind side are difficult because there is often no definitive anterior end. Scale counts above and below the lateral line are the highest obtained on the ocular side in an oblique row between the lateral line and the outer edge of the scaly sheath at the base of the dorsal and anal fins, respectively.

Vertebral counts for soles are often given in two parts, the abdominal vertebrae, followed by the caudal vertebrae. There are normally 10 abdominal vertebrae in all the species of *Aseraggodes* examined (the count includes the very small first vertebra that has been overlooked by some authors), so only the total vertebral count is given here, which includes the urostyle.

Ochiai (1963) used the count of the number of dorsal pterygiophores (he called these interneural spines) associated with the first three vertebrae (actually four, as he did not include the first very small vertebra) as a taxonomic character. He is followed in the use of this helpful count.

We follow the terminology of Ochiai (1963: text-fig. 1A) in the names of the branches of the lateralis system on the blind side of the head. However, the cephalic lateral-line system is obscure on many old or poorly preserved museum specimens and therefore could not be described.

Detecting sensory papillae, fine cirri, and ctenii on scales was facilitated by the use of Cyanine Blue 5R (Acid Blue 115), as demonstrated by Saruwatari *et al.* (1997).

None of the known species of *Aseraggodes* exhibit any but traces of the colours of the rainbow in life. The dominant ground colour is usually brown, sometimes yellowish brown or rarely greenish or bluish brown or grey. Seven species in this paper were photographed in colour but published here in black and white. When referring to these figures as the fresh

colouration, bear in mind what were various shades of brown are now shades of grey.

## GENUS *ASERAGGODES* KAUP

*Aseraggodes* Kaup, 1858: 103 (type species, *Aseraggodes guttulatus* Kaup, 1858, by subsequent designation of Jordan and Evermann, 1898: 2695).

*Parachirus* Matsubara and Ochiai 1963: 93 (type species, *Parachirus xenicus* Matsubara and Ochiai, 1963, by original designation and monotypy).

### Diagnosis

Dorsal rays 58-79; anal rays 39-61; caudal rays typically 18 (usually 14-16 branched in adults); no pectoral fins; pelvic rays normally 5; lateral-line scales 60-102 (including those extending onto head); no gill rakers; abdominal vertebrae 10 (including the very small first vertebra, not counted by some authors); total vertebrae 33-40; first two dorsal pterygiophores joined to a thicker bone (termed the erisma and counted as the first pterygiophore, though branched distally to support the first two dorsal rays), its origin between second neural spine and cranium, 7-16 dorsal pterygiophores anterior to fourth neural spine; body an elongate oval, the depth 2.0 to 2.8 in SL, and very thin; head length 2.9-5.1 in SL; eyes on right side, elevated, separated by a narrow scaled space; upper eye in advance of lower eye or rarely directly above; eyes small, 3.8-8.3 in head length; caudal peduncle, if present, very short; two nostrils on each side, the anterior nostril of both sides tubular, not more than one eye diameter in length; posterior nostril of ocular side a narrow opening in labial groove before lower eye, covered dorsally by skin or membrane; scales small, ctenoid (except lateral-line scales); a straight lateral-line midlaterally on both sides of body; cephalic lateralis system on blind side of head in branches often obscure, the cephalodorsal branch (supratemporal branch of some authors) from front of snout along base of dorsal fin generally the most evident; a very small sensory pore, usually at end of a small papilla, on snout above base of tubular anterior nostril at about level of ventral edge of upper eye; gill membranes united, free from isthmus, the lower part of head scaled over from ocular to blind side; mouth ventral and small, the jaws strongly curved; a band of villiform teeth on blind side of jaws, but not on ocular side (except one to two rows of tiny teeth on ocular side of upper jaw of *A. dubius*); dorsal fin originating anteriorly on snout, the first ray not prolonged; no pore at base of dorsal and anal rays; caudal fin not connected by membrane to dorsal and anal fins, the fin rounded (may seem rhomboid if rays not spread), the fin length 2.7-5.8 in SL; pelvic fins on ventral edge of body, close together anteriorly, the origins adjacent or with ocular-side fin slightly anterior;

anus anterior or ventroanterior to first anal ray. Sciatic part of urohyal forming an angle of about 60 to 90° to horizontal main part of bone.

### Remarks

Some generic characters are not repeated in species accounts.

The freshwater species *Aseraggodes klunzingeri* Weber is not included in the present paper because it will be placed in a new genus. It is distinct in having a more slender body, 4 pelvic rays, and 39-42 vertebrae.

### KEY TO THE INDO-MALAYAN SPECIES OF *ASERAGGODES*

- 1a. Pelvic fins attached posteriorly and joined by membrane to base of genital papilla; lateral line on ocular side of head with one or two branches .....2
- 1b. Pelvic fins not attached and not joined by membrane to genital papilla; lateral line of ocular side of head without branches (except *albidus*) .....3
- 2a. Lateral line on head with two branches; anal rays 47-55; dorsal and anal rays unbranched; dorsal pterygiophores anterior to fourth neural spine 9-11 (Queensland, Northern Territory, and Papua New Guinea).....*normani*
- 2b. Lateral line on head with one ventral branch over margin of preopercle; anal rays 41-45; dorsal and anal rays of adults branched; dorsal pterygiophores anterior to fourth neural spine 14-15 (islands of Micronesia and Indonesia to Andaman Sea, Taiwan and Ryukyu Islands) .....*xenicus*
- 3a. Lateral line on ocular side of head forked, with a second branch extending ventrally over preopercle from lower fork; colour of ocular side white in life (one specimen, Sulawesi, Indonesia) .....*albidus* sp. nov.
- 3b. Lateral line on ocular side of head without branches; colour of ocular side not white in life .....4
- 4a. Lateral-line scales 102, including 21 anterior to upper end of gill opening; head very obtuse, the snout barely projecting anterior to upper lip, the preorbital length 4.0 in head length; dorsal and anal rays unbranched (one specimen, Sumbawa, Indonesia, 274 m).....*microlepidotus*
- 4b. Lateral-line scales 64-87; head not very obtuse, the preorbital length 2.55-3.5 in head length; dorsal and anal rays branched or unbranched .....5
- 5a. Caudal peduncle present (though very short) .....6
- 5b. Caudal peduncle absent (base of last anal ray below or posterior to base of lowermost caudal ray) .....11
- 6a. Dorsal and anal rays unbranched; one to two rows of tiny teeth on ocular side of upper jaw; vertebrae 36-39 (Gulf of Carpentaria and Indonesia to Gulf of Thailand) .....*dubius*
- 6b. Dorsal and anal rays branched (except juveniles); no teeth on ocular side of upper jaw; vertebrae 34-37 .....7
- 7a. Lateral-line scales 64; eye small, 6.3 in head length; dorsal pterygiophores anterior to fourth neural spine 11 (one specimen, Mentawai Islands, Sumatra).....*zizette* sp. nov.
- 7b. Lateral-line scales 66-87; eye not small, less than 6.0 in head length; dorsal pterygiophores anterior to fourth neural spine modally 12-14 .....8
- 8a. Pelvic fins short, 2.1-2.45 in head length; caudal fin short, 3.8-4.9 in SL; lateral-line scales 66-72; vertebrae 34-35; dorsal pterygiophores anterior to fourth neural spine 11-13 (Molucca Islands and Sulawesi, Indonesia).....*suzumotoi* sp. nov.
- 8b. Pelvic fins not short, 1.55-1.75 in head length; caudal fin not short, 2.7-3.65 in SL; lateral-line scales 71-86; vertebrae 35-37; dorsal pterygiophores anterior to fourth neural spine 13-15.....9
- 9a. Lateral-line scales 86; dorsal rays 73; longest dorsal ray 1.5 in head length (one specimen, Papua New Guinea, 30 m) .....*chappleai* sp. nov.
- 9b. Lateral-line scales 69-76; dorsal rays 66-71; longest dorsal ray 1.1-1.4 in head .....10
- 10a. Caudal fin 3.2-3.65 in SL; small scales of ocular side of snout extending nearly to front edge, where replaced by small cirri; lateral-line scales 69-72 (Negros, Philippines) .....*kimurai* sp. nov.
- 10b. Caudal fin 2.7 in SL; a broad zone of cirri on ocular side of snout before base of anterior nostril; lateral-line scales 76 (Banda Sea, Indonesia) .....*longipinnis* sp. nov.
- 11a. Vertebrae 39-40 .....12
- 11b. Vertebrae 35-37 .....13
- 12a. Eyes near centre of head, the vertical distance from interorbital space to base of dorsal fin about equal to distance from interorbital space to ventral edge of head; dorsal and anal rays branched; elongate black patches in dorsal and anal fins parallel with rays (one specimen, Timor Sea, Indonesia, 216 m) .....*texturatus*
- 12b. Eyes low on head, the vertical distance from interorbital space to base of dorsal fin nearly twice distance from interorbital space to ventral edge of head; dorsal and anal rays unbranched; no elongate black patches in dorsal and anal fins (one specimen, Timor Sea, Indonesia, 216 m) .....*beauforti*

13a. Eyes very small, 7.0-8.3 in head length; lateral-line scales 73-76; body with a midlateral row of large dusky spots and numerous dark-edged white spots smaller than eye, those on fins forming a net pattern (Arafura and Timor Seas of Indonesia and southern Japan, 128-236 m) .....*kaianus*

13b. Eyes not small, 4.25-4.6 in head length; lateral-line scales 68-73; colour not as in 13a.....14

14a. Ocular side of snout fully scaled, the upper lip scaled over; pelvic fins reaching base of third anal ray, the longest ray 11.1-11.4% SL (Philippines) .....*winterbottomi* sp. nov.

14b. Ocular side of snout with papillae before anterior nostril, the upper lip distinct; pelvic fins not reaching beyond base of second anal ray, the longest ray 9.8-10.8% SL.....15

15a. Ocular side of snout before anterior nostril with irregular, flat, fleshy papillae separated by narrow spaces forming a labyrinth; caudal fin 3.95 in SL; no posterior flap with long cirri on ventroposterior end of operculum; only a few or no cirri on membranous ridge of anterior dorsal and anal rays (Similan Islands, Andaman Sea).....*satapoomini* sp. nov.

15b. Ocular side of snout before anterior nostril with a dense zone of pointed papillae; caudal fin 4.25-4.6 in SL; a posterior flap with long cirri on ventroposterior end of operculum; many cirri on membranous ridge of anterior dorsal and anal rays .....16

16a. Caudal rays 18; tubular anterior nostril long, extending to or posterior to anterior edge of eye when depressed posteriorly; eye diameter 4.1-4.55 in head length; longest dorsal ray 1.5-1.6 in head length (Philippines and Indonesia) .....*matsuurai* sp. nov.

16b. Caudal rays 16; tubular anterior nostril short, not reaching cutaneous edge of eye when extended posteriorly; eye diameter 3.8 in head length; longest dorsal ray 1.4 in head length (one specimen, Mabul Island, Malaysia) .....*senoui* sp. nov.

***ASERAGGODES ALBIDUS* SP. NOV.**

(Fig. 1; Tabs. I-VI)

**Material examined**

*Holotype*. - BPBM 38802, 29.3 mm, Indonesia, Sulawesi, Lembah Strait, off Kungkungan Bay, dark silty sand, 15 m, caught in plastic bag, J.E. Randall, 23 Sept. 2000.

**Diagnosis**

Dorsal rays 67; anal rays 49; lateral-line scales of ocular

side 73, including 9 anterior to upper end of gill opening, where it forks, with a ventral branch from lower fork over edge of preopercle; lateral line continuing into basal scaled part of caudal fin, with 6 pores; vertebrae 35; dorsal pterygiophores anterior to fourth neural spine 12; body depth 2.7 in SL; head length 4.2 in SL; no caudal peduncle; snout length 2.65 in head length; preorbital length 3.25 in head length; eyes small, 6.1 in head length; interorbital space 9.5 in head length; tubular anterior nostril not reaching fleshy edge of orbit when depressed posteriorly; scales ctenoid with 3 to 5 cteni; scales on ocular side of snout smaller, fleshy, and with fewer cteni, replaced before anterior nostril with thin, irregular, longitudinal, fleshy ridges; longest dorsal ray 1.65 in head length; caudal fin 4.15 in SL; pelvic fins reaching base of second anal ray, 1.9 in head length, colour in alcohol pale brown with three rows of faint brown spots smaller than pupil, one row beneath dorsal fin, one along lateral line, and one above base of anal fin; fins paler brown; colour of ocular side in life white.

**Description**

Dorsal rays 67, none branched; anal rays 49, none branched; caudal rays 18, the middle 14 branched; pelvic rays 5, all but first branched; lateral-line scales on ocular side 73, including 9 before a vertical at upper end of gill opening; anterior end of lateral line on head branched to a fork of about 60°, the upper part of 6 scales and the lower of 5 scales; middle of lower branch with a ventral branch of 6 scales over edge of preopercle; scales above lateral line about 29; scales below lateral line about 34; vertebrae 35; 4 pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 5 pterygiophores; space between third and fourth neural spines with 3 pterygiophores (hence a total of 12 dorsal pterygiophores anterior to fourth neural spine). Ventroanterior margin of the urohyal forming an angle of about 85°, the inner angle moderately rounded.

Body oval and elongate, the depth 2.7 in SL; body thin,

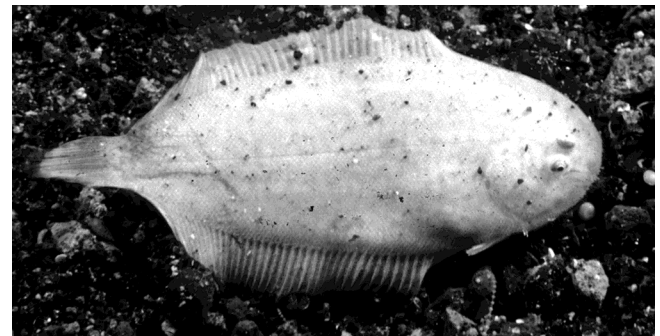


Figure 1. - Holotype of *Aseraggodes albidus*, BPBM 38802, 29.3 mm SL, Sulawesi, Indonesia (Photo J. Randall).

Table I. - Dorsal rays of Indo-Malayan species of *Aseraggodes* [Nombre de rayons de la nageoire dorsale des espèces indo-malaisiennes d'*Aseraggodes*].

	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
<i>A. albidus</i>								1												
<i>A. beauforti</i>																			1	
<i>A. chapleaui</i>													1							
<i>A. dubius</i>												1	3	1	1				2	1
<i>A. kaianus</i>						1		1	2		1									
<i>A. kimurai</i>						1				1										
<i>A. longipinnis</i>											1									
<i>A. matsuurai</i>						1	1	1		1										
<i>A. microlepidotus</i>														1						
<i>A. satapoomini</i>							1													
<i>A. senoui</i>							1													
<i>A. suzumotoi</i>						1	2	1		1	1	1								
<i>A. texturatus</i>															1					
<i>A. winterbottomi</i>							1	1			1									
<i>A. xenicus</i>	1		1	2	4	3	3		1											
<i>A. zizette</i>						1														

Table II. - Anal rays of Indo-Malayan species of *Aseraggodes*. [Nombre de rayons de la nageoire anale des espèces d'*Aseraggodes* de l'Indo-Malaisie].

	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
<i>A. albidus</i>									1						
<i>A. beauforti</i>														1	
<i>A. chapleaui</i>									1						
<i>A. dubius</i>										2	2	3	2	1	
<i>A. kaianus</i>								1	1	3					
<i>A. kimurai</i>						1		1							
<i>A. longipinnis</i>									1						
<i>A. matsuurai</i>									2	1		1			
<i>A. microlepidotus</i>															1
<i>A. satapoomini</i>									1						
<i>A. senoui</i>									1						
<i>A. suzumotoi</i>								1	2	2	1	1			
<i>A. texturatus</i>														1	
<i>A. winterbottomi</i>										1	1	1			
<i>A. xenicus</i>	2	4	4	4	1										
<i>A. zizette</i>								1							

Table III. - Lateral-line scales of Indo-Malayan species of *Aseraggodes*. \* The lateral-line scale count for the holotype and only known specimen of *A. microlepidotus* is 102. [Nombres d'écaillés de la ligne latérale chez les espèces indo-malaisiennes d'*Aseraggodes*. \* Nombre d'écaillés de la ligne latérale de l'holotype, seul spécimen connu, de *A. microlepidotus* est 102.]

	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
<i>A. albidus</i>											1													
<i>A. beauforti</i>													1											
<i>A. chapleaui</i>																								1
<i>A. dubius</i>						1	1	1	3		1	1	1		1	1								
<i>A. kaianus</i>										1		3	1											
<i>A. kimurai</i>						1				1														
<i>A. longipinnis</i>														1										
<i>A. matsuurai</i>						1		2	1															
<i>A. satapoomini</i>						1																		
<i>A. senoui</i>											1													
<i>A. suzumotoi</i>				1	2	1	1	1	1															
<i>A. texturatus</i>																				1				
<i>A. winterbottomi</i>							1	1		1														
<i>A. xenicus</i>	1	2	2	4	2	1	2	1																
<i>A. zizette</i>		1																						

Table IV. - Vertebrae of Indo-Malayan species of *Aseraggodes*. [Nombre de vertèbres chez les espèces indo-malaisiennes d'*Aseraggodes*.]

	33	34	35	36	37	38	39	40
<i>A. albidus</i>			1					
<i>A. beauforti</i>								1
<i>A. chapleaui</i>			1					
<i>A. dubius</i>				1	1	6	2	
<i>A. kaianus</i>				1	4			
<i>A. kimurai</i>			1	1				
<i>A. longipinnis</i>				1				
<i>A. matsuurai</i>			2	2				
<i>A. microlepidotus</i>							1	
<i>A. satapoomini</i>				1				
<i>A. senoui</i>					1			
<i>A. suzumotoi</i>			2	5				
<i>A. texturatus</i>							1	
<i>A. winterbottomi</i>				3				
<i>A. xenicus</i>	4	8	1					
<i>A. zizette</i>				1				

the width (thickness) 4.6 in body depth; head length 4.2 in SL; no caudal peduncle; depth of caudal-fin base 1.85 in head length; snout length moderately long, 2.65 in head length; preorbital length 3.25 in head length; eye diameter 6.1 in head length; eyes separated by a narrow concave space, the least vertical interorbital width 9.5 in head length; upper eye overlapping one-fourth of lower eye; a line parallel to lateral line connecting upper end of gill opening and ventral edge of lower eye. Mouth inferior, the jaws strongly curved; maxilla extending slightly posterior to a vertical through centre of lower eye, the upper-jaw length 2.7 in head length; dentition not checked due to small size of specimen and firmly closed mouth; tubular anterior nostril in front of upper half of lower eye, not reaching cutaneous edge of lower eye when depressed posteriorly, its length about one-half eye diameter; a small papilla with a pore on snout

anterior to ventral edge of upper eye and dorsal to front of base of anterior nostril (also seen on other species); posterior nostril a small aperture at base of lower third of eye (difficult to detect) in labial groove directly in front of ventral third of lower eye (also present in other species), anterior nostril of blind side a slender membranous tubule above upper lip nearly in middle of upper jaw, an eye diameter in length; posterior nostril of blind side a short, broad-based, pointed tubule an eye diameter dorsoposterior to anterior nostril.

Scales ctenoid on both sides, with 3 to 5 cteni; scales on ocular side of snout smaller, fleshy, and with fewer cteni, replaced before anterior nostril with thin, irregular, longitudinal, fleshy ridges; eyes separated by about three rows of small scales, with scales extending onto medial and anterior edges of eyes; anterior edge of predorsal part of snout with slender cylindrical cirri, a tuft of four just above upper lip;

Table V. - Number of dorsal pterygiophores anterior to fourth neural spine of Indo-Malayan species of *Aseraggodes*. [Nombre de ptérygiophores antéro-dorsaux jusqu'à la quatrième épine neurale chez les espèces indo-malaisiennes d'*Aseraggodes*.]

	9	10	11	12	13	14	15
<i>A. albidus</i>				1			
<i>A. beauforti</i>					1		
<i>A. chapleaui</i>					1		
<i>A. dubius</i>				2	2		
<i>A. kaianus</i>		1	3	1			
<i>A. kimurai</i>					1	1	
<i>A. longipinnis</i>						1	
<i>A. matsuurai</i>		3	1				
<i>A. microlepidotus</i>			1				
<i>A. satapoomini</i>			1				
<i>A. senoui</i>		1					
<i>A. suzumotoi</i>			2	4	1		
<i>A. texturatus</i>		1					
<i>A. winterbottomi</i>	1	2					
<i>A. xenicus</i>						8	5
<i>A. zizette</i>			1				

about 20 similar cirri along ventral edge of head, the one just below lower lip the longest, three-fourths eye diameter; lesser cirri medially on blind side; long cirri also present adjacent to lower lip; prominent cirri on opercular edge of gill opening of blind side, but not detected on ocular side; a broad zone of low pointed papillae on blind side of chin and extending from above upper jaw to basal part of dorsal fin; lateral line straight on both sides along middle of body, projecting forward on ocular side (before the branching) to above upper eye; lateral line of ocular side slightly raised, in contrast to that of ventral side, slightly recessed; lateral line continuing into basal scaled part of caudal fin, with 6 pores; branches of lateralis system of blind side of head conspicuous as single rows of sensory papillae: a row from chin along ventral part of head, dividing to a preopercular branch and a mandibulo-opercular branch continuing near edge of opercle to end of gill opening; one to two rows of papillae around mouth; cephalodorsal branch continuing as the dorsolateral line about half way back on body.

Two rows of scales over base of dorsal and anal fins; a narrow membranous ridge on basal half or more of dorsal and anal rays; cirri on edges of membranous ridges of about anterior third of dorsal fin on blind side.

Origin of dorsal fin (base of first ray) anterior to upper eye, the predorsal length 3.45 in head length; first dorsal ray (tip free) 4.15 in head length; longest dorsal ray 1.65 in head length; origin of anal fin below base of 20<sup>th</sup> dorsal ray, the preanal length 3.7 in SL; anus anterior to first anal ray; genital papilla on ocular side dorsoposterior to anus at base of first anal ray; length of first anal ray 3.6 in head length; longest anal ray 1.65 in head length; caudal fin 4.15 in SL; pelvic fins close together on ventral edge of body, but not linked by membrane, and with no connection of membrane

Table VI. - Proportional measurements of the holotype of *Aseraggodes albidus* (BBPM 38802) as percentages of the standard length. [Mesures proportionnelles de l'holotype d'*Aseraggodes albidus* en pourcentage de la longueur standard.]

Standard length (mm)	29.3
Body depth	37.4
Body width	7.5
Head length	23.7
Snout length	8.9
Preorbital length	7.3
Eye diameter	3.9
Interorbital width	2.5
Upper-jaw length	8.7
Caudal-fin base depth	12.8
Predorsal length	6.9
Preanal length	27.0
Prepelvic length	19.4
First dorsal ray	5.7
Longest dorsal ray	14.5
First anal ray	10.4
Longest anal ray	14.5
Caudal-fin length	24.0
Pelvic-fin length	12.3

to genital papilla; origin of ocular-side pelvic fin one-ray width anterior to origin of blind-side fin; prepelvic length 5.15 in SL; third pelvic rays longest, just reaching base of third anal ray, 1.9 in head length.

Colour in alcohol pale brown with three rows of brown spots smaller than pupil: one of about 17 spots below base of dorsal fin, one of about 16 along lateral line, and one about 10 above base of anal fin; fins paler brown; the rays of dorsal and anal fins more pigmented than the membranes, the reverse for the caudal fin.

Colour in life bluish white, the scales faintly edged in pale brownish orange; small brown spots described above more evident on preserved specimen than in life (spots now brownish orange); operculum with interconnected pale orangish brown blotches. Note that sand grains of black, grey, and white are present on the ocular side in the black and white copy of the colour photograph.

**Etymology**

Named *albidus* from the Latin for white, in reference to the unusual white overall colour of the ocular side of this sole in life.

**Remarks**

This species is represented by only one small specimen, probably a juvenile or subadult (no gonad was detected). It is easily separated from all the known species of the genus, except *A. normani* Chabanaud and a new species from Northern Territory, Australia, in having a double branching lateral line on the ocular side of the head. It shares many other characters with *normani*, including meristics, except

for having 12 dorsal pterygiophores anterior to the fourth neural spines instead of 10 or 11. It is most convincingly different from *normani* in not having the pelvic fins joined by membrane, and with no connection of the pelvic membrane to the genital papilla. The lateral line does not extend out on the caudal fin beyond the basal scaled part. The dorsal and anal rays of *albidus* are shorter, 1.65 in the head length, compared to 1.35-1.5 for *normani* (median fins tend to shorten with growth in species of *Aseraggodes*, so this difference is not due to the different size of the specimens). Also, *normani* is distinct in its black-dotted colour pattern.

### **ASERAGGODES BEAUFORTI CHABANAUD**

(Fig. 2; Tabs. I-V)

*Solea cyanea* (non Alcock) Weber, 1913: 435, pl. 11, fig. 3 (Timor Sea, 10°27.9'S, 123°28.7'E).

*Aseraggodes Beauforti* Chabanaud, 1930a: 189 (new name for *Solea cyanea* Weber).

#### **Material examined**

Timor Sea, ZMA 115.242, male, 49.2 mm (lectotype of *A. beauforti*).

#### **Diagnosis**

Dorsal rays 78; anal rays 53; no dorsal or anal rays branched; caudal rays 18, 16 branched, about 12 double-branched; lateral-line scales 75, including 10 anterior to upper end of gill opening; vertebrae 40; dorsal pterygiophores anterior to fourth neural spine 13; body depth 2.45 in SL; head length 4.7 in SL; no caudal peduncle (base of last anal rays slightly posterior to base of lowermost caudal ray); snout length 3.35 in head length; preorbital length 2.55 in head length; eyes low on head, the vertical distance from interorbital space to base of dorsal fin nearly twice distance from interorbital space to ventral edge of head; eyes small,

8.1 in head length; upper eye overlapping one-third of lower eye; least vertical interorbital width about 10.5 in head length, the eyes separated by two to three longitudinal rows of scales; upper end of gill opening on a horizontal line through ventral edge of lower eye; tubular anterior nostril on ocular side short, not longer than its base; front of lateral line directed toward dorsal edge of upper eye; scales of body strongly ctenoid with 8 to 12 long cteni (average about 10); scales on ocular side of snout extending nearly to front edge, those before anterior nostril without cteni; scales anteriorly on blind side of head also extending to front of head and without cteni anteriorly; cycloid scales extending well out on anterior part of dorsal fin on both sides; tubes of lateral-line scales evident on both sides; front of lateral line on ocular side directed toward dorsal edge of upper eye; cephalodorsal branch of lateral line visible on blind side, but other branches of cephalic sensory system not evident; cirri at front edge of snout and ventrally on head thin and variable in length, the longest on chin about two-thirds eye diameter; no cirri detected on opercular edge of gill opening of either side (they may have been present when first preserved; the specimen was obviously completely dried at one time); longest dorsal ray 1.5 in head length; no cirri visible on edge of dorsal and anal rays; caudal-fin length 4.35 in SL; pelvic fins may have reached base of second anal rays when fresh, the longest ray about 2.0 in head length; genital papilla not detected (unless it is a rounded longitudinal ridge at ventral edge of anus on blind side; pelvic fins attached by membrane to base of this ridge); colour of ocular side orangish brown; fin rays pale yellowish, the membranes translucent.

#### **Remarks**

This species was first reported by Weber (1913) as *Aseraggodes cyaneus* Alcock, 1890 (type locality east coast of India) from two specimens collected in the Timor Sea of Indonesia. Chabanaud (1930a) realized these are not *cyaneus* and described them as a new species, *A. beauforti*. Examination of the two syntypes revealed that the smaller specimen, 37.2 mm, is *A. kaianus* (Günther, 1880). The larger specimen, 49.2 mm, is here designated as the lectotype and retains the number ZMA 115.242.

It is curious that three species of *Aseraggodes* were taken at the same Siboga trawling station from 216 m in the Timor Sea: *A. beauforti*, *A. kaianus*, and *A. texturatus*.

*Aseraggodes beauforti* is easily distinguished at a glance by the unusual configuration of the head, with the very small eyes low on the head instead of near the middle as in other species. It is also distinct in being the only marine species of the genus with 40 vertebrae. Five new species of a related new genus from rivers of New Guinea and northern Australia have 40-42 vertebrae (Randall, in press).

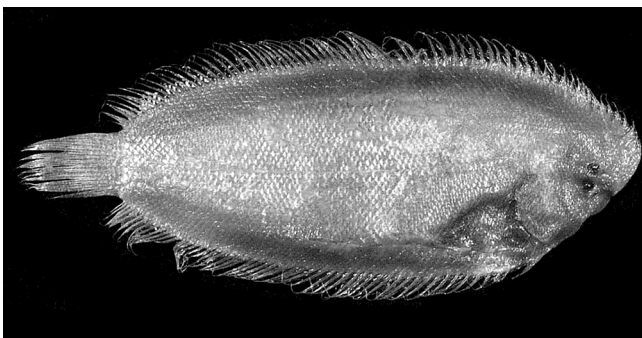


Figure 2. - Lectotype of *Aseraggodes beauforti*, ZMA 115.242, 49.2 mm, SL, Timor Sea (Photo M. Hauteceur).



**ASERAGGODES CHAPLEAUI SP. NOV.**

(Fig. 3; Tabs. I-V, VII)

**Material examined**

*Holotype.* - BPBM 15863, male, 35.5 mm, Papua New Guinea, Madang Province, Rausch Pass, south side, sloping sand bottom adjacent to isolated coral block, 30 m, rotenone, J.E. Randall and R.C. Steene, 18 Aug. 1973.

**Diagnosis**

Dorsal rays 73; anal rays 49; most dorsal and anal rays branched; lateral-line scales 86; vertebrae 35; dorsal pterygiophores anterior to fourth neural spine 13; body depth 2.55 in SL; head length 4.45 in SL; caudal peduncle present, its length 6.6 in head length; caudal-peduncle depth 1.7 in head length; snout length 2.6 in head length; preorbital length 2.65 in head length; eye diameter 5.0 in head length; interorbital space 6.8 in head length; tubular anterior nostril nearly reaching front edge of lower eye when laid back; well developed lappet-like cirri on front of snout and ventral side of head, the longest three-fourths eye diameter; scales with 7-10 cirri; scales dorsally on snout replaced with small cirri in front of base of anterior nostril; longest dorsal ray 1.5 in head length; caudal-fin length 3.2 in SL; pelvic-fin length 1.75 in head length, reaching base of third or fourth anal ray; colour of ocular side in alcohol pale yellowish; colour when fresh light grey-brown with scattered small blackish blotches and larger, irregular, white spots.

**Description**

Dorsal rays 73, branched except first 18 rays; anal rays 49, branched except first 2 rays; caudal rays 18, 15 branched, 13 double-branched; pelvic rays 5, branched at tips, except the last; lateral-line scales 86, including 10 anterior to upper end of gill opening; scales above lateral line 29; scales below lateral line 31; vertebrae 35; 3 dorsal pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 7 pterygiophores; space between third and fourth neural spines with 3 pterygiophores, hence a total of 13 pterygiophores before the fourth neural spine; ventroanterior margin of urohyal forming an angle of about 80°, the inner angle slightly rounded.

Body moderately elongate, the depth 2.55 in SL; body thin, the width (thickness) 5.2 in body depth; head length 4.45 in SL; caudal peduncle present, its length 6.6 in head length; depth of caudal peduncle 1.7 in head length; snout length 2.6 in head length; preorbital length 2.65 in head length; eye diameter 5.0 in head length; least vertical interorbital width 7.8 in head length; upper eye overlapping one-half of lower eye; upper end of gill opening at level of a line passing slightly below ventral edge of lower eye.

Mouth inferior, the jaws strongly curved; maxilla extending posterior to a vertical at front edge of pupil, the

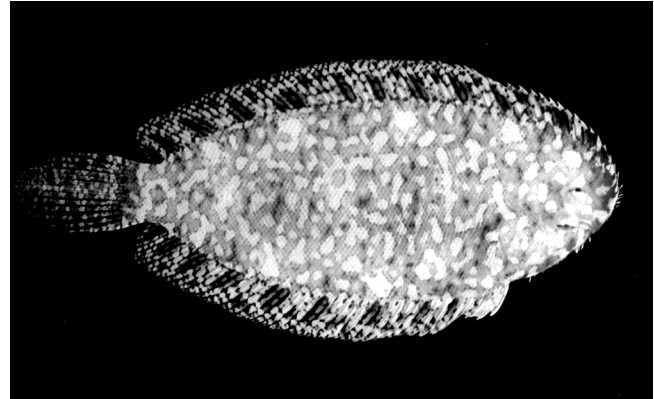


Figure 3. - Holotype of *Aseraggodes chapleauui*, BPBM 15863, 35.5 mm, SL, Papua New Guinea (Photo J. Randall).

Table VII. - Proportional measurements of holotype of *Aseraggodes chapleauui* as percentages of the standard length. [*Mesures proportionnelles de l'holotype d'Aseraggodes chapleauui en pourcentage de la longueur standard.*]

	Holotype BBPM 15863
Standard length (mm)	35.5
Body depth	39.4
Body width	7.6
Head length	22.5
Snout length	8.6
Preorbital length	8.5
Eye diameter	4.5
Interorbital width	2.9
Upper-jaw length	7.6
Caudal-peduncle depth	13.2
Caudal-peduncle length	3.4
Predorsal length	5.3
Preanal length	27.0
Prepelvic length	20.1
First dorsal ray	9.2
Longest dorsal ray	14.8
First anal ray	8.5
Longest anal ray	15.5
Caudal-fin length	31.3
Pelvic-fin length	13.0

upper-jaw length 2.95 in head length; jaws on blind side with a band of villiform teeth in about 4-5 rows at its widest place; tubular anterior nostril before dorsal edge of lower eye, nearly reaching anterior edge of eye when depressed posteriorly, its length equal to eye diameter; anterior nostril of blind side a slender tubule above upper lip one-third back in upper jaw, its length three-fourths eye diameter; posterior nostril of blind side a short, broad-based, pointed tubule nearly three-fourths eye diameter dorsoposterior to anterior nostril.

Scales on body with 7 to 10 cteni, mostly with 8 or 9; small scales on ocular side of snout, losing cteni for three rows before base of anterior nostril and the sensory pore

directly above, then replaced with a zone of slender cirri to front of snout; edge of snout and ventral edge of head with a row of lappet-like cirri, the longest three-fourths eye diameter; eyes separated by 2 rows of scales, with 3 or 4 rows of small scales extending onto medial and anterior part of eyes; opercular edge of gill opening with a row of slender well-spaced cirri on both sides, longer ventrally; a dense zone of papillae around mouth, broad on chin (where they form cirri) and above mouth; lateral line straight on both sides along middle of body, on ocular side in alignment with dorsal edge of upper eye; cephalodorsal branch of lateral line present on blind side of head along base of dorsal fin, continuing indistinctly in dorsal-fin base about half way back in body.

Base of dorsal and anal fins with a scaly sheath of 2 to 3 rows of small scales; base of caudal fin with 8 transverse rows of scales, progressively smaller posteriorly; membranous ridge on dorsal and anal rays poorly developed (may have been more apparent on fresh specimen); small cirri basally on dorsal rays about half way back in fin on blind side, and one-third back on ocular side; only a few anterior anal rays of blind side with cirri (cirri best seen by staining).

Origin of dorsal fin (base of first ray) anterior to ventral cutaneous edge of upper eye, the predorsal length 4.25 in head length; distal ends of anterior dorsal rays not free as filaments; first dorsal ray 2.45 in head length; longest dorsal ray 1.5 in head length; origin of anal fin below base of 22nd dorsal ray, the preanal length 3.7 in SL; anus anterior to first anal ray; genital papilla on dorsoposterior edge of anus, the pointed tip directed ventroposteriorly; first anal ray 2.65 in head length; longest anal ray 1.45 in head length; caudal fin 3.2 in SL; pelvic fins close together on ventral edge of body, the ocular-side fin slightly anterior, the prepelvic length 5.0 in SL; third pelvic ray longest, reaching base of fourth anal ray, 1.75 in head length.

Colour in alcohol of ocular side of body pale yellowish, the fins translucent yellowish. Colour when fresh shown in figure 3; the series of large black spots basally in the membranes of the dorsal and anal fins are transparent areas with the black background showing through.

### Etymology

Named in honour of François Chapleau, in recognition of his research on soleid fishes.

### Remarks

Our only specimen of this species was collected from sand at the edge of an isolated coral head in 30 m in Rausch Pass, Madang Province, Papua New Guinea. It was first identified as *Aseraggodes diringeri* (Quéro, 1997) because its fin-ray and scale counts and general morphology are the same and by its almost identical colour pattern. The type locality of *A. diringeri* is the island of Réunion. Randall and

Gon (2006) extended the range to the Comoro Islands, Seychelles, Chagos Archipelago, KwaZulu-Natal, and Kenya. Identification of their eight specimens from Kenya was considered tentative because of a modal count of 36 instead of 37 vertebrae for the remaining 28 specimens of the species. The vertebral count of 35 for the holotype of *A. chapleaui* is in contrast to the count of 36 specimens of *A. diringeri*, only one of which, a specimen from Kenya, has 35 vertebrae.

*Aseraggodes chapleaui*, at 35.5 mm, is also distinct in having 15 double-branched caudal rays. Specimens of *A. diringeri* as large as 49 mm have none. Also, *A. chapleaui* has more branched dorsal rays than *A. diringeri* as large as 53 mm.

We expect that more differences from *Aseraggodes diringeri* will be apparent if a series of *A. chapleaui* is obtained for comparison.

### ASERAGGODES DUBIUS WEBER

(Fig. 4; Tabs. I-V)

*Aseraggodes dubius* Weber, 1913: 438, fig. 82 (Java Sea, 6°16.5'S, 114°37'E).

### Material examined

Java Sea, 6°16.5'S, 114°37'E, ZMA 109390, 66.2 mm (holotype). South China Sea, off southern Luzon, 14°43'55"N, 120°12'50"E, USNM 137668, 52.7 mm; vicinity of Hong Kong, 21°42'N, 114°50'E, USNM 137677, 73.0 mm. Gulf of Thailand, 6.4 miles from Goh Koram, CAS 205951, 72.8 mm. Australia, Gulf of Carpentaria, QM I.28001, 6: 60.5-73 mm.

### Diagnosis

Dorsal rays 71-79, anal rays 50-54; dorsal and anal rays unbranched; caudal rays 18, 14-16 branched, and several double-branched except in smallest specimen; lateral-line

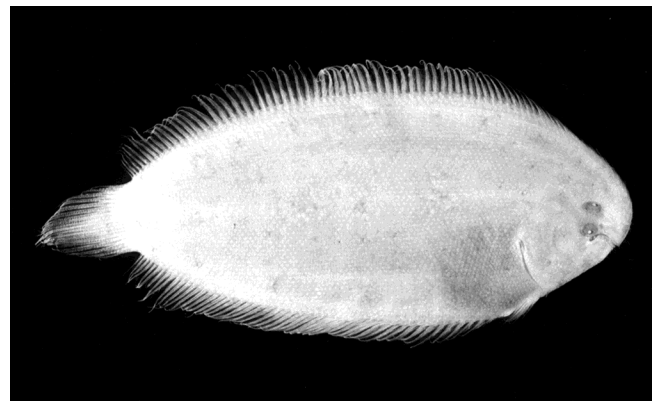


Figure 4. - *Aseraggodes dubius*, USNM 137677, 73.0 mm SL, South China Sea near Hong Kong (Photo J. Randall)

scales 68-78, including 9 or 10 anterior to upper end of gill opening; vertebrae 38-39; dorsal pterygiophores anterior to fourth neural spine 12 or 13; body depth 2.45-2.75 in SL; head length 4.45-4.75 in SL; caudal peduncle present but very short, about 17 in head length; depth at base of caudal fin 1.55-1.65 in head length; snout length 2.75-2.8 in head length; preorbital length 2.65-2.8 in head length; eye diameter 5.4-6.1 in head length; upper eye overlapping one-half to seven-eighths of lower eye; least vertical interorbital width about 15 in head length, the eyes separated by only one row of scales; one to two rows of very small teeth on ocular side of upper jaw (in addition to the usual broad band of villiform teeth on both sides of lower jaw); upper end of gill opening on a horizontal line about one-half eye diameter below lower eye; tubular anterior nostril on ocular side short, not longer than its base; lateral line directed toward dorsal edge of upper eye; scales of body with 6 to 14 cteni (averaging about 10 cteni); scales on ocular side of snout progressively shorter anteriorly, extending nearly to front edge, those before anterior nostril without cteni, but with small cirri; cirri at front edge of snout and ventrally on head of variable length, the longest above upper lip and on chin one-half eye diameter in length; one to three cirri on front of upper lip; cirri on edge of gill opening on both sides, more numerous and more evident on blind side; longest dorsal ray 1.55-1.65 in head length; no cirri on edge of dorsal and anal rays; caudal-fin length 4.0-4.55 in SL; pelvic fins reaching to between base of first and third anal rays, 1.7-1.85 in head length; genital papilla dorsoposterior to anus, small in females, very large in males (up to eye diameter in length); colour of ocular side of USNM 137677 in alcohol pale orangish brown with three faint longitudinal rows of dark spots of about eye-size, one row of about 10 spots below base of dorsal fin, one on lateral line (only two spots visible), and one of about six spots above base of anal fin; rays of fins yellowish, the membranes translucent; peritoneum black.

**Remarks**

Seven of the ten specimens of *Aseraggodes dubius* examined, including the holotype, are mature females. The remaining three specimens are males, all easily distinguished externally from the females by their very long genital papilla.

This species is unusual in having one or two rows of tiny teeth (at most 12 teeth in outer row) on the ocular side of the upper jaw. These teeth are difficult to detect, so it is not certain if they are absent in all other species.

The holotype was obtained in the Java Sea at a depth of 82 m from Siboga Station 319. The two USNM specimens, one originally identified as *A. dubius* and the other as *A. cyaneus*, were taken by trawl in the South China Sea from the steamer ‘Albatross’ from the depth range of 45-70 m in 1908. The CAS specimen from the Gulf of Thailand, cor-

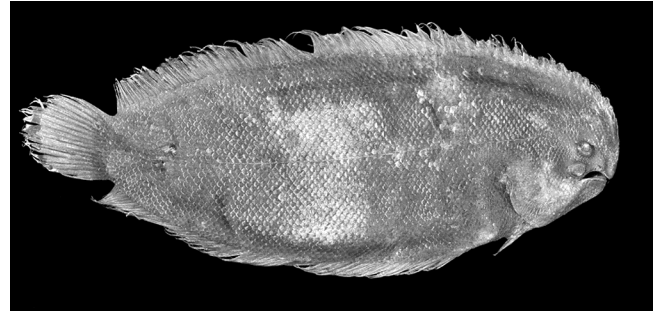


Figure 5. - Lectotype of *Aseraggodes cyaneus*, BMNH 1928.3.20.136, 75 mm SL, Vizagapatam coast of India (Photo J. Maclaine).

rectly identified as *A. dubius*, was collected from 50 m. The six specimens from the Gulf of Carpentaria, Queensland, were taken by a dredge in 48 m.

Because a USNM specimen of *Aseraggodes dubius* had been identified as *A. cyaneus*, the possibility arose that they might be the same species. The latter was described from two specimens from the east coast of India by Alcock (1890). No information could be obtained from the Zoological Survey of India on the syntype deposited at the Indian Museum in Kolkata (Calcutta), but the second syntype (BMNH 1928.3.20.136, 75 mm), here designated as the lectotype, was sent on loan from the Natural History Museum, London by James Maclaine; a photograph of the specimen taken by him is shown here as figure 5. The specimen has counts of 39 vertebrae and 13 dorsal pterygiophores anterior to the fourth neural spine, as in *A. dubius*, and its dorsal-ray count of 74, anal-ray count of 49, and lateral-line scale count of 76 are well within the expected range of *dubius*. The body depth, head length, eye diameter, and caudal-peduncle depth and length are also very close to these measurements for *dubius*. The most obvious differences are the more obtuse dorsal profile of the head of *cyaneus* as indicated by its shorter preorbital length, 3.2 in the head length, and the broader interorbital space, where three longitudinal rows of scales may be seen. Also, all the fins are consistently shorter.

**ASERAGGODES KAIANUS (GÜNTHER)**

(Fig. 6; Tabs. I-V)

*Solea kaiana* Günther, 1880: 49, pl. 21, fig. C (type locality, Kai Islands, Arafura Sea, Indonesia).

**Material examined**

Indonesia, Arafura Sea, Kai Islands, BMNH 1879.5.14.64, 87.5 mm (holotype); Timor Sea, ZMA 123.862, 37.2 mm (former syntype of *A. beauforti* Chabanaud). Japan, Shikoku, Tosa Bay, BSKU 44490, 99.5 mm; BSKU 44491, 99.5 mm; BSKU 44493, 97.5 mm.

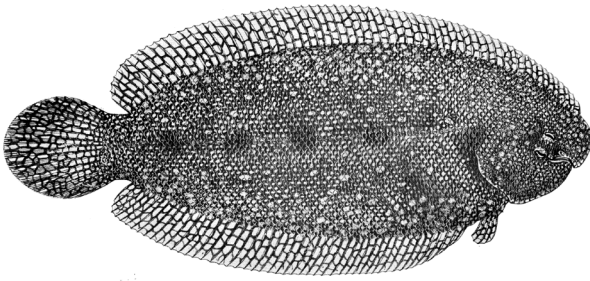


Figure 6. - *Aseraggodes kaianus*, about 95 mm SL, southern Japan (after Ochiai, 1963).

### Diagnosis

Dorsal rays 66-71; anal rays 48-50; only the last 8-18 dorsal and anal rays branched; lateral-line scales 73-76, including 10-12 anterior to upper end of gill opening; vertebrae 36-37; dorsal pterygiophores anterior to fourth neural spine 10-12; body depth 2.3-2.7 in SL; head length 4.1-4.45 in SL; no caudal peduncle; snout length 2.65-3.5 in head length; preorbital length 3.1 in head length; eyes small, the eye diameter of adults 7.0-8.3 in head length; upper eye overlapping about one-half of lower eye; interorbital space 8.45 in head length (in holotype); tubular anterior nostril short, not reaching cutaneous edge of lower eye when depressed posteriorly; scales strongly ctenoid, with up to 10 cteni; scales on ocular side extending to front and ventral edge of head; cirri at front of snout and ventrally on head thin and small (longest about one-half eye diameter); no cirri detected on opercular edge of gill opening on ocular side, but a few small thin ones on blind side; cirri on edges of anterior dorsal rays on blind side; longest dorsal ray 1.65-1.7 in head length; anus in front of first anal ray; genital papilla dorsoposterior to anus; caudal fin 4.0-4.8 in SL; pelvic fins not attached to anal fin or genital papilla; longest pelvic ray reaching base of second anal ray, 2.25 in head length of holotype; colour of ocular side of holotype dominated by numerous, dark-edged pale spots, smaller than eye, so close-set on fins that their edges form a network; a row of large dusky spots along lateral line, and often in a row near base of both the dorsal and anal fins.

### Remarks

This species was described from one specimen collected at H.M.S. Challenger Station 192 in 236 m off the Kai Islands in the Arafura Sea. Kamohara (1934) recorded it from Kochi, Japan, and Ochiai (1963: 32-34) reported 12 specimens from "Amami and the southern part of Japan." No information was given by him on habitat or depth of capture of the Japanese specimens. He included an X-ray of the head and anterior body of one of his specimens, and a drawing of a large adult (reproduced here as Fig. 6). His range of

the dorsal and anal are 64-71 and 47-52, respectively. Masuda *et al.* (1984: pl. 319 F) illustrated the species in colour from Japan, and Shen (1993: pl. 197, fig. 6) from Taiwan. Three specimens from Tosa Bay examined by us were taken by trawl in 128-130 m.

Weber (1913) identified two specimens collected in the Timor Sea from 216 m as *Aseraggodes cyaneus* (Alcock). Chabanaud (1930a) reidentified these specimens as a new species, *A. beauforti*. As noted in the Remarks of *A. beauforti* above, the smaller of the two syntypes, 37.2 mm, is reidentified as *A. kaianus*; it has been recatalogued as ZMA 123.862.

### *ASERAGGODES KIMURAI* SP. NOV.

(Fig. 7; Tabs. I-V, VIII)

### Material examined

*Holotype*. - BPBM 22165, female, 52.6 mm, Philippines, Negros, Dumaguete fish market, J.E. Randall, 28 Aug. 1977.

*Paratype*. - USNM 385814, male, 71.7 mm, same data as holotype.

### Diagnosis

Dorsal rays 66-70; anal rays 46-48; lateral-line scales 69-72; vertebrae 35-36; dorsal pterygiophores anterior to fourth neural spine 13-14; body depth 2.55-2.7 in SL; head length 4.6-4.9 in SL; caudal peduncle present, its length 7.0-7.6 in head length; snout length 2.65-2.7 in head length; preorbital length 2.7-2.75 in head length; eye diameter 5.3-5.7 in head length; interorbital space narrow, 10-12 in head length; tubular anterior nostril not reaching cutaneous edge of orbit when depressed posteriorly; longest dorsal ray 1.1-1.3 in head length; caudal fin moderately long, 3.2-3.65 in SL; pelvic fins reaching base of third anal ray, 1.5-1.65 in head length, colour of ocular side in alcohol brown, with numerous roundish pale spots of about pupil to eye size edged in dark brown dots; fins with small dark brown spots, mainly on rays, the dots on caudal fin only on basal scaled part.

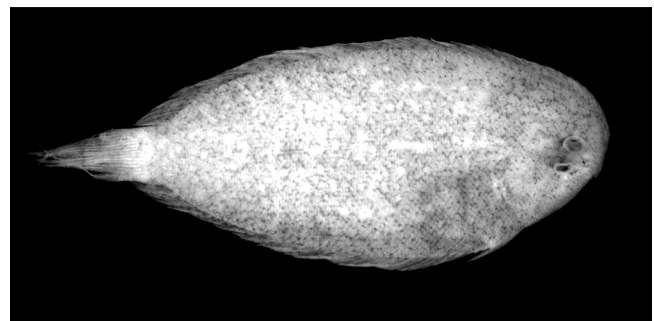


Figure 7. - Holotype of *Aseraggodes kimurai*, BPBM 22165, 52.6 mm, SL, Negros, Philippines (Photo J. Randall).

Table VIII. - Proportional measurements of type specimens of *Aseraggodes kimurai* as percentages of the standard length. [Mesures proportionnelles des spécimens types d'*Aseraggodes kimurai* en pourcentage de la longueur standard.]

	Holotype BPBM 22165	Paratype USNM 385814
Standard length (mm)	52.6	71.7
Body depth	39.1	37.1
Body width	7.5	7.1
Head length	21.8	20.5
Snout length	8.1	7.8
Preorbital length	8.0	7.5
Eye diameter	4.1	3.6
Interorbital width	1.8	2.1
Upper-jaw length	7.4	7.2
Caudal-peduncle depth	12.3	12.5
Caudal-peduncle length	3.1	2.7
Predorsal length	5.1	4.9
Preanal length	26.5	25.2
Prepelvic length	20.9	18.7
First dorsal ray	9.3	9.6
Longest dorsal ray	16.5	18.5
First anal ray	9.5	9.8
Longest anal ray	17.0	18.9
Caudal-fin length	27.5	31.4
Pelvic-fin length	13.4	13.8

**Description**

Dorsal rays 66 (70), branched except first 11 (9) rays; anal rays 46 (48), all branched; no dorsal or anal rays double-branched; caudal rays 18, the uppermost and lowermost unbranched, the rest branched, the middle 12 (15) double-branched; pelvic rays 5, all branched; lateral-line scales 69 (72), including 9 or 10 anterior to a vertical at upper end of gill opening; scales above lateral line 25; scales below lateral line 27; vertebrae 35 (36); 3 dorsal pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 8 pterygiophores; space between third and fourth neural spines with 3 (2) pterygiophores, hence a total of 14 (13) pterygiophores before the fourth neural spine; ventroanterior margin of urohyal forming an angle of about 80°, the inner angle slightly rounded.

Body moderately elongate, the depth 2.55 (2.7) in SL; body thin, the width (thickness) 5.2 in body depth; head length 4.6 (4.9) in SL; caudal-peduncle depth 1.75 (1.65) in head length; caudal-peduncle length 7.0 (7.6) in head length; snout length 2.7 (2.65) in head length; preorbital length 2.7 (2.75) in head length; eye diameter 5.3 (5.7) in head length; eyes separated by a very narrow concave space, the least vertical interorbital width 12.1 (9.8) in head length; upper eye overlapping on third to one-half of lower eye; upper end of gill opening at level of a line passing slightly below ventral edge of lower eye.

Mouth inferior, the jaws strongly curved; maxilla nearly

reaching a vertical through centre of eye, the upper-jaw length 2.95 (2.85) in head length; jaws on blind side with a band of villiform teeth in about 6 rows at widest place; tubular anterior nostril before upper edge of lower eye, not reaching cutaneous edge of lower eye when depressed posteriorly, its length about three-fourths orbit diameter; anterior nostril of blind side a slender tubule above upper lip nearly half way back in upper jaw, its length more than one-half eye diameter; posterior nostril of blind side a short, broad-based, pointed tubule slightly more than an eye diameter dorsoposterior to anterior nostril.

Scales on body with 10 to 15 cteni (mostly 12-13); eyes separated by 2 rows of scales, with 5 or 6 rows of small scales extending onto medial half of eyes; small scales on ocular side of snout, losing cteni anteriorly, and extending nearly to front edge of snout, where replaced by fine short cirri, a few on lower part of snout and front of upper lip one-half orbit diameter in length and somewhat flattened; a zone of fleshy papillae, many with a slender cirrus, around mouth, the zone broad on chin and above upper lip; opercular edge of gill opening on both sides with a row of small well-spaced cirri; lateral line straight on both sides along middle of body, on ocular side in alignment with dorsal edge of upper eye; cephalodorsal branch of lateral line present on blind side of head following dorsal contour just below dorsal fin, continuing indistinctly anteriorly on body to below about 25<sup>th</sup> dorsal ray.

Base of dorsal and anal fins with a scaly sheath of 2 to 3 rows of small scales; base of caudal fin with 8 rows of progressively smaller scales; a membranous ridge on basal half or more of dorsal and anal rays, progressively thinner and shorter posteriorly; small cirri on edge of membranous ridges on about anterior two-thirds of dorsal and anal fins (better developed on paratype); progressively smaller scales extending broadly out on dorsal rays of about anterior third of fin.

Origin of dorsal fin (base of first ray) anterior to interorbital space, the predorsal length 4.3 (4.2) in head length; distal ends of first five dorsal rays free as short filaments; first dorsal ray 2.35 (2.1) in head length; longest dorsal ray 1.3 (1.1) in head length; origin of anal fin below base of 22<sup>nd</sup> (23<sup>rd</sup>) dorsal ray, the preanal length 3.8 (3.95) in SL; anus anterior to first anal ray; genital papilla on ocular side dorso-posterior to anus at base of first anal ray; length of first anal ray 2.3 (2.1) in head length; longest anal ray 1.3 (1.1) in head length; caudal fin 3.65 (3.2) in SL; pelvic fins close together on ventral edge of body, their origins adjacent, the prepelvic length 4.8 (5.35) in SL; pelvic fins short, the third ray longest, reaching base of third anal ray, 1.65 (1.5) in head length.

Colour of ocular side of holotype in alcohol brown, with numerous pale spots of pupil to eye size, mostly round or nearly so, but a few of irregular shape; pale spots edged with

dark brown dots (from pigment on edges of scales surrounding spots); some pale spots anteriorly on lateral line partially merged; dorsal and anal fins with translucent membranes, the rays yellowish with small dark brown spots; basal scaled part of caudal fin yellowish brown with dark brown dots, the rest of fin with translucent membranes, yellowish rays, and a few faint brown dots basally on rays.

### Etymology

Named in honour of Seishi Kimura in appreciation of his assistance in this study.

### Remarks

The two type specimens of this species were obtained by the first author from a small roadside fish market in Dumaguete City, Negros, along with a specimen of *Aseraggodes xenicus*. No information was available on the locality or method of capture.

The small female holotype and the larger male differ notably in the longer median fins of the male. Were it not for their near-identical colour pattern and their being obtained together, they would have been suspected as different species.

*Aseraggodes kimurai* appears most closely related to *A. longipinnis*, described below from one specimen. The number of vertebrae and dorsal pterygiophores are the same for the two species, and the number of dorsal and anal rays of *kimurai* are within one count of *longipinnis*. Of the meristic data, only the count of 76 lateral-line scales for *longipinnis* suggests a possible species-level difference. More convincing is the longer caudal fin of *longipinnis* and the orbital side of its snout having a broad anterior zone of small cirri, in contrast to being nearly fully scaled in *kimurai*. Also, *longipinnis* has a small cutaneous flap on the snout extending over the dorsal part of the upper lip, and the colour patterns are different.

### *ASERAGGODES LONGIPINNIS* SP. NOV.

(Fig. 8; Tabs. I-V, IX)

### Material examined

*Holotype*. - BPBM 36647, male, 54.8 mm, Indonesia, Banda Sea, Nil Desperandum Reef, 6°37'S, 129°47'E, sand pocket, 9 m, quinaldine, J.L. Earle, 31 Oct. 1990.

### Diagnosis

Dorsal rays 71; anal rays 49; lateral-line scales 76; vertebrae 36; dorsal pterygiophores anterior to fourth neural spine 14; body depth 2.55 in SL; head length 4.55 in SL; caudal peduncle present, its length 6.3 in head length; snout moderately long, 2.55 in head length; preorbital length 2.7 head

length; eye diameter 4.7 in head length; interorbital space very narrow, 18.5 in head length; tubular anterior nostril not reaching cutaneous edge of orbit when depressed posteriorly; dorsal and anal rays long, the longest 1.1 in head length; caudal fin long, 2.7 in SL; pelvic fins reaching base of third anal ray, 1.65 in head length; colour of ocular side in alcohol pale yellowish with a series of faint dark blotches along lateral line.

### Description

Dorsal rays 71, branched except first four rays; anal rays 49, all branched; no dorsal or anal rays double-branched; caudal rays 18, the uppermost and lowermost unbranched, the middle 16 double-branched; pelvic rays 5, all branched; lateral-line scales on ocular side 76, including 9 anterior to a

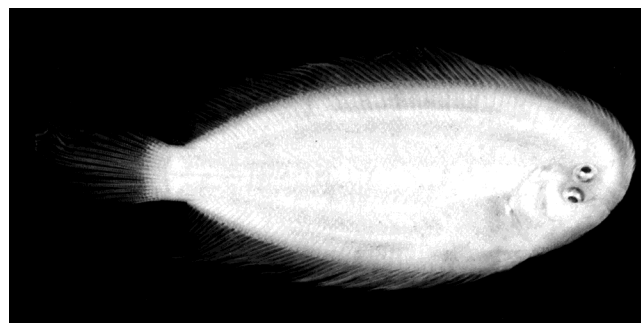


Figure 8. - Holotype of *Aseraggodes longipinnis*, BPBM 36647, 54.8 mm SL, Banda Sea (Photo J. Randall).

Table IX. - Proportional measurements of holotype of *Aseraggodes longipinnis* as percentages of the standard length. [Mesures proportionnelles de l'holotype d'*Aseraggodes longipinnis* en pourcentage de la longueur standard.]

	Holotype BBPM 36647
Standard length (mm)	54.8
Body depth	39.0
Body width	7.4
Head length	22.0
Snout length	8.6
Preorbital length	8.2
Eye diameter	4.7
Interorbital width	1.2
Upper-jaw length	7.6
Caudal-peduncle depth	12.9
Caudal-peduncle length	3.5
Predorsal length	5.1
Preanal length	26.2
Prepelvic length	19.7
First dorsal ray	9.5
Longest dorsal ray	20.0
First anal ray	8.5
Longest anal ray	19.7
Caudal-fin length	36.8
Pelvic-fin length	13.2

vertical at upper end of gill opening; scales above lateral line 26; scales below lateral line 27; vertebrae 36; 3 dorsal pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 8 pterygiophores; space between third and fourth neural spines with 3 pterygiophores, hence a total of 14 pterygiophores before the fourth neural spine; ventroanterior margin of urohyal forming an angle of about 80°, the inner angle slightly rounded.

Body moderately elongate, the depth 2.55 in SL; body thin, the width (thickness) 5.3 in body depth; head length 4.55 in SL; caudal peduncle present, its length 6.3 in head length; depth of caudal peduncle 1.7 in head length; snout length 2.55 in head length; preorbital length 2.7 in head length; eye diameter 4.7 in head length; eyes separated by a very narrow concave space, the least vertical interorbital width 18.5 in head length; upper eye overlapping one-half of lower eye; upper end of gill opening at level of a line passing to ventral edge of lower eye.

Mouth inferior, the jaws strongly curved; maxilla extending posterior to a vertical at front edge of pupil, the upper-jaw length 2.9 in head length; jaws on blind side with a band villiform teeth in about 7 rows at its widest place; membranous tubular anterior nostril before upper edge of lower eye, not reaching cutaneous edge of lower orbit when depressed posteriorly, its length at most three-fourths eye diameter; anterior nostril of blind side a slender membranous tubule above upper lip nearly half way back in upper jaw, its length more than one-half eye diameter; posterior nostril of blind side a short, broad-based, pointed tubule slightly more than an eye diameter dorsoposterior to anterior nostril.

Scales on body with 9 to 15 cteni, most with 11 or 12; scales on ocular side of snout losing cteni above base of anterior nostril, replaced anteriorly with a zone of slender cirri; a dense band of slender cirri at front edge of snout and ventral edge of head, the longest about two-thirds orbit diameter, only a few a little flattened; eyes separated by one row of scales, with 5 to 6 rows of small scales extending onto medial half of eyes; opercular edge of gill opening slender well-spaced cirri on both sides, longer on blind side; a dense zone of papillae around mouth, broad on chin (where they form cirri) and above mouth; lateral line straight on both sides along middle of body, on ocular side in alignment with dorsal edge of upper eye; cephalodorsal branch of lateral line present on blind side of head along base of dorsal fin, continuing indistinctly about half way back on body.

Base of dorsal and anal fins with a scaly sheath of 2 to 3 rows of small scales; base of caudal fin with 9 transverse rows of progressively smaller scales; a membranous ridge on basal half or more of dorsal and anal rays, progressively less developed posteriorly; small cirri on edge of membranous ridges of both dorsal and anal fins on about anterior

three-fourths of dorsal fin and anterior half of anal fin of both sides.

Origin of dorsal fin (base of first ray) anterior to upper eye, the predorsal length 4.3 in head length; distal ends of first five dorsal rays free as filaments; first dorsal ray 2.3 in head length; longest dorsal ray 1.1 in head length; origin of anal fin below base of 23<sup>rd</sup> dorsal ray, the preanal length 3.8 in SL; anus anterior to first anal ray; genital papilla on ocular side slightly dorsoposterior to anus at base of first anal ray; length of first anal ray 2.3 in head length; longest anal ray 1.1 in head length; caudal fin very long, 2.7 in SL; pelvic fins close together on ventral edge of body, their origins adjacent, the prepelvic length 5.1 in SL; third pelvic ray longest, reaching base of third anal ray, 1.65 in head length.

Colour of ocular side pale yellowish with a series of faint dark spots smaller than twice eye diameter along lateral line; fins with pale yellowish rays and translucent membranes.

### Etymology

Named *longipinnis* from the Latin *longus* for long, and *pinna* for fin, in reference to the long median fins.

### Remarks

Known from one male specimen from Indonesia that was collected from a patch of sand in a reef in the Banda Sea at a depth of 9 m. Its pale colouration is probably related to the near-white sand in which it was found.

*Aseraggodes longipinnis* differs from all of the species of the genus in its very long median fins, the caudal fin 2.7 in the SL, and the longest dorsal and anal rays 1.1 in the head length. It appears to be most closely related to *A. kimurai* (see Remarks for this species for the comparison).

## *ASERAGGODES MATSUURAI* SP. NOV.

(Figs. 9, 10; Tabs. I-V, X)

### Material examined

*Holotype*. - NSMT-P 71517, male, 39.7 mm, Indonesia, Lombok, northeast coast of Kodek Bay, 15 m, Matsuura *et al.*, 15 Feb. 1994.

*Paratypes*. - CAS 46099, male, 55.1 mm, Philippines, Negros, Dumaguete, A.W. Herre, 10 July 1948; USNM 273855, female, 49.6 mm, Philippines, Negros, Port Siyt, 9°4'0" N, 123°10'48" E, 0-3 m, rotenone, L.W. Knapp *et al.*, 28 April 1979; ROM 48617, female, 37.5 mm, Philippines, Cebu, Mactan Island, 10°15'N, 124°0'E, 0.5 km south of Hudson Beach, drop-off near point, with numerous small caves and some sand and rubble, 12-18 m, rotenone, R. Winterbottom and E.O. Murdy, 8 Aug. 1985.

### Diagnosis

Dorsal rays 66-70; anal rays 49-52; lateral-line scales 68-

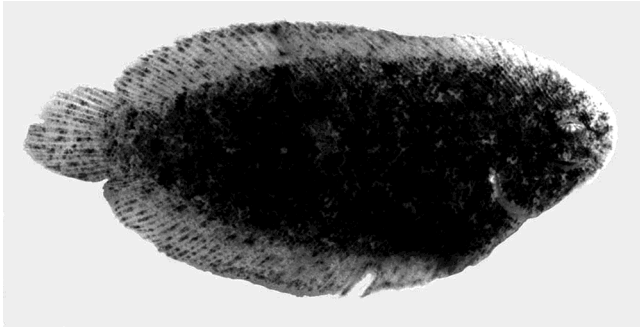


Figure 9. - Holotype of *Aseraggodes matsuurai*, NSMT-P 71517, 39.7 mm SL, Lombok, Indonesia (Photo K. Matsuura).

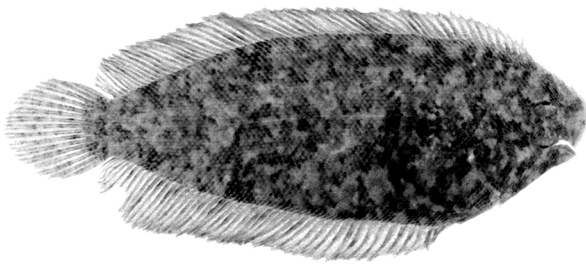


Figure 10. - Paratype of *Aseraggodes matsuurai*, ROM 48617, 37.5 mm SL, Cebu, Philippines (Photo R. Winterbottom).

71; vertebrae 35-36; dorsal pterygiophores anterior to fourth neural spine 10-11; body depth 2.4-2.55 in SL; head length 4.15-4.35 in SL; no caudal peduncle; snout length 2.7-2.9 in head length; preorbital length 3.5-3.6 in head length; eye diameter 4.35-4.55 in head length; interorbital space 10.0-11.9 in head length; tubular anterior nostril reaching or extending posterior to anterior edge of eye when depressed posteriorly; scales ctenoid, with 8-11 cteni; scales on ocular side of snout replaced by papillae that become longer and pointed before anterior nostril; edge of predorsal snout and narrow adjacent zone of blind side with a dense band of slender cirri only a little longer than the fleshy cirri; one to three rows of cirri to each side of lateral line on blind side of body and its cephalic branches; longest dorsal ray 1.5-1.6 in head length; caudal fin 4.25-4.6 in SL; pelvic fins nearly reaching base of third anal ray, 2.2-2.35 in head length; colour of ocular side in alcohol brown with scattered pale blotches of about eye size on the average, numerous small darker brown spots (some within pale blotches), and three longitudinal rows of larger dark brown blotches, the two largest on lateral line; rays of fins pale with a few brown spots.

### Description

Dorsal rays 67 (66-70), branched except first 15 rays (4-12), and double-branched on some posterior rays of two largest paratypes; anal rays 49 (49-52), all branched (many

Table X. - Proportional measurements of type specimens of *Aseraggodes matsuurai* as percentages of the standard length. [Mesures proportionnelles des spécimens types d'*Aseraggodes matsuurai* en pourcentage de la longueur standard.]

	Holotype	Paratypes		
	NSMT-P 71517	ROM 48617	USNM 273855	CAS 46099
Standard length (mm)	39.7	37.5	49.6	55.1
Body depth	39.4	39.0	41.8	39.8
Body width	8.5	8.4	7.9	8.1
Head length	23.8	24.0	23.6	23.0
Snout length	8.5	8.6	8.2	8.3
Preorbital length	7.8	8.0	6.7	6.5
Eye diameter	5.5	5.5	5.2	5.3
Interorbital width	2.0	2.4	2.1	2.0
Upper-jaw length	7.3	7.0	6.7	7.3
Caudal-fin base depth	13.0	13.4	14.3	14.4
Predorsal length	5.3	5.6	5.6	5.5
Preanal length	28.7	28.7	27.4	27.8
Prepelvic length	21.4	21.2	20.4	20.8
First dorsal ray	6.1	5.9	5.8	5.6
Longest dorsal ray	15.8	15.7	15.2	14.6
First anal ray	6.7	7.4	6.6	7.2
Longest anal ray	15.9	15.9	14.9	14.5
Caudal-fin length	23.5	23.7	21.8	22.0
Pelvic-fin length	10.2	10.7	10.3	10.6

double-branched on two largest paratypes); caudal rays 18, 14 (16-18) branched, the middle 5 (14) double-branched; pelvic rays 5, all branched; lateral-line scales 71 (68-70), including 7-8 before a vertical at upper end of gill opening; scales above lateral line 25 (23-24); scales below lateral line 27 (25-26); vertebrae 35 (35-36); 2 (2-3) pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 5 (4-5) pterygiophores; space between third and fourth neural spines with 3 pterygiophores, hence a total of 10 (10-11) dorsal pterygiophores anterior to fourth neural spine; inner edge of urohyal very broadly rounded, the short straight ends forming an angle of about 75° if projected to meet.

Body depth 2.55 (2.4-2.55) in SL; body thin, the width (thickness) 4.65 (4.65-5.3) in body depth; head length 4.2 (4.15-4.35) in SL; no caudal peduncle (base of last anal ray distinctly posterior to base of lowermost caudal ray); depth of caudal-fin base 1.85 (1.6-1.8) in head length; snout length 2.8 (2.8-2.9) in head length; preorbital length 3.05 (3.0-3.5) in head length; eye diameter 4.35 (4.35-4.55) in head length; eyes separated by a narrow concave space, the least vertical interorbital width 11.9 (10.0-11.5) in head length; upper eye overlapping three-fourths (two-thirds to three-fourths) of lower eye; a horizontal line projecting forward from upper end of gill opening passing about one-half eye diameter ventral to lower eye.

Mouth inferior, the jaws strongly curved; maxilla extending to a vertical through centre of lower eye, the



upper-jaw length 3.25 (3.15-3.5) in head length; a band of villiform teeth on blind side of jaws in 6 (6-8) irregular rows at widest place; tubular anterior nostril in front of upper half of lower eye, reaching or extending beyond anterior edge of eye when depressed posteriorly, its length about equal to eye diameter; anterior nostril of blind side a slender membranous tubule above middle of upper lip, about four times longer than adjacent papillae; posterior nostril of blind side a short, broad-based, pointed tubule, only a little longer than adjacent papillae, about three-fourths eye diameter dorso-posterior to anterior nostril.

Scales ctenoid on both sides, with 8 to 11 cteni projecting beyond scale margins on ocular side, but only the tips showing on blind side; scales basally on ocular side of snout fleshy, without cteni, replaced by papillae that become longer and pointed before anterior nostril; edge of predorsal part of snout and a narrow adjacent zone of blind side with a dense band of slender cirri only a little longer than the pointed papillae; a similar narrow band along ventral edge of head; a broad dense zone of pointed papillae on blind side of chin; a broad dense zone of nodular papillae above upper lip on blind side with sensory papillae along ventral edge; lateral line straight on both sides of body, the tubes apparent only on scales of ocular side; lateral-line scales of blind side with one to four very small, low, sensory papillae (best seen by staining); one to three rows of fine cirri to each side of lateral line on blind side of body and its cephalic branches; fine cirri also present on scales of blind side on base of caudal fin; mandibulo-opercular and preopercular branches of lateralis system evident on blind slide of head; cephalodorsal branch of sensory papillae in a slight scale-free groove along base of dorsal fin that continues to posterior third of body; a broad zone of sensory papillae with fine cirri anteriorly on blind side of head between two main cephalic branches, narrowing to a single row that continues to posterior end of head; cutaneous part of eyes separated by only one row of scales, with 4 to 6 rows of small scales extending onto medial half of eyes; a row of 35-40 prominent cirri on opercular edge of gill opening of blind side; cirri from last row of scales on operculum of ocular side short, not extending beyond edge of opercular membrane; a broad zone of low pointed papillae on blind side of chin and extending from above upper jaw to basal part of dorsal fin; anterior projection of lateral line on ocular side of head in line with middle of upper eye; anterior part of dorsal fin of both sides densely covered with papillae and cirri.

Scales along base of dorsal and anal fins in 2 or 3 rows; base of caudal fin with 7 or 8 transverse rows of scales that are progressively smaller posteriorly; well developed membranous ridges extending out one-half or more length of dorsal and anal rays on both sides, reduced posteriorly; two to several cirri on membranous ridges on blind side of first 19 dorsal rays of holotype (on first 33 rays of largest paratype), fewer on ocular side.

Origin of dorsal fin (base of first ray) anterior to upper eye, the predorsal length 4.5 (4.2-4.3) in head length; tips of first 3-6 dorsal rays free; first dorsal ray 3.9 (4.05-4.2) in head length; longest dorsal ray 1.5 (1.55-1.6) in head length; origin of anal fin below base of 18<sup>th</sup> dorsal ray, the preanal length 3.5 (3.5-3.65) in SL; anus anterior to first anal ray; genital papilla on ocular side just dorsal and slightly posterior to anus; length of first anal ray 3.55 (3.25-3.6) in head length; longest anal ray 1.5 (1.5-1.6) in head length; caudal-fin length 4.25 (4.2-4.6) in SL; pelvic fins close together anteriorly, their origins adjacent, the prepelvic length 4.9 (4.8) in SL; pelvic fins diverging posteriorly, well separated from anal fin and genital papilla; third and fourth pelvic rays longest, reaching from just posterior to base of first anal ray to base of third anal ray, 2.3 (2.2-2.35) in head length.

Colour of ocular side of holotype in alcohol brown with scattered small dark brown spots (consisting of one to a few dark scales), larger pale brown blotches (some containing small dark brown spots), and three rows of large dark brown blotches, one below dorsal fin, one along lateral line, and one above anal fin, the two largest spots on lateral line, the most posterior with an even larger pale blotch adjacent and anterior to it; median fins whitish except basal scaled part coloured like body, the rays a little dusky with a few small brown spots; blind side of body pale yellowish. Black and white images of colour photographs of the holotype are shown as figures 9 and 10.

### Etymology

This species is named in honour of Keiichi Matsuura of the National Museum of Nature and Science of Tokyo who collected and photographed the holotype.

### Remarks

*Aseraggodes matsuurai* is described from the holotype from Lombok in the Lesser Sunda Islands of Indonesia and three paratypes from the central Philippines. The 39.7-mm holotype is a mature male, and the 37.5-mm paratype a mature female. The two larger paratypes are also mature, one a female and one a male. A few differences in proportional measurements between the smallest and largest specimens, such as eye size and length of median fins, are probably ontogenetic.

This sole, *Aseraggodes satapoomini*, *A. senoui*, and *A. winterbottomi*, all from shallow coral reefs or adjacent habitats, have meristic data within the range of 35 or 36 vertebrae, 9-11 dorsal pterygiophores anterior to the fourth neural spine, 66-70 lateral-line scales, 48-52 anal rays, and 67-72 lateral-line scales. *Aseraggodes senoui*, described below from one specimen, is readily distinguished by having 16 instead of the usual 18 caudal rays, and only the tips of the cteni of the scales extending beyond the scale edges. *Aseraggodes matsuurai* differs from the remaining two species in

having a dense zone of pointed papillae dorsally on the snout before the anterior nostril, in contrast to low fleshy papillae in *satapoomini* or scales in *winterbottomi*, and in having a shorter caudal fin. *Aseraggodes magnoculis* Randall from New Caledonia, also from the shallow coral-reef habitat, is a similar species. It differs in having the higher count of 71-76 lateral-line scales and slightly longer fin rays.

### **ASERAGGODES MICROLEPIDOTUS WEBER**

(Figs. 11, 12; Tabs. I-V)

*Aseraggodes microlepidotus* Weber, 1913: 437, fig. 81 (type locality, Saleh Bay, Sumbawa, Indonesia).

#### **Material examined**

Indonesia, Sumbawa, ZMA 109405, 76.9 mm (holotype).

#### **Diagnosis**

Dorsal rays 74; anal rays 55; dorsal and anal rays unbranched; caudal rays 18, 13 branched; pelvic rays 5, unbranched; lateral-line scales 102 (including 21 anterior to upper end of gill opening); vertebrae 39; dorsal pterygiophores anterior to fourth neural spine 11; body depth 2.8 in SL; head length 4.2 in SL; head very obtuse, the snout projecting only slightly anterior to upper lip; caudal peduncle present but extremely short, 34 in head length; caudal-



Figure 11. - Holotype of *Aseraggodes microlepidotus*, ZMA 109405, 76.9 mm SL, Sumbawa, Indonesia (Photo M. Hauteccœur).

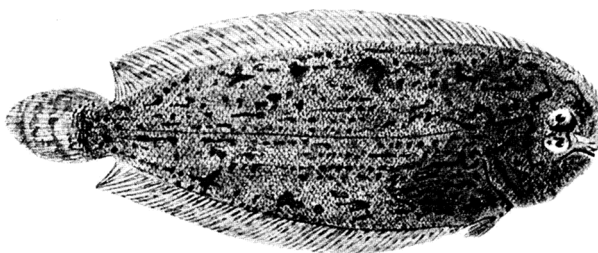


Figure 12. - Holotype of *Aseraggodes microlepidotus* 76.9 mm SL, Sumbawa, Indonesia (after Weber, 1913).

peduncle depth 1.9 in head length; snout length 3.2 in head length; preorbital length 4.0 in head length; eye diameter 5.4 in head length; upper eye slightly in advance of lower; interorbital space 13.5 in head length; tubular anterior nostril broad and short, tapering little, not reaching cutaneous edge of lower eye when depressed posteriorly, its length three-fifths eye diameter; most scales of body with 8-11 cteni; scales on ocular side of snout without cteni, reaching to anterior edge; fine cirri in a row anteriorly on snout and along ventral edge of head, the longest nearly equal to eye diameter; a row of fine cirri on opercular edge of gill opening of both sides, longer ventrally; longest dorsal ray 1.6 in head length; caudal fin short, 5.1 in SL; pelvic fin of ocular side slightly anterior to fin of blind side, the fins diverging posteriorly and not connected to genital papilla; third pelvic ray longest, reaching to base of second anal ray, 2.2 in head length; colour in alcohol pale orangish brown, with no dark markings visible. Prominent dark markings present on Weber's illustration of the holotype, reproduced here as figure 12.

#### **Remarks**

*Aseraggodes microlepidotus* was described from a single male specimen collected in 274 m at Saleh Bay, Sumbawa in the Lesser Sunda Islands of Indonesia. We are aware of no other specimens. This species is easily distinguished by its obtuse head and the very high count of 102 lateral-line scales (the species name is therefore very appropriate). Such a high scale count would be expected more of a species of *Pardachirus* than one of the genus *Aseraggodes*. There are, however, no pores at the base of dorsal and anal rays as seen in the species of *Pardachirus*. This sole is one of 11 species of the genus with unbranched caudal rays as an adult.

### **ASERAGGODES SATAPOOMINI SP. NOV.**

(Fig. 13; Tabs. I-V, XI)

#### **Material examined**

*Holotype*. - ROM 69819, male, 44.8 mm, Andaman Sea, Thailand, west coast, Ko Racha Noi, southeast end, 7°28'16"N, 98°19'35"E, very large coral head surrounded by sand and patch reef, 1.5-9 m, rotenone, R. Winterbottom, R. Mooi, W. Holleman, and U. Satapoomin, 18 Nov. 1993.

#### **Diagnosis**

Dorsal rays 67; anal rays 48; lateral-line scales 68; vertebrae 35; dorsal pterygiophores anterior to fourth neural spine 11; body depth 2.5 in SL; head length 4.15 in SL; no caudal peduncle; snout length 2.7 in head length; preorbital length 2.75 in head length; eye 4.45 in head length; interorbital space narrow, 10.5 in head length; tubular anterior nostril just reaching fleshy edge of orbit when depressed posterior-

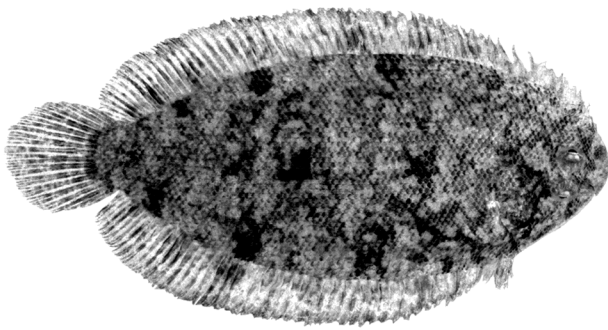


Figure 13. - Holotype of *Aseraggodes satapoomini*, ROM 69819, 44.8 mm SL, Thailand, Andaman Sea (Photo R. Winterbottom).

ly; ocular side of snout with irregular flat papillae forming a labyrinthic pattern in middle portion; cirri at front of snout and ventrally on head short and very fine; scales on body with 7-10 cteni (mostly 8 or 9); longest dorsal ray 1.55 in head length; caudal fin 3.95 in SL; pelvic fins reaching beyond base of second anal ray, 2.1 in head length, colour in alcohol brown with numerous dark-edged pale spots and three rows of four dark brown blotches, one below base of dorsal fin, one along lateral line, and one above base of anal fin; fins pale, the dorsal and anal with rows of large dusky blotches along base, and the caudal with a narrow dark bar at base.

**Description**

Dorsal rays 67, branched, except first 14 and last 2; anal rays 48, all branched; no dorsal and anal rays double-branched; caudal rays 18, all but uppermost branched, 13 double-branched; pelvic rays 5, all branched; lateral-line scales on ocular side 68, including 6 anterior to a vertical at upper end of gill opening; scales above lateral line 23; scales below lateral line 25; vertebrae 35; 3 pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 5 pterygiophores; space between third and fourth neural spines with 3 pterygiophores (hence a total of 11 dorsal pterygiophores anterior to fourth neural spine). Ventroanterior margin of the urohyal forming an angle of about 80°, the inner angle broadly rounded.

Body depth 2.5 in SL; body thin, the width (thickness) 4.4 in body depth; head length 4.15 in SL; no caudal peduncle; depth of caudal-fin base 1.65 in head length; snout length moderately long, 2.7 in head length; preorbital length 2.75 in head length; eye diameter 4.45 in head length; eyes separated by a narrow concave space, the least vertical interorbital width 10.5 in head length; upper eye overlapping three-fourths of lower eye; upper end of gill opening at level of a line passing less than half an eye diameter below ventral edge of lower eye

Standard length (mm)	44.8
Body depth	40.2
Body width	9.1
Head length	24.0
Snout length	8.9
Preorbital length	8.7
Eye diameter	5.4
Interorbital width	2.4
Upper-jaw length	8.0
Caudal-fin base depth	14.0
Predorsal length	6.7
Preanal length	27.1
Prepelvic length	21.2
First dorsal ray	6.8
Longest dorsal ray	15.5
First anal ray	6.7
Longest anal ray	15.6
Caudal-fin length	25.3
Pelvic-fin length	11.3

Table XI. - Proportional measurements of the holotype of *Aseraggodes satapoomini* (ROM 69819) as percentages of the standard length. [*Mesures proportionnelles de l'holotype d'Aseraggodes satapoomini en pourcentage de la longueur standard.*]

Mouth inferior, the jaws strongly curved; maxilla extending to a vertical at front edge of pupil, the upper-jaw length 2.95 in head length; jaws on blind side with a band of villiform teeth; tubular anterior nostril anterior to upper third of lower eye, broad-based and strongly pointed, just reaching cutaneous edge of lower orbit when depressed posteriorly, its length about two-thirds eye diameter; anterior nostril of blind side a slender membranous tubule above upper lip nearly to middle of upper jaw, about four times longer than adjacent papillae; posterior nostril of blind side a short, broad-based, pointed tubule nearly an eye diameter dorso-posterior to anterior nostril.

Scales ctenoid, with 7 to 10 (mostly 8 or 9) cteni; scales on ocular side of head progressively smaller anteriorly, those on snout without cteni, soon becoming low irregular papillae separated by narrow spaces that form a labyrinthic pattern; papillae toward front of snout smaller, more round, and close-set; eyes separated by 2 to 3 rows of scales, with about 3 rows of small scales extending onto medial and anterior edges of eyes; cirri on anterior or ventral edges of head very small and thin; numerous, fairly long, close-set cirri in a row on opercular edge of gill opening on blind side, but none detected on ocular side; a dense zone of low fleshy papillae around mouth on blind side extending to front of snout; lateral line straight on both sides along middle of body, on ocular side in alignment with ventral edge of upper eye when projected forward; a few scales at posterior end of lateral line on blind side with one or two small cirri; cephalodorsal branch of lateral line on blind side conspicuous, following dorsal contour of head on dorsal-fin base, continuing indistinctly onto body to below 22<sup>nd</sup> dorsal ray.

Base of dorsal and anal fins with a scaly sheath of 2 to 3 rows of scales; base of caudal fin with 7 transverse rows of scales that are progressively smaller posteriorly (one or two

outer rows may be missing); a narrow membranous ridge on basal half or more of dorsal and anal rays, except last few rays; only a few cirri on edges of membranous ridges of some anterior dorsal and anal rays.

Origin of dorsal fin (base of first ray) anterior to upper eye, the predorsal length 4.15 in head length; first dorsal ray (tip barely free) 3.65 in head length; longest dorsal ray 1.55 in head length; origin of anal fin below base of 19<sup>th</sup> dorsal ray, the preanal length 3.7 in SL; anus anterior to first anal ray; genital papilla on ocular side dorsoposterior to anus at base of first anal ray; length of first anal ray 3.6 in head length; longest anal ray 1.55 in head length; caudal fin 3.95 in SL; pelvic fins close together on ventral edge of body, the origin of ocular-side fin slightly anterior; prepelvic length 4.7 in SL; third pelvic rays longest, reaching beyond base of second anal ray, 2.1 in head length.

Colour of ocular side of holotype in alcohol brown with many, close-set, pale spots of pupil to eye size, some with dark edges; three rows of four dark brown blotches, one below base of dorsal fin, one along lateral line, and one above base of anal fin; anterior dark blotch of row above anal-fin largest, extending irregularly over abdomen; fins pale, the basal half of dorsal and anal fins with a row of indistinct dusky blotches, 11 blotches in dorsal fin and seven in anal fin; caudal fin with a slightly curved, narrow dark bar at base, with a small dark blotch above and below; blind side light brown, becoming pale yellowish anterior to an irregular demarcation from the fifteenth dorsal ray to the third anal ray.

Colour of ocular side when fresh shown in black and white copy of colour photograph of figure 13.

### Etymology

Named for Ukkrit Satapoomin, one of collectors of the holotype, in recognition of his research on the fishes of Thailand.

### Remarks

This species is known only from the holotype, collected from the coral-reef habitat of an islet off the Andaman Sea coast of Thailand. Ukkrit Satapoomin was asked to look for other specimens that might be present in the fish collection at the Phuket Marine Biological Center, but he found none.

When the holotype was first examined, the similarity in colour and general morphology to *Aseraggodes cyclurus* Randall from Tahiti (and one probable specimen of *cyclurus* from Fiji) was noted. *Aseraggodes satapoomini* was soon distinguished from *cyclurus* by having branched instead of double-branched dorsal and anal rays, 48 instead of 52-53 anal rays, 35 instead of 36 or 37 vertebrae, and a larger head. As discussed in the Remarks for *A. matsuurai*, it seems more closely related to this species, *A. senoui*, and *A. winterbotto* - *mi*, differing especially in the low irregular fleshy papillae

anteriorly on the ocular side of the snout. *Aseraggodes senoui* is readily distinguished by having 16 caudal rays, and *winterbotto* has 9 or 10 dorsal pterygiophores anterior to the fourth neural spine, compared to 11 for *A. satapoomini*. *Aseraggodes matsuurai* differs in having a shorter caudal fin (4.25-4.6 in SL, compared to 3.95 for *A. satapoomini*), smaller upper jaw, and shorter pelvic fins

### *ASERAGGODES SENOUI* SP. NOV.

(Figs. 14, 15; Tabs. I-V, XII)

### Material examined

*Holotype*. - KPM-NI 1853, male, 43.3 mm, Malaysia, Mabul Island, 17 m, hand net, H. Senou and M. Hayashi, 19 Sept. 1995.

### Diagnosis

Dorsal rays 67; anal rays 49; caudal rays 16; lateral-line scales 73; vertebrae 36; dorsal pterygiophores anterior to fourth neural spine 10; body depth 2.5 in SL; head length 4.3 in SL; no caudal peduncle; snout length 2.55 in head length; preorbital length 3.15 in head length; eye diameter 3.8 in head length; interorbital space 11.1 in head length; tubular anterior nostril short, not reaching cutaneous edge of eye when depressed posteriorly; scales with 8-10 cteni, only the

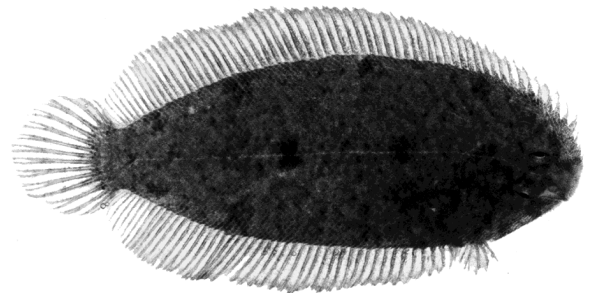


Figure 14. - Holotype of *Aseraggodes senoui*, KPM-NI 1853, 43.3 mm SL, Mabul, Malaysia (Photo H. Senou).

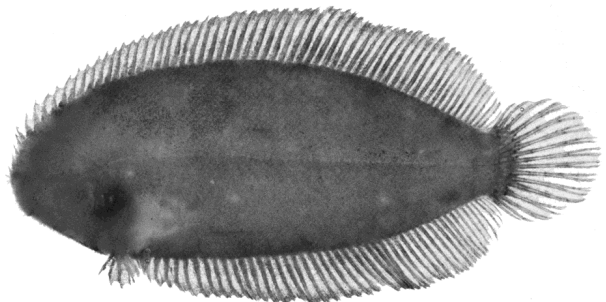


Figure 15. - Holotype of *Aseraggodes senoui*, blind side, KPM-NI 1853, 43.3 mm SL, Mabul, Malaysia (Photo H. Senou).

Table XII. - Proportional measurements of the holotype of *Aseraggodes senoui* (KPM-NI 1853) as percentages of the standard length. [*Mesures proportionnelles de l'holotype d'Aseraggodes senoui en pourcentage de la longueur standard.*]

Standard length (mm)	43.3
Body depth	39.7
Body width	8.3
Head length	23.4
Snout length	9.2
Preorbital length	7.4
Eye diameter	6.2
Interorbital width	2.1
Upper-jaw length	6.7
Caudal-fin base depth	14.2
Predorsal length	6.2
Preanal length	25.3
Prepelvic length	19.2
First dorsal ray	6.5
Longest dorsal ray	16.6
First anal ray	8.4
Longest anal ray	16.5
Caudal-fin length	22.8
Pelvic-fin length	9.8

tips showing at scale edges; scales on ocular side of snout becoming a dense mass of pointed papillae before anterior nostril and a thick fringe of cirri at front edge of snout; a comparable fringe on ventral edge of head; cirri associated with lateral line of blind side and its cephalic branches; longest dorsal ray 1.4 in head length; caudal fin 4.4 in SL; pelvic fins reaching base of second anal ray, 2.4 in head length; colour of ocular side in alcohol brown with numerous dark brown blotches smaller than pupil of eye, some interconnected ventrally on head and anteriorly on abdomen, and three rows of dark brown blotches as large or larger than eye; colour of blind side pale grey.

**Description**

Dorsal rays 67, branched except first 10 rays; anal rays 49, all branched; no dorsal or anal rays double-branched; caudal rays 16, 12 branched, the middle 6 double-branched; pelvic rays 5, all branched; lateral-line scales 73, including 8 before a vertical at upper end of gill opening; last three lateral-line scales to caudal-fin base without tubes; scales above lateral line 25; scales below lateral line 27; vertebrae 36; 2 dorsal pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 5 pterygiophores; space between third and fourth neural spines with 3 pterygiophores, hence a total of 10 dorsal pterygiophores anterior to fourth neural spine; inner edge of urohyal very broadly rounded, the short straight ends forming an angle of about 80° if projected to meet.

Body depth 2.5 in SL; body thin, the width (thickness) 4.8 in body depth; head length 4.3 in SL; no caudal peduncle (base of last anal ray distinctly posterior to base of lower-most caudal ray); depth of caudal-fin base 1.65 in head length; snout length 2.55 in head length; preorbital length 3.15 in head length; eye large, the diameter 3.8 in head

length; eyes separated by a narrow concave space, the least vertical interorbital width 11.1 in head length; upper eye overlapping three-fourths of lower eye; a horizontal line projecting forward from upper end of gill opening passing through ventral edge of lower eye.

Mouth inferior, the jaws strongly curved; maxilla nearly reaching a vertical through centre of lower eye, the upper-jaw length 3.5 in head length; dentition not checked due to mouth firmly closed; tubular anterior nostril in front of upper half of lower eye, broad-based, strongly tapering, and short, not reaching cutaneous edge of eye when depressed posteriorly, its length about equal to half eye diameter; a row of five presumed sensory papillae dorsoposterior to base of anterior nostril; anterior nostril of blind side a slender membranous tubule separated by two rows of papillae from middle of upper lip, its length about three times longer than adjacent papillae; posterior nostril of blind side a short, broad-based, pointed tubule, about twice as long as adjacent papillae, about three-fourths eye diameter dorsoposterior to anterior nostril.

Scales with 8 to 10 cteni, with only the tips projecting beyond scale margins on both ocular and blind sides; scales on ocular side of snout altering to a dense mass of pointed papillae before anterior nostril, including upper lip, becoming a thick fringe of cirri at front edge of snout; a comparable fringe on ventral edge of head; longest cirrus about one-fourth eye diameter; a broad dense zone of low rounded papillae mixed with ones ending in a slender cirrus on chin and above upper lip; a row of lower papillae at margins of these zones, which may be part of cephalic lateral-line system; lateral line straight on both sides of body, the tubules apparent only on scales of ocular side; tubes of lateral line ending three scales short of base of caudal fin (where replaced by small pores and papillae; lateral line continuing between eighth and ninth caudal rays nearly to end of fin (a row of 20 tiny papillae detected by staining); lateral line on blind side within a band of cirri that broadens posteriorly to scales of base of caudal fin; cephalodorsal branch of lateral line on blind side a close-set row of sensory papillae in a slight groove along base of dorsal fin, with many cirri to either side and transverse rows of two to four papillae on head at base of dorsal fin; cephalodorsal branch continuing as the dorsolateral line to posterior fourth of body; a branch of the lateralis system on blind side of head between main lateral line and cephalodorsal branch, also with cirri to either side and additional scattered low papilla to lateral side; mandibulo-opercular branch of sensory papillae ventrally on head continuing just inside opercular margin to upper end of gill opening; preopercular branch less defined, with a row of papillae linking it to corner of mouth; cutaneous part of eyes separated by only one row of scales; median half of eyes covered with 8-10 rows of scales; a row of about 35 slender cirri extending beyond opercular edge of gill opening of blind side; but only about 20 on ocular side of gill opening,

barely extending beyond opercular membrane; anterior part of dorsal fin of both sides densely covered with papillae and cirri.

Scales along base of dorsal and anal fins in 2 to 3 rows; 5 or 6 transverse rows of progressively smaller scales on caudal-fin base; well developed membranous ridges extending out one-half or more length of dorsal and anal rays on both sides, narrower posteriorly; scales extending out on membranous ridges of first 19 dorsal rays of ocular side and on 30 rays of blind side, with a row of fleshy cirri on same rays of both sides; scales extending out basally on only first few anal rays, and cirri on first nine or ten anal rays.

Origin of dorsal fin (base of first ray) anterior to upper eye, the predorsal length 3.8 in head length; tips of first three dorsal rays free; first dorsal ray 3.6 in head length; longest dorsal ray 1.4 in head length; origin of anal fin below base of 18<sup>th</sup> dorsal ray, the preanal length 3.95 in SL; anus anterior to first anal ray; genital papilla on ocular side at base of anal papilla, directly below base of first anal ray; length of first anal ray 2.8 in head length; longest anal ray 1.4 in head length; caudal-fin length 4.4 in SL; ocular-side pelvic fin slightly anterior to blind-side fin, the prepelvic length 5.2 in SL; pelvic fins diverging posteriorly, well separated from anal fin and genital papilla; third pelvic ray longest, reaching base of second anal ray, 2.4 in head length.

Colour of ocular side of holotype in alcohol brown with numerous dark brown blotches smaller than pupil of eye, some interconnected ventrally on head and anteriorly on abdomen, and three rows of dark brown blotches as large or larger than eye, one of four blotches along base of dorsal fin, one of three blotches on lateral line (the first on head), and a third with four less distinct blotches above base of anal fin; rays of fins light grey-brown, the membranes transparent; blind side of holotype pale grey, the dusky pigment concentrated at scale edges; a faint dusky band along base of dorsal and anal fins.

Black and white copy of colour photograph of ocular side of holotype when fresh shown in figure 14, and of blind side in figure 15.

### Etymology

This species is named in honour of Hiroshi Senou of the Kanagawa Prefectural Museum of Natural History who collected and photographed the holotype.

### Remarks

*Aseraggodes senoui* is described

from a single specimen from Mabul, Malaysia. Its count of 16 instead of 18 caudal rays separates it from all the known species of the genus except *A. steinitzi* Joglekar, described from the Dahlak Archipelago, Red Sea. Joglekar (1970) recorded 14-16 caudal rays for the three type specimens housed in the Zoological Survey of India of the Indian Museum at Kolkata. Randall and Gon (2006) were unable to confirm her caudal-ray counts but explained why they believed them to be correct.

With only the holotype of *A. senoui* having 16 caudal rays, one cannot be certain that it is abnormal in this count. In other meristic data, it groups with *A. matsuurai*, *A. satapoomini*, and *A. winterbottomi*. It may be separated from these three species by its larger eye, short anterior nostril, more extensive scalation of the eyes, only the tips of the ctenii projecting beyond scale edges, and slightly longer dorsal and anal rays.

### ASERAGGODES SUZUMOTOI SP. NOV.

(Figs. 16-19; Tabs. I-V, XIII)

### Material examined

*Holotype*. - BPBM 36545, female, 70.1 mm, Indonesia, Molucca Islands, Ambon, harbour, off dock, dark silty sand, 4.5-6 m, hand net, J.E. Randall, J.L. Earle, and A.Y. Suzumoto, 21 Oct. 1990.

*Paratypes*. - AMS I.43820-001, 63.4 mm; CAS 223735, 64.9 mm; MNHN 2006-0770, 70.4 mm; and USNM 386195,

Table XIII. - Proportional measurements of type specimens of *Aseraggodes suzumotoi* as percentages of the standard length. [*Mesures proportionnelles des spécimens types d'Aseraggodes suzumotoi en pourcentage de la longueur standard.*]

	Holotype	Paratypes					
	BPBM 36545	BPBM 36471	NSMT-P 62058	AMS I.43820	CAS 223735	MNHN 06-0770	USNM 386195
Standard length (mm)	70.1	51.2	53.4	63.4	64.9	70.4	75.3
Body depth	41.1	40.8	39.0	41.4	40.2	41.0	40.6
Body width	7.3	8.0	7.7	7.9	7.8	8.5	7.9
Head length	24.6	24.2	25.0	24.2	24.4	24.7	24.8
Snout length	8.8	8.8	8.9	8.7	7.9	7.8	8.6
Preorbital length	8.5	8.7	8.6	8.7	7.9	8.7	8.4
Eye diameter	4.3	5.5	5.1	4.4	4.6	4.3	4.2
Interorbital width	2.1	2.2	2.0	2.4	1.8	2.5	1.7
Upper-jaw length	7.5	8.1	7.5	7.7	8.2	8.9	8.5
Caudal-peduncle depth	13.2	12.1	13.0	12.8	12.5	13.2	13.3
Caudal-peduncle length	2.2	2.1	1.9	1.8	1.8	1.7	2.3
Predorsal length	5.4	6.2	6.4	4.7	4.7	6.3	6.5
Preanal length	30.2	29.1	30.9	30.0	30.0	29.6	31.3
Prepelvic length	21.4	21.8	24.6	22.2	22.2	23.2	24.7
First dorsal ray	7.0	6.7	6.9	7.1	6.9	6.8	7.3
Longest dorsal ray	13.1	15.2	15.0	14.5	13.9	13.0	13.4
First anal ray	7.8	8.9	9.3	8.6	8.2	6.7	6.6
Longest anal ray	13.1	15.2	14.9	14.5	13.9	12.8	13.1
Caudal-fin length	20.7	26.4	24.9	22.2	21.8	20.5	22.7
Pelvic-fin length	10.2	11.3	11.5	11.4	10.9	10.0	10.1

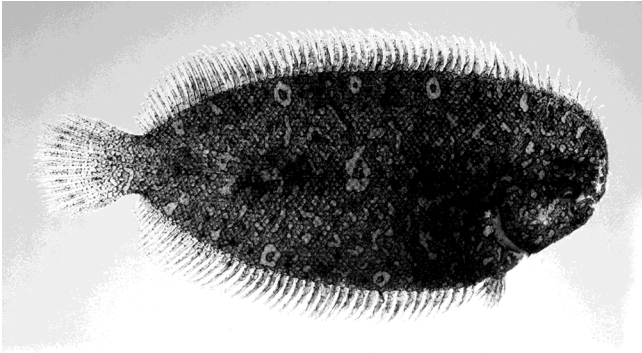


Figure 16. - Holotype of *Aseraggodes suzumotoi*, BPBM 36545, 70.1 mm SL, Ambon Indonesia (Photo J. Randall).

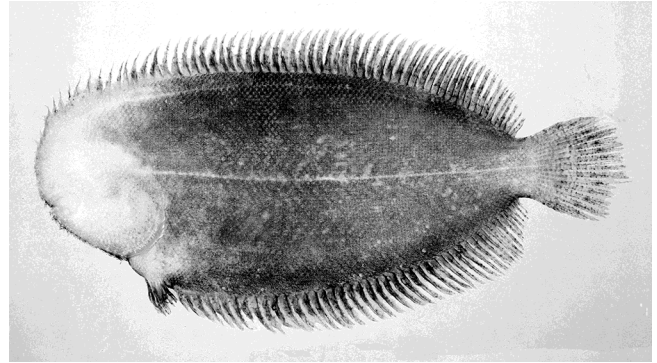


Figure 17. - Holotype of *Aseraggodes suzumotoi*, blind side, BPBM 36545, 70.1 mm SL, Ambon, Indonesia (Photo J. Randall).

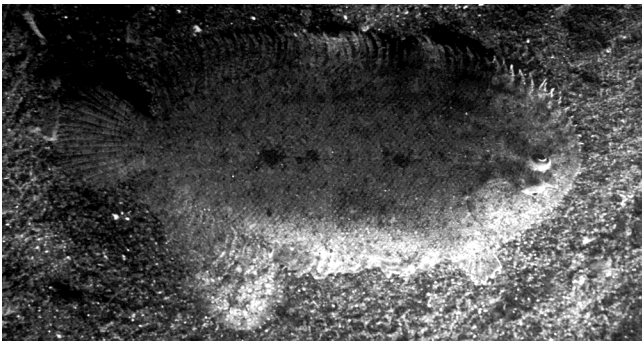


Figure 18. - Underwater photograph of *Aseraggodes suzumotoi*, about 70 mm TL, Ambon, Indonesia (Photo J. Randall).



Figure 19. - Underwater photograph of aggregation of *Aseraggodes suzumotoi*, Ambon, Indonesia (Photo J. Randall).

75.3 mm, all with same data as holotype, except AMS paratype taken by spear; BPBM 36471, 51.2 mm, Indonesia, Ambon, outer part of Ambon Bay off Laha, silty sand in cave, 6 m, hand net, J.E. Randall and J. Friedman, 12 Mar. 1995; NSMT-P 62058, 53.4 mm, Indonesia, Sulawesi, Lembeh Island, Serena Kecil, 1°26'N, 125°13.5'E, 15 m, K. Matsuura *et al.*, 13 Jul. 2000.

**Diagnosis**

Dorsal rays 66-72; anal rays 46-50; lateral-line scales 66-71; vertebrae 34-35 (two of seven with 34); dorsal pterygiophores anterior to fourth neural spine 11-13; body depth 2.4-2.55 in SL; head length 4.0-4.15 in SL; caudal peduncle present but short, its length 10.8-14.5 in head length; snout length 2.75-3.15 in head length; preorbital length 2.8-3.1 in head length; eye diameter 4.4-5.9 in head length; interorbital space narrow, 9.9-14.6 in head length; tubular anterior nostril just reaching fleshy edge of lower eye when depressed posteriorly; longest dorsal ray 1.6-1.9 in head length; caudal fin short, 3.8-4.9 in SL; pelvic fins reaching base of first or second anal ray, 2.1-2.45 in head length, colour when fresh light brown, the scale edges darker, with numerous dark brown spots, most of pupil size or smaller, and many large, irregular, near-white spots, some with dark centres; fin rays mottled brown, grading to white tips.

**Description**

Dorsal rays 71 (66-72), branched except the first 19 to 30; anal rays 49 (46-50), all branched; no dorsal or anal rays double-branched; caudal rays 18, 15 branched and all but one or two double-branched; pelvic rays 5, all branched; lateral-line scales on ocular side 69 (67-71), including 8-10 anterior to a vertical at upper end of gill opening; scales above lateral line about 24; scales below lateral line about 29; vertebrae 35 (34-35, two with 34); dorsal pterygiophores before fourth neural spine 11 (11-13); 2 pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 6 or 7 pterygiophores; space between third and fourth neural spines with 3 pterygiophores. Ventroanterior margin of the urohyal forming an angle of about 80-90°, the inner angle slightly to moderately rounded.

Body depth 2.45 (2.4-2.55) in SL; body thin, the width (thickness) 5.65 (4.8-5.25) in body depth; head length 4.05 (4.0-4.15) in SL; caudal peduncle present but short, its length 11.2 (10.8-14.5) in head length; depth of caudal peduncle 1.85 (1.85-2.0) in head length; snout length 2.8 (2.75-3.15) in head length; preorbital length 2.9 (2.8-3.1) in head length; eye diameter 5.75 (4.4-5.9) in head length; eyes separated by a narrow concave space, the least vertical interorbital width 11.5 (9.9-14.6) in head length; upper eye

overlapping two-thirds (no overlap to three-fourths) of lower eye; upper end of gill opening at level of a line passing one-half to one eye diameter below ventral edge of lower eye.

Mouth inferior, the jaws strongly curved; maxilla extending nearly to a vertical at centre of lower eye, the upper-jaw length 3.3 (2.8-3.3) in head length; jaws on blind side with a band of villiform teeth in about 7 rows at its widest place; tubular anterior nostril before upper third of lower eye, very broad-based, just reaching cutaneous edge of eye when depressed posteriorly, its length nearly equal to eye diameter; anterior nostril of blind side a slender membranous tubule above upper lip nearly to middle of upper jaw, its length about one-half eye diameter; posterior nostril of blind side a short, broad-based, pointed tubule an eye diameter dorsoposterior to anterior nostril.

Most scales of body with 8 to 10 cteni; scales on ocular side of head progressively smaller anteriorly, those on snout without cteni, more as low fleshy papillae than scales; eyes separated by 2 rows of scales, with about 3 rows of small scales extending onto medial and anterior edges of eyes; very fine cirri on anterior edge of snout; a fringe of several rows of slender cirri along ventral edge of head and extending onto blind side where progressively shorter medially; opercular edge of gill opening with a row of small fleshy cirri on both ocular and blind sides; a dense zone of fleshy papillae around mouth on blind side, extending to front of snout; zone of papillae on blind side lateral to posterior nostril altering abruptly to low fleshy scales without cteni; lateral line straight on both sides along middle of body, on ocular side in alignment with dorsal part of upper eye when projected forward; a cephalodorsal branch of lateral line on blind side conspicuous on head following dorsal contour just below the dorsal fin, continuing indistinctly on body to below about 20<sup>th</sup> ray.

Base of dorsal and anal fins with a scaly sheath of 2 rows of scales; base of caudal fin with 6 rows of progressively smaller scales (discounting tiny scales on edges of fin rays); a fleshy membranous ridge on basal half or more of dorsal and anal rays; fleshy cirri on edges of membranous ridges anteriorly on dorsal and anal fins on both sides; holotype with first 43 dorsal rays and first anal rays on ocular side with cirri (only one cirrus basally on several posterior rays of these series); first 32 dorsal and first 12 anal rays on blind side with cirri (with only one cirrus on several posterior rays).

Origin of dorsal fin (base of first ray) anterior to upper eye, the predorsal length 4.55 (3.9-5.5) in head length; first dorsal ray (tip barely free) 3.5 (3.4-3.65) in head length; longest dorsal ray 1.9 (1.6-1.9) in head length; origin of anal fin below base of 22<sup>nd</sup> dorsal ray, the preanal length 3.3 (3.2-3.6) in SL; anus anterior to first anal ray; genital papilla on ocular side, dorsoposterior to anus, stout and strongly pointed in male holotype, little larger than adjacent scales in females; length of first anal ray 3.15 (2.7-3.8) in head length;

longest anal ray 1.9 (1.6-1.9) in head length; caudal fin 4.85 (3.8-4.9) in SL; pelvic fins close together on ventral edge of body, their origins adjacent, the prepelvic length 4.7 (4.05-4.6) in SL; pelvic fins short, the third ray longest, reaching base of first anal ray (to second ray in smallest paratype), 2.4 (2.1-2.45) in head length.

Colour of ocular side of holotype in alcohol brown, the scale edges darker than centres, with numerous dark brown spots of about pupil size, and large, irregular, dark-edged, pale brown spots, many with a dark spot in centre; dorsal and anal fins with translucent membranes and light brown rays with small dark brown spots; caudal fin with translucent membranes, the rays faintly banded; blind side uniform brown except anterior part of head, including most of operculum, pale yellowish.

Figures 16 and 17 are black and white copies of colour photographs taken of the holotype when fresh. An underwater photograph of an individual estimated 70 mm in total length is shown in figure 18. It is overlapping the posterior part of a small sole that is probably a juvenile of this species.

#### Etymology

This species is named for Arnold Y. Suzumoto, the collection manager in Ichthyology at the Bishop Museum, and one of the collectors of the type specimens from the harbour at Ambon.

#### Remarks

The holotype and four of the paratypes of this species were collected in October 1990 from a dock in the harbour of Ambon, Molucca Islands, all in close proximity. The holotype is a fully mature male, and the four paratypes are gravid females with their body cavity bulging with mature ova. The photograph of figure 18 was taken at this site, but the specimen was not collected.

In March 1995 the first author photographed a dense aggregation of this species off Laha in the outer part of Ambon Bay at a depth of 25.5 m (Fig. 19); no specimens were collected from the aggregation. On another dive nearby one specimen was collected from silty sand in a cave at a depth of 6 m (BPBM 36471, 51.2 mm). It is a mature female, but its abdomen is not greatly enlarged like the female paratypes collected in 1990.

One 53.4-mm specimen collected by Keiichi Matsuura and associates at Lembbeh Island, Sulawesi in July 2000 was sent on loan from the National Museum of Nature and Science in Tokyo.

We are aware of only six species of *Aseraggodes* with the combination of 34 or 35 vertebrae and 11 or 12 dorsal pterygiophores anterior to the fourth neural spine: *A. albidus* from Sulawesi (described above), *A. brevirostris* Randall & Gon from the Comoro Islands, *A. jenny* Randall & Gon from Mauritius, *A. normani* Chabanaud from Queensland, *A.*



*sinusarabici* Chabanaud from the Gulf of Suez, and *A. therese* Randall from the Hawaiian Islands. *Aseraggodes suzumotoi* is distinguished from all of these species by having a caudal peduncle. It is further separated from *A. albidus* and *A. normani* by lacking a forked ocular-side lateral line on the head, and from all the species except *A. brevirostris*, *A. jenny*, and *A. therese* by having branched dorsal and anal rays. It is differentiated from *A. brevirostris* and *A. jenny* by a longer head, larger mouth, shorter anterior nostril, and by its distinctive colour pattern. It is also separated from *A. therese* by meristic data; *A. therese* has higher counts of 72-79 dorsal rays and 54-61 anal rays, and lower counts of 60-66 lateral-line scales.

**ASERAGGODES TEXTURATUS WEBER**

(Figs. 20, 21; Tabs. I-V)

*Aseraggodes texturatus* Weber, 1913: 437, fig. 81 (type locality, Timor Sea).

**Material examined**

Indonesia, Timor Sea, ZMA 109388, 77.4 mm (holotype).

**Diagnosis**

Dorsal rays 75, all but first 3 branched; anal rays 53, all branched; caudal rays 18, 16 branched, most double-

branched (many rays broken); pelvic rays 5, all branched; lateral-line scales 83, including 13 anterior to upper end of gill opening; vertebrae 39; dorsal pterygiophores anterior to fourth neural spine 10; body depth 2.65 in SL; head length 4.85 in SL; no caudal peduncle; caudal-peduncle depth 1.8 in head length; snout length 2.8 in head length; preorbital length 2.9 in head length; eye diameter 5.0 in head length; upper eye overlapping nearly one-half of lower eye; interorbital space 15 in head length; tubular anterior nostril broad and short, tapering little, not reaching cutaneous edge of lower eye when depressed posteriorly, its length one-half eye diameter; scales of body with 5-9 cteni; scales on ocular side of snout without ctenii, extending to front of snout; fine cirri in a row anteriorly on snout and along ventral edge of head, the longest about one-half eye diameter; a row of small cirri on opercular edge of gill opening of both sides; longest dorsal ray 1.45 in head length; caudal fin broken; pelvic fin of ocular side slightly anterior to fin of blind side, the fins diverging posteriorly and not connected to genital papilla; third pelvic ray longest, reaching to base of second anal ray, about 2.3 in head length (ray tips broken); colour in alcohol pale orangish brown, with no dark markings visible. Prominent dark markings are present on Weber's illustration of the holotype, reproduced here as figure 21.

**Remarks**

*Aseraggodes texturatus* was described from one 77.4-mm specimen collected from 216 m in the Timor Sea, and it is still known only from this specimen. As mentioned, it was taken in the same Siboga station as the holotype of *A. beauforti* and one specimen of *A. kaianus*.

Weber and de Beaufort (1929) wrote that only the caudal fin has divided rays, those of the other fins simple, except some rays, which are divided at their tip. However, all of the fins have branched rays, except the first three dorsal rays, but the branches are not well separated.

**ASERAGGODES WINTERBOTTOMI SP. NOV.**

(Fig. 22; Tabs. I-V, XIV)

**Material examined**

*Holotype*. - ROM 55042, male, 41.5 mm, Philippines, Negros, mouth of Bais Bay, 9°37'N, 123°10'E, large coral head on sand surrounded by smaller coral heads, 7.5 m, rotenone, R. Winterbottom, D. Johnson, R. Mooi, E. Downer, M. Burrige-Smith, and V. Deran, 17 May 1987.

*Paratypes*. - ROM 55040, male, 44 mm, Philippines, Siquijor Island, Tonga Point, west side about 1 km from tip of point, drop-off to reef top, 4.5-12 m, rotenone, D. Johnson, R. Mooi, E. Downer, and P. Benjamin, 9 May 1987; BPBM 40444, male, 46.3 mm, Siquijor Island, Tonga Point, drop-off with caves up to reef crest, 7.5-15 m, rotenone, R.

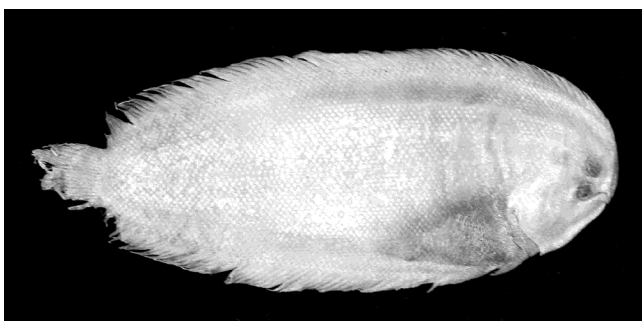


Figure 20. - Holotype of *Aseraggodes texturatus*, ZMA 109388, 77.4 mm, Timor Sea (Photo M. Hauteccœur).

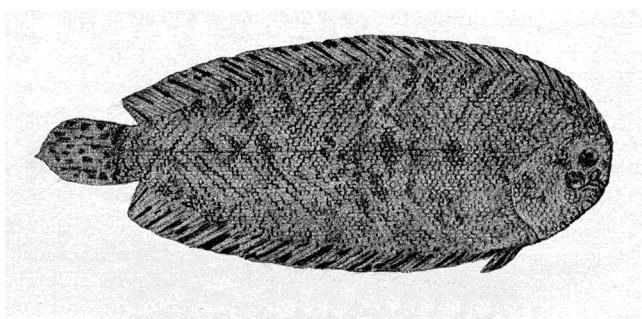


Figure 21. - Holotype of *Aseraggodes texturatus*, ZMA 109388, 77.4 mm, Timor Sea (after Weber, 1913).

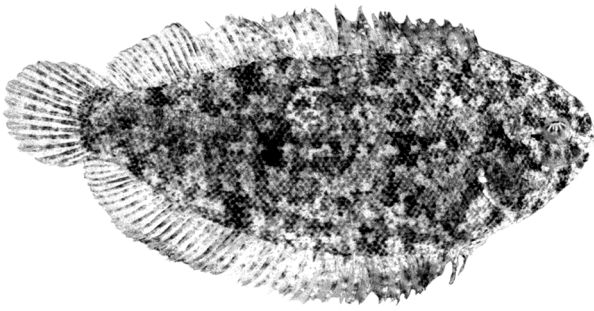


Figure 22. - Holotype of *Aseraggodes winterbottomi*, ROM 55042, 41.5 mm, Negros, Philippines (Photo R. Winterbottom).

Mooi, E. Downer, M. Burrige-Smith, P. Benjamin, and V. Deran, 14 May 1987.

### Diagnosis

Dorsal rays 67-71; anal rays 49-51; lateral-line scales 69-72; vertebrae 35; dorsal pterygiophores anterior to fourth neural spine 9-10; body depth 2.45-2.6 in SL; head length 4.25-4.3 in SL; no caudal peduncle; snout length 2.75-2.8 in head length; preorbital length 3.2-3.35 in head length; eye diameter 4.55-4.6 in head length; interorbital space 9.4-10.3 in head length; tubular anterior nostril reaching or extending posterior to anterior edge of eye when depressed posteriorly; scales ctenoid, with 8-11 cteni; ocular side of snout fully scaled, the scales small, without cteni, but with fine cirri; upper lip scaled over; cirri at front edge of predorsal snout very fine and not longer than adjacent cirri dorsally on snout; fine cirri associated with lateral line of blind side and its cephalic branches; longest dorsal ray 1.45-1.55 in head length; caudal fin 4.15 in SL; pelvic fins reaching base of third anal ray, 2.05-2.15 in head length; colour of ocular side in alcohol light brown with irregular brown-edged paler brown blotches and irregular darker brown blotches in three rows, the darkest on lateral line; fin rays light yellowish brown, the membranes translucent.

### Description

Dorsal rays 67 (68-71), branched except first 16 (9-14) rays; anal rays 49 (50-51); only one or two dorsal and anal rays double-branched at tips; caudal rays 18, 15 branched, 11 (13-14) double-branched; pelvic rays 5, all branched; lateral-line scales 70 (69-72), including 6 (6-7) before a vertical at upper end of gill opening; scales above lateral line 25 (22-25); scales below lateral line 27 (24-26); vertebrae 35; 2 pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 6 (4-6) pterygiophores; space between third and fourth neural spines with 2 (2-3) pterygiophores; a total of 10 (9-10) dorsal pterygiophores anterior to fourth neural spine; inner edge of urohyal very broadly rounded, the short straight ends

Table XIV. - Proportional measurements of type specimens of *Aseraggodes winterbottomi* as percentages of the standard length. [Mesures proportionnelles des spécimens type d'*Aseraggodes winterbottomi* en pourcentage de la longueur standard.]

	Holotype ROM 55042	Paratype BPBM 40444
Standard length (mm)	41.5	46.3
Body depth	38.6	40.7
Body width	7.7	7.6
Head length	23.4	23.7
Snout length	8.5	8.4
Preorbital length	7.3	7.1
Eye diameter	5.1	5.2
Interorbital width	2.5	2.3
Upper-jaw length	7.9	8.1
Caudal-base depth	14.2	14.5
Predorsal length	5.7	5.5
Preanal length	27.4	27.3
Prepelvic length	21.4	21.4
First dorsal ray	7.4	7.3
Longest dorsal ray	14.9	16.1
First anal ray	8.0	8.4
Longest anal ray	15.2	15.7
Caudal-fin length	24.1	24.3
Pelvic-fin length	11.4	11.1

A second paratype, ROM 55040, about 44 mm SL, was too twisted to be used for measurements.

forming an angle of about 80-85° if projected to meet.

Body depth 2.6 (2.45) in SL; body thin, the width (thickness) 5.0 (5.35) in body depth; head length 4.3 (4.25) in SL; no caudal peduncle (base of last anal ray distinctly posterior to base of lowermost caudal ray); depth of caudal-fin base 1.65 in head length; snout length 2.75 (2.8) in head length; preorbital length 3.2 (3.35) in head length; eye diameter 4.6 (4.55) in head length; eyes separated by a narrow concave space, the least vertical interorbital width 9.4 (10.3) in head length; upper eye overlapping three-fourths (two-thirds) of lower eye; a horizontal line projecting forward from upper end of gill opening passing about one-half eye diameter ventral to lower eye.

Mouth inferior, the jaws strongly curved; maxilla extending to a vertical through centre of lower eye, the upper-jaw length 2.95 (2.9) in head length; a band of villiform teeth on blind side of jaws in 6 irregular rows at widest place; tubular anterior nostril in front of upper half of lower eye, reaching to or extending beyond anterior edge of eye when depressed posteriorly, its length about equal to eye diameter; anterior nostril of blind side a slender tubule above middle of upper lip, about four times longer than adjacent papillae; posterior nostril of blind side a short, broad-based, pointed tubule, about twice as long as adjacent papillae, about two-thirds eye diameter dorsoposterior to anterior nostril.

Scales ctenoid on both sides, with 8 to 11 cteni projecting well beyond scale margins on both ocular and blind

sides; ocular side of snout fully scaled, the scales small, without cteni, but with fine cirri; cirri at front edge of predorsal snout very fine and not longer than adjacent cirri dorsally on snout; dorsal edge of upper lip concealed by overlying scales; cirri at front edge of predorsal snout very fine and not longer than adjacent cirri dorsally on snout; a broad dense zone of slender papillae on chin and above upper lip; slender papillae on anterior fourth of upper lip on blind side; lateral line straight on both sides of body, the tubules apparent only on scales of ocular side; scattered very fine cirri along lateral line of blind side and on basal scales of caudal fin (best seen by staining); numerous fine cirri present on operculum of blind side and scattered small low sensory papillae, but a complete pattern obscure; cephalodorsal branch of sensory papillae along base of dorsal fin continuing to posterior third of body; cutaneous part of eyes separated by only one row of scales, with about 6 rows of small scales extending onto medial half of eyes; a row of about 30 slender cirri on opercular edge of gill opening of blind side; but fewer (12 counted on holotype) on ocular side of gill opening; anterior part of dorsal fin of both sides densely covered with papillae and cirri.

Scales along base of dorsal and anal fins in 2 to 3 rows; 6 transverse rows of progressively smaller scales on base of caudal fin; well developed membranous ridges extending out one-half or more length of dorsal and anal rays on both sides, reduced posteriorly; scales extending out on membranous ridges of about first 20 dorsal rays of ocular side and to a lesser degree on blind side; one or two cirri on ocular side of first four anal rays.

Origin of dorsal fin (base of first ray) anterior to upper eye, the predorsal length 4.1 (4.3) in head length; tips of first 5 dorsal rays free; first dorsal ray 3.15 (3.25) in head length; longest dorsal ray 1.55 (1.45) in head length; origin of anal fin below base of 18<sup>th</sup> dorsal ray, the preanal length 3.65 in SL; anus anterior to first anal ray; genital papilla on ocular side just dorsal and slightly posterior to anus; length of first anal ray 2.9 (2.8) in head length; longest anal ray 1.55 (1.5) in head length; caudal-fin length 4.15 in SL; pelvic fins close together anteriorly, their origins adjacent, the prepelvic length 4.9 (4.8) in SL; pelvic fins diverging posteriorly, well separated from anal fin and genital papilla; third pelvic ray longest, reaching to base of third anal ray, 2.05 (2.15) in head length.

Colour of ocular side of holotype in alcohol light brown with irregular paler brown blotches, mostly with darker brown edges, and irregular dark brown blotches in three rows, one below base of dorsal fin, one on lateral line, and one above base of anal fin, the darkest blotch on lateral line two-thirds of SL from front of snout; fin rays light yellowish brown, the membranes translucent.

Figure 22 is a black and white copy of a colour photograph taken of the holotype when fresh.

**Etymology**

This species is named in honour of Richard Winterbottom who collected and photographed the holotype.

**Remarks**

The three type specimens of this species were collected in the coral-reef habitat from the depth range of 4.5-12 m at the Philippine Islands of Siquijor and Negros by an expedition sponsored by the Royal Ontario Museum of Toronto.

As mentioned in the Remarks for *Aseraggodes matsuurai*, *A. winterbottomi* is one of four species with nearly identical counts of fin rays, scales, vertebrae, and anterior dorsal pterygiophores. It was first regarded as conspecific with *A. matsuurai* until scales instead of papillae were noticed on the ocular side of the snout. Another difference is the structure of the scales. The cteni of *A. winterbottomi* project well beyond the cutaneous edges of the scales, whereas only the tips protrude in *A. matsuurai*.

**ASERAGGODES XENICUS  
(MATSUBARA & OCHIAI)  
(Figs. 23, 24; Tabs. I-V, XV)**

*Parachirus xenicus* Matsubara & Ochiai, 1963: 94, figs. 6-8 (type locality, Ankyaba, Amami Islands, Japan).

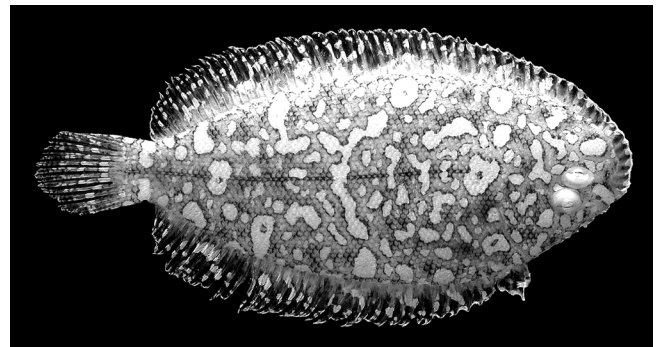


Figure 23. - *Aseraggodes xenicus*, FRLM 25690, 49.2 mm, Lembeh Island, Sulawesi (Photo S. Kimura).

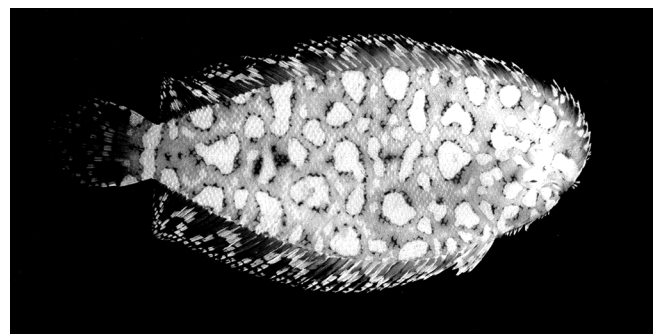


Figure 24. - *Aseraggodes xenicus*, BPBM 22792, 34.8 mm, Thailand, Andaman Sea (Photo J. Randall).

Table XV. - Proportional measurements of specimens of *Aseraggodes xenicus* as percentages of the standard length. [*Mesures proportionnelles des spécimens d'Aseraggodes xenicus en pourcentage de la longueur standard*].

	USNM 273794	USNM 273794	BPBM 22792	USNM 273794	USNM 273829	USNM 273794	FRLM 25690	FAKU 130781	BPBM 40415
Standard length (mm)	21.2	34.8	35.0	36.2	42.6	49.1	49.2	55.0	55.8
Body depth	39.8	40.6	41.8	41.6	42.2	39.8	42.9	40.0	40.3
Body width	7.0	8.2	8.0	7.1	8.2	7.7	7.9	8.7	8.7
Head length	24.8	24.4	24.8	24.6	24.8	24.5	24.7	24.9	24.8
Snout length	9.8	8.9	8.3	9.7	9.2	9.5	8.9	8.6	8.6
Preorbital length	9.8	10.1	9.1	9.9	9.4	8.6	10.3	8.6	10.2
Eye diameter	4.8	5.5	4.4	4.4	4.7	5.1	5.3	4.7	4.3
Interorbital width	2.2	2.1	1.1	1.8	1.2	1.0	1.2	1.0	2.0
Upper-jaw length	8.1	8.5	8.6	8.2	7.5	8.2	8.1	7.6	8.8
Caudal-peduncle depth	12.1	13.9	13.8	12.5	13.7	12.2	13.6	13.3	12.8
Caudal-peduncle length	1.4	1.1	1.5	1.1	1.0	2.4	1.4	1.8	1.8
Predorsal length	5.6	5.1	4.5	5.0	4.7	5.8	4.2	5.4	5.0
Preanal length	27.4	25.0	25.7	24.7	26.8	24.8	25.4	27.6	26.1
Prepelvic length	21.2	20.4	20.0	19.0	19.3	18.3	18.7	21.0	18.6
First dorsal ray	8.9	8.8	7.1	8.0	8.6	7.3	7.1	7.2	8.0
Longest dorsal ray	18.9	17.0	16.8	16.4	16.5	16.4	16.0	15.8	15.0
First anal ray	9.7	9.3	8.5	8.2	9.6	8.7	7.8	8.9	9.0
Longest anal ray	18.9	17.3	16.6	16.4	16.5	16.8	16.2	16.0	15.2
Caudal-fin length	30.5	28.6	28.2	27.1	25.1	26.3	25.6	25.2	23.2
Pelvic-fin length	14.3	14.3	13.8	13.8	14.0	13.9	13.2	12.9	12.9

*Aseraggodes smithi* Woods in Schultz *et al.*, 1966: 73, fig. 151 (type locality, Rongerik Atoll, Marshall Islands).

#### Material examined

Japan, Amami Islands, FAKU 130781, 5 of 19 specimens, 39.6-55 mm (probable paratypes of *Parachirus xenicus* Matsubara & Ochiai). Taiwan, Pingtung, Nan-wan, ASIZP 56230, 43.0 mm; Ylian, Dahsi, ASIZP 60527, 46.7 mm. Marshall Islands, Rongerik Atoll, USNM 141766, 17 mm (holotype of *A. smithi* Woods). Palau, Augulpelu Reef, BPBM 39631, 17 mm; ROM 76582, 2: 14.5-22.5 mm. Philippines, Negros, Dumaguete market, BPBM 40415, 55.8 mm; southern Negros, Port Siyt, USNM 273794, 4: 21.2-49.1 mm; Apo Island, USNM 273829, 42.6 mm. Indonesia, Sulawesi, Lembah Island, FRLM 25690, 49.2 mm. Andaman Sea, Thailand, Similan Islands, Ko Miang, BPBM 22792, 34.8 mm.

#### Diagnosis

Dorsal rays 60-69, all but first 20 rays branched in largest specimen, none in smallest; anal rays 41-45, all branched on largest specimen, only a few of longest rays branched on smallest specimen; lateral-line scales 63-70; vertebrae 33-35 (one of 13 with 35); dorsal pterygiophores anterior to fourth neural spine 14-15; body depth 2.3-2.5 in SL; head length 4.0-4.1 in SL; caudal peduncle very short, its length about 10.2-24.8 in head length; snout length 2.55-3.0 in head length; preorbital length 2.4-2.9 in head length; eye 4.5-5.75 in head length; upper eye overlapping about one-half of lower eye; interorbital space narrow, 11.3-24.9 in head length; tubular anterior nostril nearly or just reaching cuta-

neous edge of lower eye when depressed posteriorly; scales of body with 10-14 cteni; small scales dorsally on ocular side of snout extending nearly to anterior edge, losing cteni anteriorly; 18-30 thin lappet-like cirri along ventral edge of head, and up to 12 at front of snout (actually anterior membranous edge of dorsal fin); thin, well-spaced cirri along opercular edge of gill opening on blind side, but absent on ocular side except for a few on ventral edge; longest dorsal ray 1.44-1.65 in head length (1.3 in 21-mm juvenile); caudal fin 3.4-4.3 in SL (3.3 in 21-mm juvenile); longest pelvic ray reaching base of second or third anal ray, 1.7-1.95 in head length; colour of ocular side of adults in alcohol light brown with many small dark brown spots (as dark edges on scales) and numerous pale spots, some dark-edged, mostly round, but a few irregular; about 12 dark brown spots smaller than eye along lateral line, some horizontally elongate; fin membranes translucent, the rays light yellowish with a few small dark blotches.

#### Remarks

*Aseraggodes xenicus* (Matsubara & Ochiai) was described from 59 specimens, 33-65 mm, collected from the Amami Islands in the Ryukyu Islands by members of the Misaki Marine Biological Institute of Kyoto University. The species was classified in the new genus *Parachirus* (considered a synonym of *Aseraggodes* by Randall, 2005), and a 55-mm specimen was selected as the holotype. No museum number was given for any of the specimens in the publication describing the species. Ochiai (1963) also reported in detail on the type specimens and illustrated one in colour as Plate II. His ranges of meristic data for the 59 specimens are

57-69 dorsal rays, 39-47 anal rays, 53-64 lateral-line scales (he did not include the pored scales on the head), and 32-33 vertebrae (he did not count the first small vertebra). Because no mention was made of a preopercular branch of the lateral line on the ocular side of the head in the original description, or by Ochiai (1963), and none was shown on any of the illustrations, this species was first regarded by us as an endemic Japanese species distinct from *A. smithi* Woods.

However, on receiving a loan of two specimens collected in southern Taiwan from Academia Sinica in Taipei that are typical of what we had identified as *A. smithi*, it was realized that the preopercular branch of the lateral line may have been overlooked on the Japanese type specimens of *xenicus*. A request was made of Yoshiaki Kai of Kyoto University to borrow some of the type specimens. He replied initially that the specimens could not be found. Part of the fish collection of the Misaki Marine Biological Institute had been transferred to the Department of Fisheries, Faculty of Agriculture of Kyoto University at Maizuru (FAKU), but the type series was not located there. Kai later found a jar with 19 specimens of *A. xenicus*, but with no field data. At our request, he sent the five of these specimens closest to 55 mm in the hope that one might be the holotype (which could be determined from its combination of meristic data and by comparison with the figures of the holotype in Matsubara and Ochiai's description). Unfortunately, none is the holotype, but all have the distinctive ventral branch of the lateral line on the head over the preopercular edge. We conclude therefore that *A. smithi* is a junior synonym of *A. xenicus*. Moreover, we believe that these 19 specimens are part of the original type series and therefore paratypes.

*Aseraggodes smithi* Woods was described from a single juvenile specimen, 17 mm SL (18.5 mm to the front of the head) from the Marshall Islands. The lateral-line pores are not yet evident, hence the preopercular branch on the ocular side could not be detected. However, this branch is evident on specimens from Palau as reported by Randall and Bartsch (2005). A 22.5-mm juvenile was illustrated by them from a photograph taken by Richard Winterbottom. Some errors in Woods' description should be noted. He wrote that many of the dorsal and anal rays are branched, whereas none are. He counted 4 rays for the blind-side pelvic fin, but there are 5. He reported that the pelvic fins are free and not joined to the anal papilla, but they are attached and joined to the base of the papilla by membrane (the genital papilla is not evident on the specimen).

Shao and Chen (1988: 121, fig. 9) reported a 45.9-mm specimen as *Parachirus xenicus* from Nan-wan, southern Taiwan and illustrated it in colour. The specimen was sent on loan by Leon Yun-Chih Liao, along with a second specimen, and the identification as *xenicus* confirmed.

Also confirmed as this species is the 50-mm specimen from Lembah Island, Sulawesi identified as *Parachirus*

*xenicus* by Kimura and Matsuura (2003: 216, upper fig.) sent on loan by Seishi Kimura. His colour photograph is reproduced here in black and white as figure 23.

*Aseraggodes xenicus* is a shallow-water species. The type specimens were found in the sand of a shallow tidepool. The holotype of *A. smithi* was taken from the "ocean reef" of Rongerik Atoll, Marshall Islands. Three small specimens from Palau were collected in 6-10 m at Augulpelu Reef by R. Winterbottom *et al.*; four specimens from southern Negros in 0-3 m by L. Knapp *et al.*; the Andaman Sea specimens from shore in 0-2 m by the first author and associates; and the specimen from Lembah Island, Sulawesi by beach seine by S. Kimura and K. Matsuura.

**ASERAGGODES ZIZETTE SP. NOV.**

(Fig. 25; Tabs. I-V, XVI)

**Material examined**

*Holotype*. - ANSP 145364, male, 36.3 mm, Indonesia, Mentawai Islands, Siberut, coral and sand, 0.3-1.5 m,



Figure 25. - Holotype of *Aseraggodes zizette*, ANSP 145364, male, 36.3 mm, Mentawai Islands, Indonesia (Photo J. Randall).

Standard length (mm)	36.3
Body depth	40.0
Body width	6.4
Head length	25.1
Snout length	8.4
Preorbital length	8.3
Eye diameter	4.0
Interorbital width	2.2
Upper-jaw length	7.7
Caudal-peduncle depth	13.7
Caudal-peduncle length	1.6
Predorsal length	5.4
Preanal length	27.1
Prepelvic length	21.9
First dorsal ray	7.9
Longest dorsal ray	18.6
First anal ray	9.6
Longest anal ray	18.2
Caudal-fin length	27.7
Pelvic-fin length	12.7

Table XVI. - Proportional measurements of the holotype of *Aseraggodes zizette* (ANSP 145364) as percentages of the standard length. [*Mesures proportionnelles de l'holotype d'Aseraggodes zizette en pourcentage de la longueur standard*].

rotenone, R. Bolin *et al.*, Te Vega Cruise A, Station 104, 30 Nov. 1963.

### Diagnosis

Dorsal rays 66, anal rays 47; lateral-line scales 64; vertebrae 36; dorsal pterygiophores anterior to fourth neural spine 11; body depth 2.5 in SL; head length 4.0 in SL; caudal peduncle very short, its length 15.7 in head length; snout length 3.0 in head length; preorbital length 3.0 in head length; interorbital space narrow, 11.4 in head length; tubular anterior nostril just reaching anterior edge of lower eye when depressed posteriorly; longest dorsal ray 1.35 in head length; caudal fin 3.6 in SL; pelvic fins reaching base of fourth anal ray, 2.0 in head length, colour in alcohol pale orangish brown with numerous faint dusky spots, two on lateral line largest and most visible.

### Description

Dorsal rays 66, branched at tips except first 24; anal rays 47, branched at tips except first eight; caudal rays 18, the middle 14 branched, none double-branched; pelvic rays 5, branched at tips; lateral-line scales on ocular side 64, including 6 anterior to a vertical at upper end of gill opening; scales above lateral line 22; scales below lateral line 25; vertebrae 36; 3 pterygiophores, including the erisma, before tip of second neural spine; space between second and third neural spines with 6 pterygiophores; space between third and fourth neural spines with 2 pterygiophores, hence a total of 11 dorsal pterygiophores anterior to fourth neural spine. Ventroanterior margin of urohyal forming an angle of about 80°, the inner angle moderately rounded.

Body depth 2.5 in SL; body thin, the width (thickness) 6.3 in body depth; head length 4.0 in SL; caudal peduncle present but very short, its length 15.7 in head length; caudal-peduncle depth 1.85 in head length; snout length 3.0 in head length; preorbital length 3.0 in head length; eye diameter 6.3 in head length; eyes separated by a narrow concave space, the least vertical interorbital width 11.4 in head length; upper eye overlapping anterior one-third of lower eye; upper end of gill opening at level of a line passing about one-half eye diameter below ventral edge of lower eye.

Mouth inferior, the jaws strongly curved; maxilla extending posterior to a vertical at front edge of pupil, the upper-jaw length 3.3 in head length; dentition not checked (jaws firmly closed); tubular anterior nostril before upper edge of lower eye, just reaching a vertical at edge of lower eye when depressed posteriorly, its length about equal to eye diameter; anterior nostril of blind side a slender membranous tubule in second row of papillae above upper lip nearly to middle of upper jaw, about four times longer than adjacent papillae; posterior nostril of blind side a short, broad-based, pointed tubule a little more than an eye diameter dorsoposterior to anterior nostril.

Scales ctenoid on both sides, most with 7 to 9 cteni (scales fleshy, the cteni visible mainly at scale edges); scales on ocular side of head progressively smaller toward front of head and with fewer cteni, replaced by papillae before eyes, except for two large fleshy scales before upper eye and a patch of longitudinal fleshy ridges above anterior nostril (when depressed horizontally backward); eyes separated by 2 rows of scales, with about 3 to 4 rows of small scales extending onto medial and anterior edges of eyes; cirri on anterior or ventral edges of head small and thin; prominent cirri on opercular edge of gill opening on both sides, 23 on ocular side; a dense zone of pointed fleshy papillae around mouth on blind side, longest on chin below front half of lower lip; cirri above upper lip abruptly shorter lateral to posterior nostril; lateral line straight on both sides along middle of body, on ocular side in alignment with middle of upper eye; cephalodorsal branch of lateral line on blind side conspicuous on head following dorsal contour on dorsal-fin base, continuing indistinctly on body to below 36<sup>th</sup> dorsal ray.

Base of dorsal and anal fins with a scaly sheath of 2 to 3 rows of scales; a fleshy membranous ridge on basal half or more of dorsal and anal rays, except last few rays; cirri present on edges of membranous ridges on first 22 dorsal rays on both sides, the posterior rays with only one or two cirri near the base

Origin of dorsal fin (base of first ray) anterior to upper eye, the predorsal length 4.65 in head length; first dorsal ray (tip barely free) 3.2 in head length; longest dorsal ray 1.35 in head length; origin of anal fin perpendicular to posterior end of gill opening, the preanal length 3.7 in SL; anus anterior to first anal ray; genital papilla on ocular side just dorsoposterior to anus; length of first anal ray 2.6 in head length; longest anal ray 1.4 in head length; caudal fin 3.6 in SL; pelvic fins close together on ventral edge of body, their origins adjacent; prepelvic length 4.55 in SL; third pelvic rays longest, reaching base of fourth anal ray, 2.0 in head length.

Colour of holotype in alcohol pale orangish brown with very faint dusky blotches in three rows on ocular side: one beneath dorsal fin, one above anal fin, and one of three blotches on lateral line, the middle one most visible; fin rays pale yellowish, the membranes translucent.

### Etymology

We name this species with the nickname of our esteemed colleague and good friend, Marie-Louise Bauchot, in recognition of her ichthyological research. The name is treated as a noun in apposition.

### Remarks

This species is described from one small mature male specimen taken in a shallow rotenone station in the Mentawai Islands off Sumatra during a Te Vega cruise in 1968.

Five Indo-Malayan species of *Aseraggodes* share the counts of 35 or 36 vertebrae and 10 or 11 dorsal pterygiophores anterior to the fourth neural spines with *A. zizette*, but all differ in lacking a caudal peduncle.

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