

On the Status of the Australian Serranid Fishes
***Epinephelus ergastularius* Whitley**
and *E. thompsoni* Whitley

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ABSTRACT. The grouper *Epinephelus ergastularius* Whitley, 1930, from New South Wales and Queensland is recognised as a valid species; it is closely related to the wide-ranging Indo-Pacific *E. octofasciatus* Griffin and the Japanese *E. septemfasciatus* (Thunberg), sharing with them such characters as one or a few small spines on the ventral margin of the preopercle, seven dark bars on the body of the young, the upper half of the peduncular bar black, and the same meristic data, including nine anal soft rays. It differs in having a truncate to slightly emarginate caudal fin in the adult with a distinct broad pale posterior border, pale borders posteriorly on the dorsal and anal fins of adults, and irregular, fine dermal ridges on the back adjacent to the dorsal-fin base. The young can be distinguished by the unequal spacing between the first four dark bars on the body. *Epinephelus chabaudi* (Castelnau) of East Africa is also a close relative, differing in having numerous branched pyloric caeca, a prominent black streak above the maxilla in the adult, and in lacking dermal ridges and broad pale borders on the fins. *Epinephelus thompsoni* Whitley, 1948, is known from a single specimen, taken in 129 to 137 m off Queensland, which has only 13 dorsal soft rays. This grouper name is a junior secondary homonym of *E. thompsoni* (Fowler, 1923). The name, *E. perplexus*, replaced the homonym.

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Whitley (1930) described a new species of grouper, *Epinephelus ergastularius*, from a specimen 180 mm in standard length taken in about 15 m near Sydney, New

South Wales, in 1925. He gave localities in New South Wales for other specimens in the Australian Museum but did not provide their lengths, registration numbers, or

any indication of their status as paratypes. Under the heading "Affinities" he wrote that this species "is apparently closely allied to the Japanese *Perca septemfasciata* Thunberg..." With the possible exception of a smaller eye, none of the characters given by Whitley to differentiate *E. ergastularius* from *E. septemfasciatus* are valid. The colour pattern, general morphology, and meristic data, including nine anal soft rays, are essentially the same. Our first reaction to Whitley's species was to regard it as a probable junior synonym of *E. septemfasciatus*. However, large specimens of a brown grouper from the upper continental slope off northern New South Wales, which were unidentified in the Australian Museum fish collection, have been linked through intermediate specimens to Whitley's *E. ergastularius*. Additional adult specimens from the Coral Sea off Queensland have been obtained from exploratory fishing surveys by the CSIRO. Adult specimens of *Epinephelus ergastularius* and *E. septemfasciatus* have different caudal-fin shapes and colour patterns which led us to recognise them as different species; *E. ergastularius* has a truncate to slightly emarginate caudal fin with a broad pale posterior border, whereas the caudal fin of the adults of *E. septemfasciatus* is rounded and the pale border is either narrow and poorly defined or lacking. Initially we believed *E. septemfasciatus* to be a wide-ranging, deep-dwelling Indo-Pacific species of grouper, but Rudie H. Kuiter informed the senior author that there are two very closely related species of *Epinephelus* in Japan that most authors have confused under the name *E. septemfasciatus*. Katayama in Masuda *et al.* (1984: 132, pl.118A-C) recognised the two, but his characters to differentiate them are largely invalid, and he misidentified the second species as *E. mystacinus* (Poey), a western Atlantic and eastern Pacific fish. The correct name for this species is *E. octofasciatus* Griffin (1926), described from a specimen from New Zealand. The true *E. septemfasciatus* is most easily distinguished by having two narrow close-set dark bars beneath the middle of the soft portion of the dorsal fin instead of a single broad dark bar as in *E. octofasciatus*. From our present knowledge, *E. septemfasciatus* seems to be confined to Japanese waters and may be encountered in SCUBA-diving depths. *Epinephelus octofasciatus* is wide-ranging in the Indo-Pacific; in tropical seas it is generally found at depths greater than 100 m.

We provide below a diagnosis of *E. ergastularius* and differentiate it from *E. octofasciatus*, *E. septemfasciatus*, and another close relative, *E. chabaudi* (Castelnau, 1862) from east Africa.

Whitley (1948) described *Epinephelus thompsoni* as a new species from a gutted specimen ("about 490 mm. in standard length") collected north-east of Cape Moreton, Queensland in 129 to 137 mm; it was deposited in the Australian Museum (AMS E.2116). The mouth of this specimen is wide open, making it difficult to take measurements involving the head. Examination of this specimen revealed that it is a valid species; no other specimens have been found. The name *Epinephelus thompsoni* Whitley, however, is invalid; it is a junior

secondary homonym of *Stereolepoides thompsoni* Fowler, 1923, now known to be a junior synonym of *Epinephelus lanceolatus* (Bloch). The name was replaced by *E. perplexus* in Randall & Heemstra (1991). A diagnosis is given for Whitley's fish.

We have examined specimens of *Epinephelus* for this study from the following institutions: AMS – Australian Museum, Sydney; BPBM – Bernice P. Bishop Museum, Honolulu; CSIRO – CSIRO Marine Laboratories, Hobart; NMV – Museum of Victoria, Melbourne; NMNZ – National Museum of New Zealand, Wellington; QM – Queensland Museum, Brisbane; WAM – Western Australian Museum, Perth. In addition, data on specimens of *E. chabaudi* from South Africa have been provided by Phillip C. Heemstra of the JLB Smith Institute of Ichthyology, Grahamstown (RUSI).

Proportional measurements have been rounded to the nearest 0.05. Length measurements of specimens are standard length (SL).

Epinephelus ergastularius Whitley

Figs 1-5

Epinephelus (*Schistorus*) *ergastularius* Whitley, 1930: 119, pl.14, fig.1 (type locality, off Long Bay, coast near Sydney, NSW).

Material examined. AMS IA.2482, 185 mm, holotype of *Epinephelus ergastularius* Whitley, off Long Bay, near Sydney, NSW 15 m; AMS IB.7620, 565 mm, east of Ballina, NSW (28°52'S 153°34'E), 275 m; AMS E.5237, 270 mm, 32 km north of Montague Island, NSW, 108 m; AMS I.23712-001, 625 mm, off Coff's Harbour, NSW (30°41'S 153°25'E), 267-274 m; AMS I.23713-001, 3: 312-402 mm, off Woolli, NSW; AMS I.24504-001, 204 mm, off Bateman's Bay, NSW (35°40'S); AMS I.26022-003, 63 mm, off Woody Head, NSW (29°21'S 153°27'E); AMS I.25865-001, 143 mm, off Port Stephens, NSW (32°49'S 152°07'E), 40 m; AMS I.27362-001, 720 mm, east of Dunk Island, Qld (18°01'S 147°07'E), 300 m; BPBM 30943, 680 mm, off Dunk Island (17°59'S 147°07'E), 320 m; BPBM 31959, 310 mm, northern NSW, 123 m; CSIRO H631-01, 809 mm, east of Dunk Island (18°01'S 147°07'E), 300 m; CSIRO H632-01, 632 mm, east of Dunk Island (17°59'S 147°05'E), 302-308 m; CSIRO H781-01, 545 mm, east of Bowen (19°44'S 152°06'E), 370 m; NMV A5297, 886 mm, east of Dunk Island (18°01'S 147°07'E), 300 m; QM 25660, 781 mm, east of Dunk Island (18°00'S 147°08'E), 298-300 m.

Diagnosis. Dorsal rays XI,14-15 (one of 18 with 15 rays); anal rays III,9-10 (one of 18 with 10 rays); pectoral rays 18-19 (four of 18 with 19 rays); lateral-line scales 63-70; longitudinal scale series 103-116; gill rakers 7-9 + 14-16; pyloric caeca varying from about 30 in a 143-mm specimen (AMS I.25865-001) to 89 in a 680-mm specimen (BPBM 30943).

Body moderately deep for the genus, the depth 2.6-2.9 in SL, and somewhat compressed, the width 1.85-2.35 in depth; head length 2.35-2.55 in SL; snout 3.05-

3.9 in head; orbit diameter 5.6-7.45 in head; interorbital space strongly convex, the least fleshy width 4.55-4.95 in head; suborbital depth 7.9-11.5 in head; least depth of caudal peduncle 3.2-3.9 in head.

Mouth moderately large, the maxilla nearly or just reaching a vertical at rear margin of orbit; upper jaw length 2.0-2.3 in head; dentition typical of the genus (Figs 3,4), the anterior pair of canines not enlarged; 2 rows of teeth on midside of lower jaw, the teeth of inner row longer and depressible.

Posterior nostril ovate and enlarged, 2 or more times larger than anterior nostril; nostrils close together, the posterior flap of anterior nostril reaching posterior nostril when laid back.

The 3 opercular spines broad, very flat, the middle spine much closer to lower than upper spine; posterior preopercular margin finely serrate, the rounded corner fully serrate, the serrae there not or only slightly enlarged; ventral margin of preopercle with 1-4 small downward-projecting spines (often concealed); subopercle and interopercle finely serrate.

Scales on body ctenoid except for nape, thorax, and abdomen; scales on nape and anterodorsally on body very small; no auxiliary scales on body; no scales on maxilla;

irregular, fine dermal ridges in a narrow zone on back adjacent to base of dorsal fin (Fig.5).

Third dorsal fin spine usually longest, 2.55-3.2 in head; membranes of spinous portion of dorsal fin deeply incised, the membrane-free distance of third and fourth dorsal spines more than one third (and as much as two thirds) length of spine; scaled basal portion of dorsal fin very fleshy; fourth soft dorsal fin ray usually longest, 2.4-3.5 in head; third anal spine usually longer than second, the second (which can be measured more accurately) 3.1-4.7 in head; second or third soft anal fin rays longest, 2.15-2.9 in head; caudal fin slightly rounded in young, truncate to slightly emarginate in adults; fin length 1.75-2.0 in head; pectoral fins relatively short, 1.65-3.25 in head; pelvic fins 1.8-2.5 in head. All fins becoming relatively shorter, in general, with growth.

Colour in alcohol of juveniles brown with 7 dark brown bars on body which are broader than their paler interspaces; first bar on nape, the last covering most of caudal peduncle (upper half of peduncular bar black); second and third dark bars and fourth and fifth dark bars much closer together than third and fourth bars; dorsal edge of maxillary groove dark brown; median and pelvic fins dark brown; pectoral fins light brown.

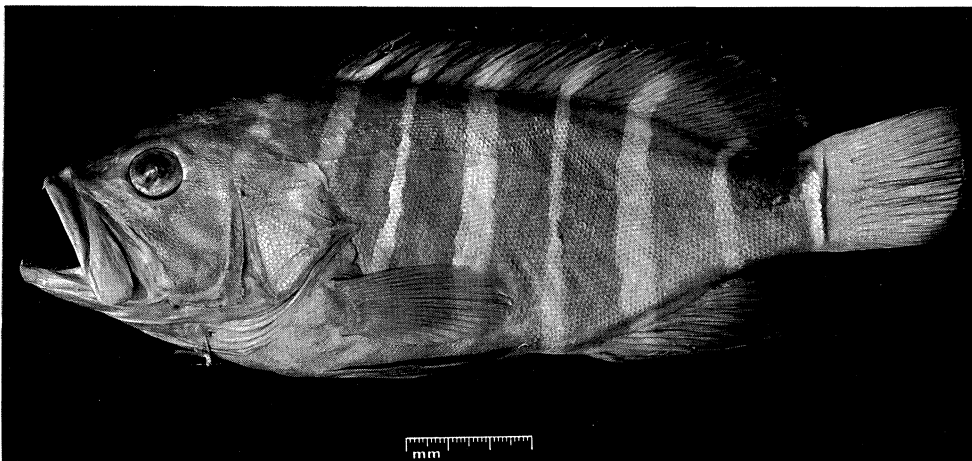


Fig.1. Holotype of *Epinephelus ergastularius* Whitley, AMS IA.2482, 185 mm SL, Long Bay, near Sydney, NSW.

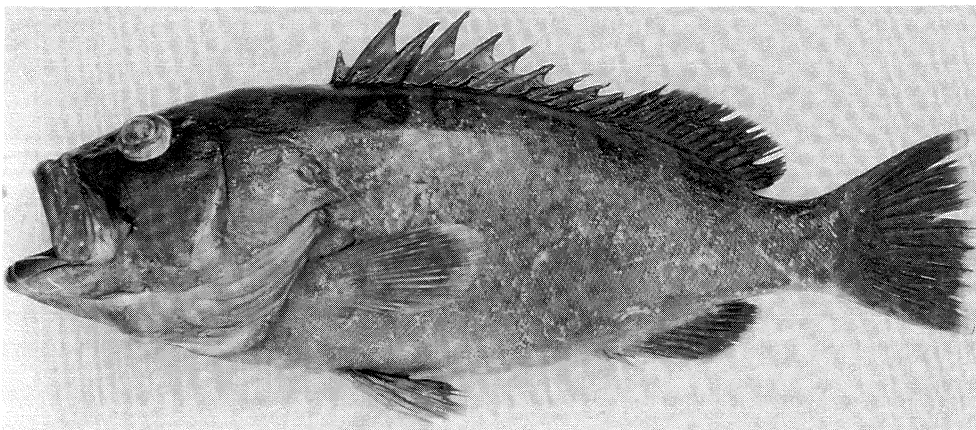


Fig.2. Adult of *Epinephelus ergastularius* (photo by Ken Graham).

Colour in alcohol of an adult (AMS IB.7620, 565 mm SL): dark brown without bars; caudal fin and soft portion of anal fin with a broad (7-8 mm) pale yellowish posterior margin; soft portion of dorsal fin with a pale yellowish margin 2-3 mm in width; pectoral fins dark brown, becoming pale yellowish distally (but without having a sharply defined pale border).

A Bishop Museum specimen 310 mm in SL (BPBM 31959) which has well-developed dark bars on the body is just beginning to show a pale margin posteriorly on the caudal fin. A 327-mm specimen (AMS I.23713-001) also has dark bars, a more obvious pale border on the caudal fin, a narrow pale margin on the soft portion of the anal fin and a trace of a pale border on the soft

portion of the dorsal fin. Specimens of 452 mm SL and larger lack the dark bars and have more distinct pale borders posteriorly on the median fins.

Colour of large adults from 350 m off Queensland when fresh: pinkish grey with no trace of bars; fins darker than body except for distinct white margins on soft portions of dorsal and anal fins, posterior edges of caudal fin and pectoral fins, and edge of distal half of pelvic fins.

Remarks. Meristic data of *E. ergastularius* above are based on 18 specimens; measurements were taken of 13 specimens, 185-886 mm SL.

Adults of *E. ergastularius* are readily distinguished



Fig.3. Upper jaw of *Epinephelus ergastularius*, CSIRO H632-01, 632 mm SL.



Fig.4. Lower jaw of *Epinephelus ergastularius*, CSIRO H632-01, 632 mm SL.

from *E. octofasciatus* by the truncate to slightly emarginate caudal fin (rounded in *E. octofasciatus*), broad pale margins on fins (absent or narrow on *E. octofasciatus*), and in the possession of the unique dermal ridges next to the base of the dorsal fin. Also on adults the basal scaled portion of the dorsal fin of *E. ergastularius* is more fleshy.

At first, juveniles of *Epinephelus ergastularius* seemed to be indistinguishable from those of *E. octofasciatus*. Both have a dark brown bar on the nape, five on the body beneath the dorsal fin, and a broad one on the caudal peduncle, the upper half of which is black. Then it was noticed that the spacing of the dark bars beneath the dorsal fins is uneven. Designating the bar on the nape as the first, bars two and three are very closely spaced, as are bars four and five. But the pale interspace between bars three and four is about twice as broad as the adjoining pale interspaces. Dark bars two to five on juveniles and subadults of *E. octofasciatus* and *E. septemfasciatus* are approximately evenly spaced. The same spacing is maintained in subadults to a size where the bars are no longer evident. In *E. ergastularius* the second body bar is almost vertical, extending well behind the opercular spine and to above the pectoral base well behind the pectoral insertion; the fifth bar is convex anteriorly. In *E. septemfasciatus* the second body bar curves anteroventrally, with its posterior margin at the posterior end of the opercular spine and ventrally the bar does not extend noticeably beyond the end of the pectoral insertion; the fifth body bar is vertical or slightly convex anteriorly.

We have not examined specimens nor do we know of valid records of *E. octofasciatus* from eastern Australia. This suggests that this species and *E. ergastularius* are

allopatric. In view of their obvious close relationship, it is possible that the latter is only a subspecies of *octofasciatus*. However, in view of the differences we have given, we believe they are best regarded as species.

We have data on four lots of *E. octofasciatus* from Western Australia, one of which, AMS I.26027-001, consists of six juveniles, 40-51 mm, taken in 27-51 m off Broome. The other three lots are of single specimens, 240-432 mm, from the Western Australian Museum. The largest, from Rottnest Island, differs in having only a slightly rounded caudal fin. A colour photograph provided by Barry Hutchins of an angler holding a freshly caught *E. octofasciatus* at least 600 mm SL from 80 m at Ocean Reef, WA, has a truncate caudal fin with a distinct white posterior margin that is broader at the corners. Since occasional *E. octofasciatus* have a comparable caudal coloration, and the fish otherwise shows very distinct alternating broad dark brown and narrow white bars typical of the species, we regard it as *E. octofasciatus*. A specimen of *E. ergastularius* of this size would be pinkish grey without bars. However, the truncate caudal fin of this fish suggests that *E. octofasciatus* may have differentiated in Western Australia. Large adult specimens are needed for detailed examination.

The principal difficulty in comparing these various species and forms is the lack of specimens of comparable size from each area. For example, we have only juveniles of *E. ergastularius* from central New South Wales and only subadults and adults from northern New South Wales and Queensland.

Epinephelus chabaudi (Castelnau, 1861) is also a close relative of *E. ergastularius*. It occurs off South Africa to at least 34°S in the depth range of 9-55 m and has been taken off Kenya in 125-200 m (Randall & Heemstra,

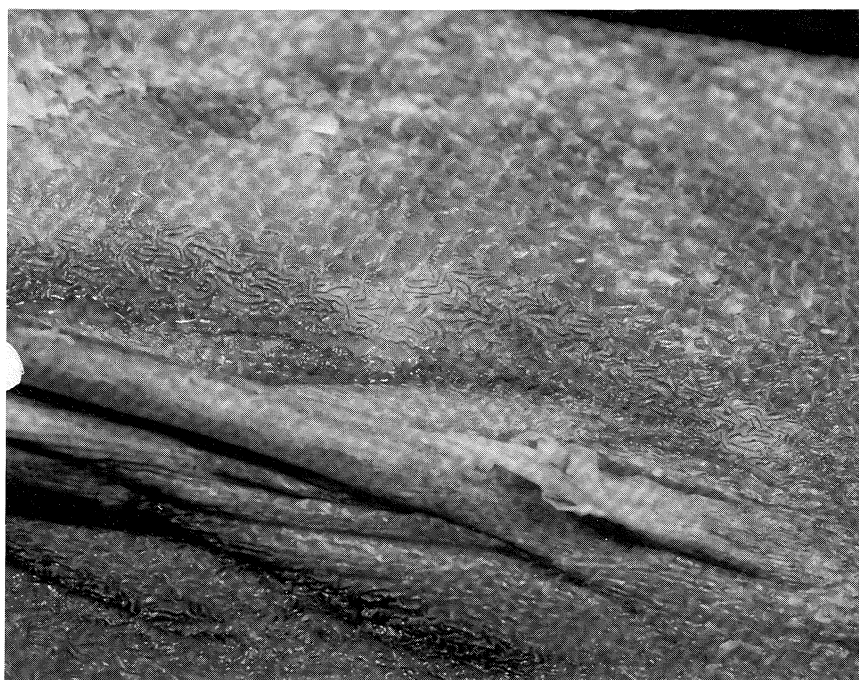


Fig.5. Dorsal view of dermal ridges at base of spinous portion of dorsal fin of *Epinephelus ergastularius*, QM 25660, 781 mm SL.

1991). Like *E. ergastularius*, it has nine soft anal-fin rays, one or two small spines on the ventral margin of the preopercle, a truncate caudal fin and close-set nostrils, with the posterior nostril enlarged. Some of the meristic data for *E. chabaudi* are slightly different: soft dorsal-fin rays 13-14 (usually 14); pectoral rays 18-19 (usually 18); lower-limb gill rakers 15-17. The pyloric caeca are numerous, and they are branched. Phillip C. Heemstra counted 30-40 on RUSI 9498, 517 mm SL, each of which has two to five branches. Also *E. chabaudi* lacks irregular dermal ridges adjacent to the dorsal fin, has small scales on the maxilla, and large adults may have some auxiliary scales on the body. In addition, there are differences in colour. *E. chabaudi* lacks pale margins on the fins and has a prominent black streak at the upper edge of the maxillary groove which persists in adults (this streak is less obvious in adults of *E. ergastularius*). The common name for *E. chabaudi* is Moustache Grouper, alluding to this distinctive marking.

Epinephelus ergastularius is known from the eastern coast of Australia between 18°S and 36°S. Our adult specimens were collected in depths from 108 m (specimen from 20 miles north of Montague Island, NSW) to 370 m (east of Bowen, Qld). Juveniles appear to occur in shallower water off New South Wales. The holotype of *E. ergastularius*, for example, was caught in "about 50 feet" (Whitley, 1948). A survey of fishery resources in depths of 200-1200 m in the vicinity of Dunk Island, Qld (17°55'S 146°29'E) resulted in the capture (by trawling and droplining) of specimens of *E. ergastularius* within the relatively narrow depth band of 280-370 m. Its occurrence in shallower depths off New South Wales may be related to the cooler sea temperature there.

The stomach contents of four large adults taken from the FRV "Soela" were dominated by fish remains, including species of *Triacanthodes*, *Argentina* and *Plectranthias*.

Epinephelus perplexus Randall, Hoese & Last

Figs 6, 7

Epinephelus thompsoni Whitley, 1948: 89 (type locality, 58 km north-east of Cape Moreton, Qld).

Epinephelus perplexus Randall, Hoese & Last in Randall & Heemstra, 1991: 222 (replacement name for *Epinephelus thompsoni*).

Material examined. AMS E.2116, 465 mm, holotype, north-east of Cape Moreton, Qld.

Diagnosis. Dorsal fin rays XI,13; anal fin rays III,8; pectoral fin rays 18; lateral-line scales 52 (not "about 83" as given by Whitley); longitudinal scale series 104; gill rakers 10 + 17.

Body depth 2.9 in SL; body width 1.6 in depth; head length 2.35 in SL; snout 3.8 in head; orbit diameter 6.0 in head; interorbital space slightly convex, the fleshy width 6.8 in head; suborbital depth 9.5 in head; least depth of caudal peduncle 3.65 in head.

Mouth moderately large: maxilla nearly reaching a vertical through rear margin of orbit, its length 2.3 in head. Dentition typical of the genus; rows of teeth on side of lower jaw, the teeth of the inner row about twice as long as those of the outer row. Posterior nostril ovate, about twice as large as anterior nostril; membranous flap on rear edge of anterior nostril just reaching posterior nostril when adpressed.

Middle opercular spine nearer lower than upper spine; margin of preopercle finely serrate, the corner with a prominent posterior bulge bearing 7 moderately enlarged serrae which seem to be somewhat worn; subopercle and interopercle not serrate.

Scales ctenoid except on thorax and abdomen; no auxiliary scales on body; no small scales on maxilla.

Third dorsal spine longest, 3.25 in head; sixth soft

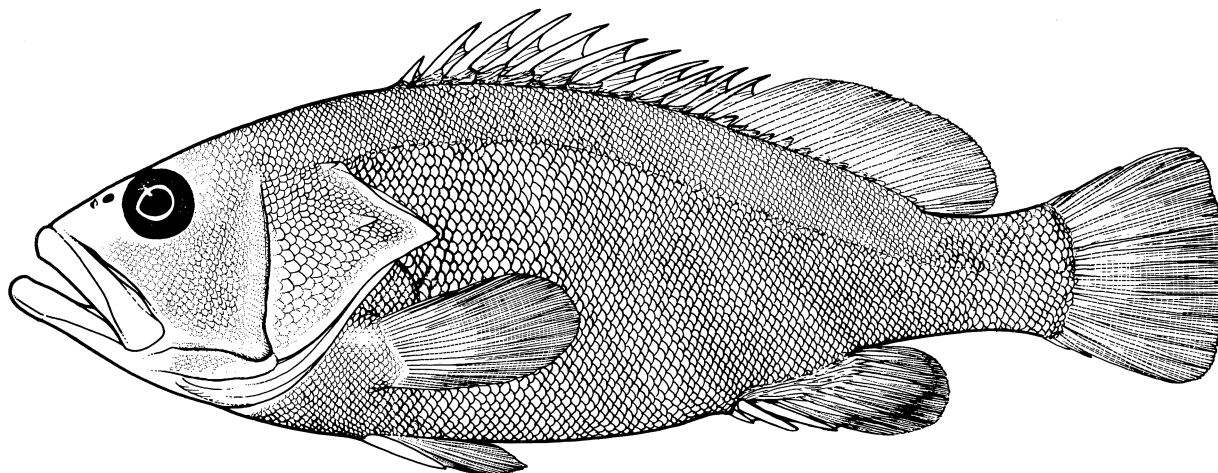


Fig.6. Holotype of *Epinephelus perplexus*, AMS E.2116, 465 mm SL, north-east of Cape Moreton, Qld (drawing by Roger Swainston).

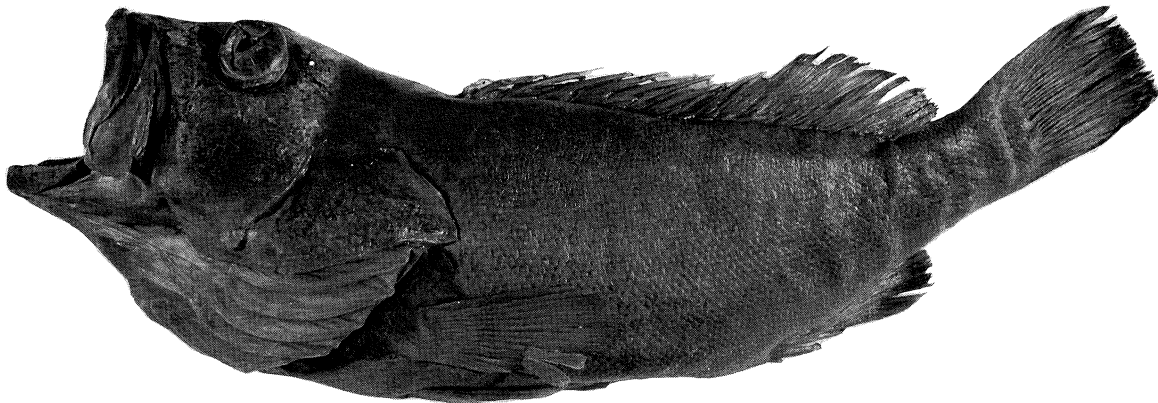


Fig.7. Holotype of *Epinephelus perplexus*, AMS E.2116, 465 mm.

dorsal fin ray longest, 3.1 in head; second anal fin spine 4.1 in head; third soft anal fin ray longest, 2.9 in head; caudal fin slightly rounded, 2.2 in head; pectoral fins not fleshy, their length 2.05 in head; pelvic fins short, 2.5 in head.

Colour in alcohol brown with no obvious dark or light markings. Of the colour, Whitley (1948) wrote, "after long preservation in formalin, light brown. Margins of unpaired fins dark brown. A dark spot on each body-scale. No dark moustache or other conspicuous markings."

Remarks. As mentioned above, *Epinephelus thompsoni* Whitley is a junior secondary homonym of *E. thompsoni* (Fowler). *Epinephelus perplexus* was selected as a replacement name because it seemed odd that only a single specimen of this species is known. The specimen was caught in moderately deep water (the label gives 70-75 fathoms). Because groupers are readily taken by handlines, it is surprising that more specimens have not been found. The lack of additional specimens and the absence of any highly diagnostic characters, apart from the unusual low dorsal soft ray count of 13, is puzzling. Only four other Indo-Pacific species of *Epinephelus* have been recorded with this count: *E. bruneus* Bloch, *E. latifasciatus* (Temminck & Schlegel), *E. radiatus* (Day), and *E. septemfasciatus* (Thunberg) (Randall, 1987). All four have higher lateral-line scale counts (57 or more compared to 52 for *E. perplexus*), and all have dark markings. If the modal soft dorsal fin ray count for *E. perplexus* were 14, 22 other species of the genus in the Indo-Pacific region would need to be compared. All of these are easily distinguished by colour and other meristic data.

Etymology. This species is named *perplexus* due to its many peculiarities.

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