

## A new species of Cardinalfishes (Apogonidae) from northern Australia

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**Abstract** – A new species of apogonid fish is described on the basis of five trawl-captured specimens from northwestern Australia. *A. fuscomaculatus*, sp. nov. appears to be most closely related to *A. striatus* from the Indo-Malay Archipelago. The two species have similar low gill raker counts (8–9 developed rakers), fin shapes (relatively low dorsal and anal with slightly rounded caudal), and preopercle serration (moderate serrae on margin and smooth ridge). Additionally, they both possess a silvery abdomen and a similar pattern of three dark lines radiating from the eye. They differ markedly, however in overall colour pattern. *A. fuscomaculatus*, sp. nov. has large dark spots on the side of the body compared with about 10 narrow bars on the side of *A. striatus*.

### INTRODUCTION

The fishes of the family Apogonidae, popularly known as cardinalfishes, are common reef inhabitants of tropical and subtropical regions. They are relatively small (rarely exceeding 10 cm in standard length), often brightly coloured fishes, with two separate dorsal fins (the first of six to eight spines), and a large oblique mouth. Most seek shelter during the day, emerging at night to feed on small benthic invertebrates (primarily crustaceans). They are oral-brooders, the males holding the fertilised ova in their mouth for several days until hatching. The family is large, estimated to contain 250 species in 21 genera. The present paper describes a new species of *Apogon* Lacepède collected by trawl in relatively deep water off north-western Australia.

Type specimens have been deposited in the Museum and Art Gallery of the Northern Territory, Darwin (NTM) and the Western Australian Museum, Perth (WAM).

Lengths given for specimens are standard length (SL), measured from the front of the upper lip to the base of the caudal fin (posterior end of hypural plate); body depth is the maximum depth from the base of the dorsal spines; body width is measured just posterior to the gill opening; head length is taken from the front of the upper lip to the end of the opercular membrane, and snout length from the same anterior point to the fleshy edge of the orbit; orbit diameter is the greatest fleshy diameter, and interorbital width the least bony width; caudal peduncle depth is the least depth, and caudal peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of fin spines and soft rays are measured to their extreme bases.

Pectoral-ray counts include the upper rudimentary ray; lateral-line scale counts are made to the base of the caudal fin (hence do not include the pored scales posterior to the hypural plate); gill-raker counts are made on the first gill arch and include developed rakers only (those which are higher than the width of their base); the count of the upper-limb rakers is given first, followed by the lower-limb count; the raker at the angle is contained in the lower-limb count.

Proportional measurements of type specimens are given in Table 1 as percentages of the standard length. Data in parentheses in the description refer to paratypes.

### SYSTEMATICS

#### *Apogon fuscomaculatus*, sp. nov.

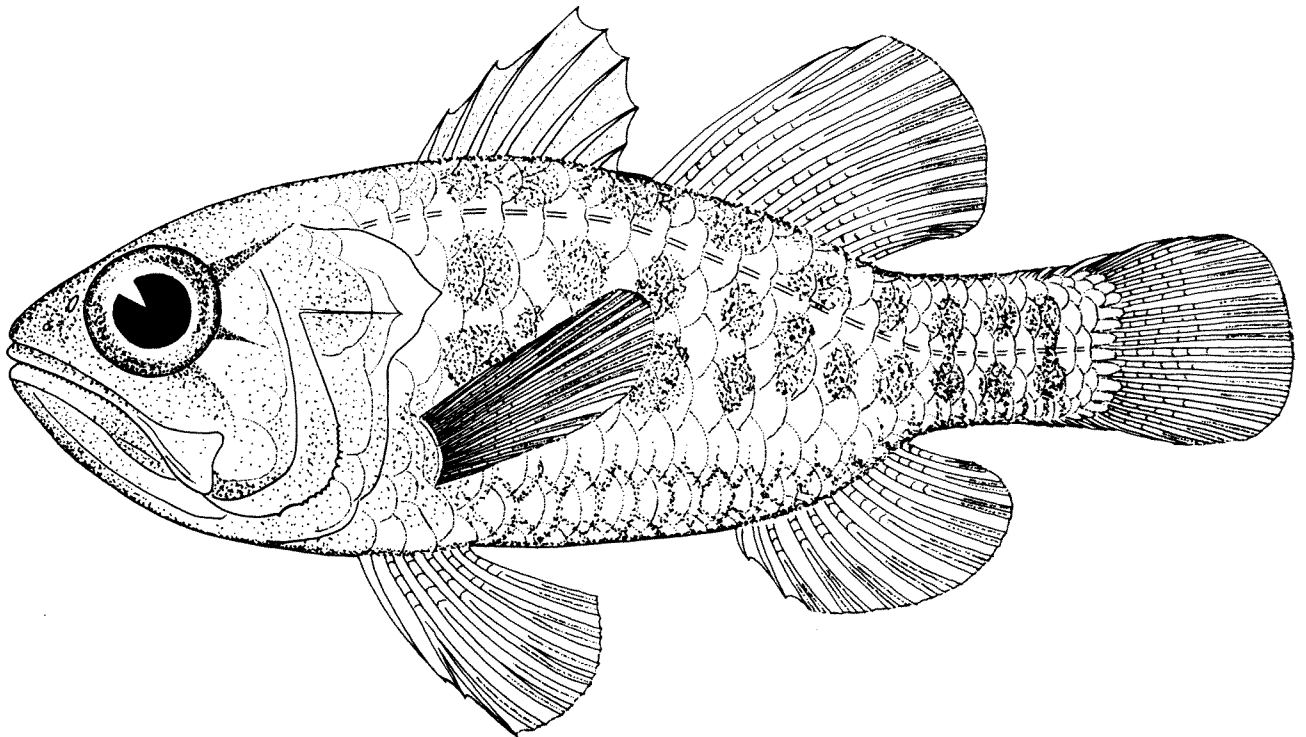
Figure 1; Table 1

#### Holotype

NTM S.13284–014, 48.5 mm SL, NE of Charles Point, Darwin, Northern Territory, (approximately 12°17'S, 130°40'E), 18–24 m, trawl, R. Williams, 2 September 1992.

#### Paratypes

NTM S.11672–027, 51.1 mm SL, S of Rowley Shoals, Western Australia (approximately 19°02'S, 118°30'E), 82–86 m, trawl, NT Fisheries Dept., 2 June 1985; NTM S.11673–037, 43.7 mm SL, S of Rowley Shoals, Western Australia (approximately 19°12'S, 118°41'E), 76–80 m, trawl, NT Fisheries Dept., 1 June 1985; NTM S.13337–003, 45.0 mm SL, SW of Flat Top Bank, Timor Sea (approximately 19°02'S, 118°30'E), 82–86 m, trawl, NT Fisheries Dept., 23 November 1990; WAM P.30992–001, 48.5 mm SL, same data as NTM S.11673–037.



**Figure 1** *Apogon fuscomaculatus*, holotype, 48.5 mm SL. Damaged scales and fins have been reconstructed. Drawing by S. Morrison.

### Diagnosis

Dorsal rays VII–I,9; anal rays II,8; pectoral rays 15–16; lateral-line scales 24; predorsal scales 2–3; developed gill rakers 8–9; preopercular margin serrate; preopercular ridge smooth; body depth 2.9–3.5 in SL; overall colour pale with 3–4 horizontal rows of large brown spots on side, belly silvery, 3 narrow lines radiating from rear half of eye, and fins pale to dusky.

### Description

Dorsal rays VII–I,9; anal rays II,8; all dorsal and anal soft rays branched, the last to base; pectoral rays 15 (one paratype with 16), lowermost and two uppermost unbranched; pelvic rays I,5, all rays branched; principal caudal rays 17, upper and lower rays unbranched; upper and lower procurent caudal rays 7, posteriormost (and occasionally that preceding it) segmented; lateral-line scales 24, plus 4 pored scales posterior to hypural plate, the last (missing on all but one paratype) long and narrow, somewhat triangular; scales above lateral line to origin of dorsal fin 2; scales below lateral line to origin of anal fin 6; median predorsal scales about 2–3 (scales missing on most specimens; circumpeduncular scales 12; developed gill rakers 1 + 8 (1+7–8); branchiostegal rays 7; supraneural (predorsal) bones 3; vertebrae 10 + 14.

Body depth 2.9 (2.9–3.5) in SL; body width 1.8 (2.0–2.3) in depth; head length 2.3 (2.2–2.5) in SL; dorsal profile of head straight except for rounded

front of snout; snout length 4.1 (3.9–4.7) in head; orbit diameter 3.2 (3.0–3.4) in head; interorbital width 3.8 (3.8–4.1) in head; caudal peduncle depth 2.7 (2.7–3.2) in head; caudal peduncle length 2.5 (2.2–2.8) in head.

Mouth large, the maxilla reaching vertical at rear edge of pupil or beyond this point, upper jaw length 2.0 (1.8–2.0) in head; mouth oblique, gape forming an angle of about 30 degrees to horizontal axis of head and body; posterior edge of maxilla slightly concave; no supramaxilla present; lower jaw slightly inferior; upper and lower jaws with a band of small villiform teeth in five to six irregular rows; irregular row of small teeth forming a “V” on vomer; double row of small conical teeth on palatines. Tongue broad-based with rounded tip.

Anterior nostril a small, low-rimmed, membranous tube directly in front of center of eye about half distance from edge of orbit to front of upper lip; posterior nostril ovate without a rim, on a line connecting anterior nostril to top of orbit, more than twice as large as anterior nostril. Cephalic lateralis pores numerous, especially on interorbital, around eye, and on ventral surface of lower jaw.

A single, flat, obtuse opercular spine. Preopercular margin serrate (21 serrae on left side of holotype and 13–16 on paratypes); preopercular ridge smooth.

Scales weakly ctenoid. Lateral line conspicuous, nearly paralleling dorsal contour of body, and ending short distance posterior to caudal-fin base

**Table 1** Proportional measurements of type specimens of *Apogon fuscomaculatus* expressed as percentage of the standard length.

Character	Holotype	Paratype	Paratype	Paratype	Paratype
	NTM S.13284 -014	NTM S.11672 -027	WAM P.30992 -001	NTM S.13337 -003	NTM S.11673 -037
Standard length (mm)	48.5	51.1	48.5	45.0	43.7
Body depth	35.1	32.1	34.8	34.9	28.4
Body width	19.6	14.1	16.1	15.8	14.4
Head length	43.5	39.3	45.4	44.2	42.3
Snout length	10.5	10.0	10.3	10.9	8.9
Orbit diameter	13.6	13.1	13.2	12.9	14.0
Interorbital width	11.3	10.4	11.3	11.1	10.3
Upper jaw length	21.9	21.5	22.9	22.0	21.1
Caudal peduncle depth	15.9	14.5	14.0	15.8	13.5
Caudal peduncle length	17.7	18.0	17.5	16.0	15.3
Predorsal length	43.9	45.2	47.0	40.7	44.4
Preanal length	71.8	71.8	75.1	72.2	74.1
Prepelvic length	39.2	38.6	38.1	38.9	39.6
Length 1st dorsal spine	4.5	4.5	3.7	4.9	3.9
Length 2nd dorsal spine	10.1	10.0	7.8	10.2	8.2
Length 3rd dorsal spine	17.3	16.4	14.2*	10.7*	15.6
Spine of 2nd dorsal fin	13.0	13.2	13.2	13.2	13.2
Longest soft dorsal ray	23.1	22.1	18.8	23.1	22.4
Length 1st anal spine	2.9	3.7	3.3	3.1	3.7
Length second anal spine	10.3	10.2	11.1	11.3	10.1
Longest anal soft ray	19.8	18.4	17.7	19.3	20.1
Caudal fin length	27.0	29.2	27.4	25.6	27.2
Pectoral fin length	21.9	19.6	20.2	22.4	20.1
Pelvic spine length	13.4	11.4	11.5	12.9	12.4
Pelvic fin length	23.9	22.1	22.1	23.6	23.8

\* indicates damaged condition

(four pored scales posterior to hypural, the last pointed). No scales on dorsal and anal fins except low sheath at base of second dorsal and anal fins; small scales on basal third of caudal fin; no scales on paired fins except pair of large midventral scales at base of pelvic fins.

Origin of first dorsal fin above third lateral-line scale; first dorsal spine slender and short, 9.6 (8.7–12.2) in head; third dorsal spine longest, 2.5 (2.4–4.1) in head; middle soft dorsal rays longest, 1.9 (1.8–2.4) in head; origin of anal fin below base of third dorsal soft ray; first anal spine very short, 15.1 (10.6–14.2) in head; second anal spine 4.2 (3.9–4.2) in head; middle anal soft rays longest, 2.2 (2.1–2.6) in head; caudal fin slightly rounded, 1.6 (1.3–1.7) in head; middle pectoral rays longest, 2.0 (2.0–2.2) in head; origin of pelvic fins slightly anterior to pectoral-fin base; first pelvic soft ray longest, reaching to about anus, its length 1.8 (1.8–2.1) in head.

Colour in alcohol: Overall pale tan, nearly white, with 3–4 horizontal rows of large (largest are nearly size of pupil), irregular brown spots on side of body; abdomen slightly silvery; a pair of faint brownish, diagonal lines radiating from rear margin of eye across upper preoperculum; a

similar, slightly wider band from lower edge of eye across cheek; fins whitish, except for fine pepper-like pigmentation most heavily concentrated on membranes of first dorsal fin, outer edge of anal fin and along anterior edge of pelvic fins. Colour in life is unknown.

#### Remarks

*Apogon fuscomaculatus* has been collected from the vicinity of Darwin, Northern Territory and on the outer edge of the North West Shelf of Western Australia. It apparently inhabits flat sand or rubble bottoms, probably sheltering among gorgonians and sponges. Depth of collection ranged between 18–86 m, which is relatively deep compared to the shallow range (less than 20 m) for most members of the family.

*A. fuscomaculatus* belongs to the subgenus *Nectamia* Jordan, as defined by Fraser (1972); however, this name is now replaced by *Ostorhinchus* Lacepède (Randall *et al.* 1990). This subgenus is by far the largest within *Apogon*, containing at least 60 species. *A. fuscomaculatus* appears to be closely related to *A. striatus* (Smith and Radcliffe 1912) from the Indo-Malay Archipelago. The two species have similar low gill

raker counts (8–9 developed rakers), fin shapes (relatively low dorsal and anal with slightly rounded caudal), and preopercle serration (moderate serrae on margin and smooth ridge). Furthermore, they both possess a silvery abdomen and a similar pattern of three dark lines radiating from the eye. They differ markedly, however, in overall colour pattern. *A. fuscomaculatus* has large dark spots on the side of the body compared to about 10 narrow bars on the side of *A. striatus*. *Apogon melanopus* (Weber 1911) of north-western Australia and the Aru Islands and *A. fuscomaculatus* exhibit similar patterns of large spots on the side of the body, but the former species differs in having a dark bar below the first dorsal fin, intensely black pelvic fins, serrae on the preopercular ridge, at least 14 developed gill rakers on the first arch, and an emarginate caudal fin. *Apogon fusovatus* Allen (1985) is a junior synonym of *A. melanopus*.

The species is named *fuscomaculatus* (Latin: "dusky-spotted") in reference to the dominant colour pattern feature.

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#### REFERENCES

- Fraser, T.H. (1972). Comparative osteology of the shallow water cardinal fishes (Perciformes: Apogonidae) with reference to the systematics and evolution of the family. *Ichthyological Bulletin of the J.L.B. Smith Institute of Ichthyology* **34**: 1–105.
- Radcliffe, L. (1912). Descriptions of fifteen new fishes of the family Cheilodipteridae, from the Philippine Islands and contiguous waters. *Proceedings of the United States National Museum* **41**: 431–446.
- Randall, J.E., Fraser, T.H. and Lachner, E.A. (1990). On the validity of the Indo-Pacific cardinalfishes *Apogon aureus* (Lacepède) and *A. fleurieu* (Lacepède), with description of a related new species from the Red Sea. *Proceedings of the Biological Society of Washington* **103**: 39–62.
- Weber, M. (1911) Die Fische der Aru- und Kei- Inseln. Ein Beitrag zur Zoogeographie dieser Inseln. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft. Frankfurt* **34**: 1–49.

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