

## Revision of the Monacanthid Fish Genus *Brachaluteres*

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### Abstract

Four species of the monacanthid genus *Brachaluteres* are recognised: *B. jacksonianus* (Quoy and Gaimard) from southern Australia; *B. taylori* Woods from Queensland, Lord Howe Island, New Guinea and the Marshall Islands; *B. ulvarum* Jordan and Snyder from Japan; and *B. fahaqa* Clark and Gohar from the Red Sea. The long accepted name of *B. baueri* (Richardson) is shown to be a junior synonym of *B. jacksonianus*. A key to the species is provided, as well as diagnostic illustrations.

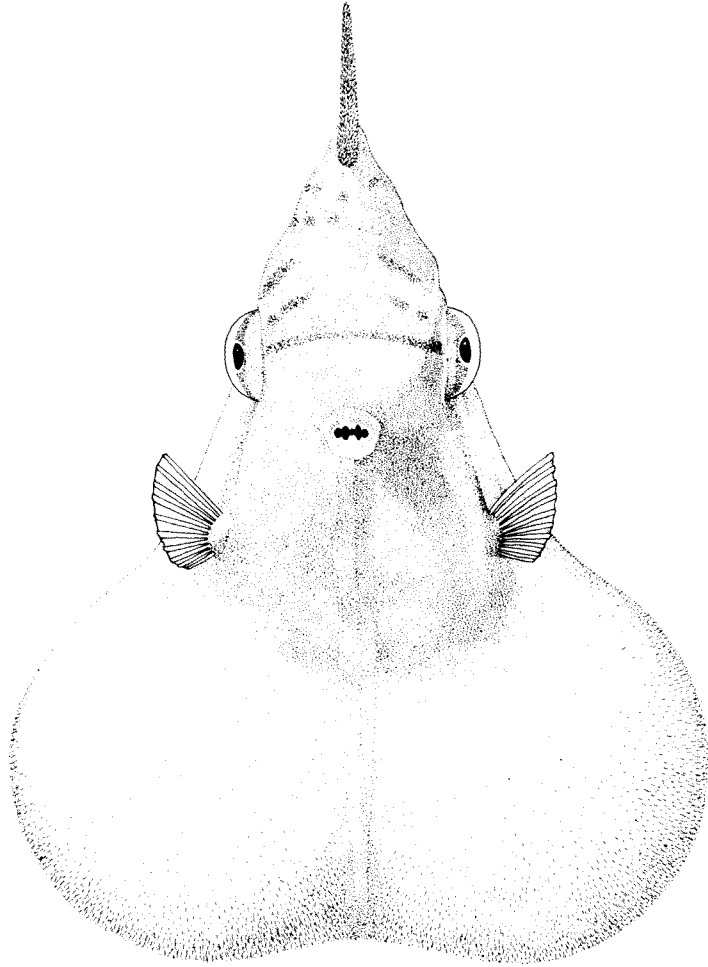
### Introduction

The monacanthid genus *Brachaluteres* consists of small fishes which are known from shallow inshore waters of several areas in the Indian and Pacific Oceans. They are reasonably common in Australia and Japan, but records for the Marshall Islands, Papua New Guinea, the Maldives and the Red Sea are each based on one to three specimens only. Being poor swimmers, they are usually found on sheltered reefs, in sea grasses or around jetty piles. All members of the genus can greatly inflate their abdomens when in danger, an adaptation which serves to noticeably increase their body size (Figure 1). This feature, together with their cryptic coloration, probably decreases the chances of predation, and therefore compensates for their relatively poor swimming ability.

The genus has not been reviewed previously, although species lists and/or species accounts were presented by Günther (1870), Macleay (1881), McCulloch (1929), Fraser-Brunner (1941), Clark and Gohar (1953), Whitley (1964), Woods (1966) and Scott (1969). The paper by Clark and Gohar also provided a key to three species. The present study recognises four species, *Brachaluteres jacksonianus* (Quoy and Gaimard), *B. ulvarum* Jordan and Snyder, *B. taylori* Woods and *B. fahaqa* Clark and Gohar from a total of 13 nominal species. The majority of these are here considered junior synonyms of *B. jacksonianus* from southern Australia, a species which varies considerably in both colour and body form. This species is also the best known member of the genus, being found in reasonable numbers throughout its range. The other three are less well known as they are poorly represented in collections.

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**Figure 1** *Brachaluteres jacksonianus* (based on WAM P.8622, 37 mm SL), showing size and shape of inflated abdomen (anterior view).

Other studies on the genus have focused on its osteology (Matsuura 1979; Tyler 1980; and Tyler and Matsuura 1981) and visceral anatomy (Clark and Gohar 1953 and Mok 1975).

### Methods

Measurements and counts follow Hutchins (1977), with the following exceptions: the caudal peduncle depth was made at the point of least depth, usually between

the origins of the uppermost and lowermost caudal fin rays; and proportional measurements were taken from specimens over 25 mm SL. Also, the terminology used here differs with reference to the structure representing the rudimentary pelvic fin located at or near the end of the pelvis in most monacanthids. The 'pelvic bony structure' of Hutchins is replaced by 'pelvic fin rudiment'. The length recorded for specimens is standard length when indicated by the abbreviation SL; total length is used for the remainder.

Counts of the soft dorsal, anal and pectoral fin rays are given in Table 1.

The following abbreviations for institutions are used: AM, Australian Museum, Sydney; BMNH, British Museum (Natural History), London; CAS, California Academy of Sciences, San Francisco; MNHN, Muséum National d'Histoire Naturelle, Paris; NMV, Museum of Victoria, Melbourne; NSMT, National Science Museum, Tokyo; QM, Queensland Museum, Brisbane; QVM, Queen Victoria Museum, Launceston; SAM, South Australian Museum, Adelaide; TM, Tasmanian Museum and Art Gallery, Hobart; USNM, U.S. National Museum of Natural History, Washington, D.C.; WAM, Western Australian Museum, Perth.

All illustrations, except Figure 6, were prepared by the junior author.

## Systematics

### *Brachaluteres* Bleeker, 1866

*Brachaluteres* Bleeker, 1866: 13 (Type species *Aleuterius trossulus* Richardson, 1846, by original designation = *Balistes jacksonianus* Quoy and Gaimard, 1824).

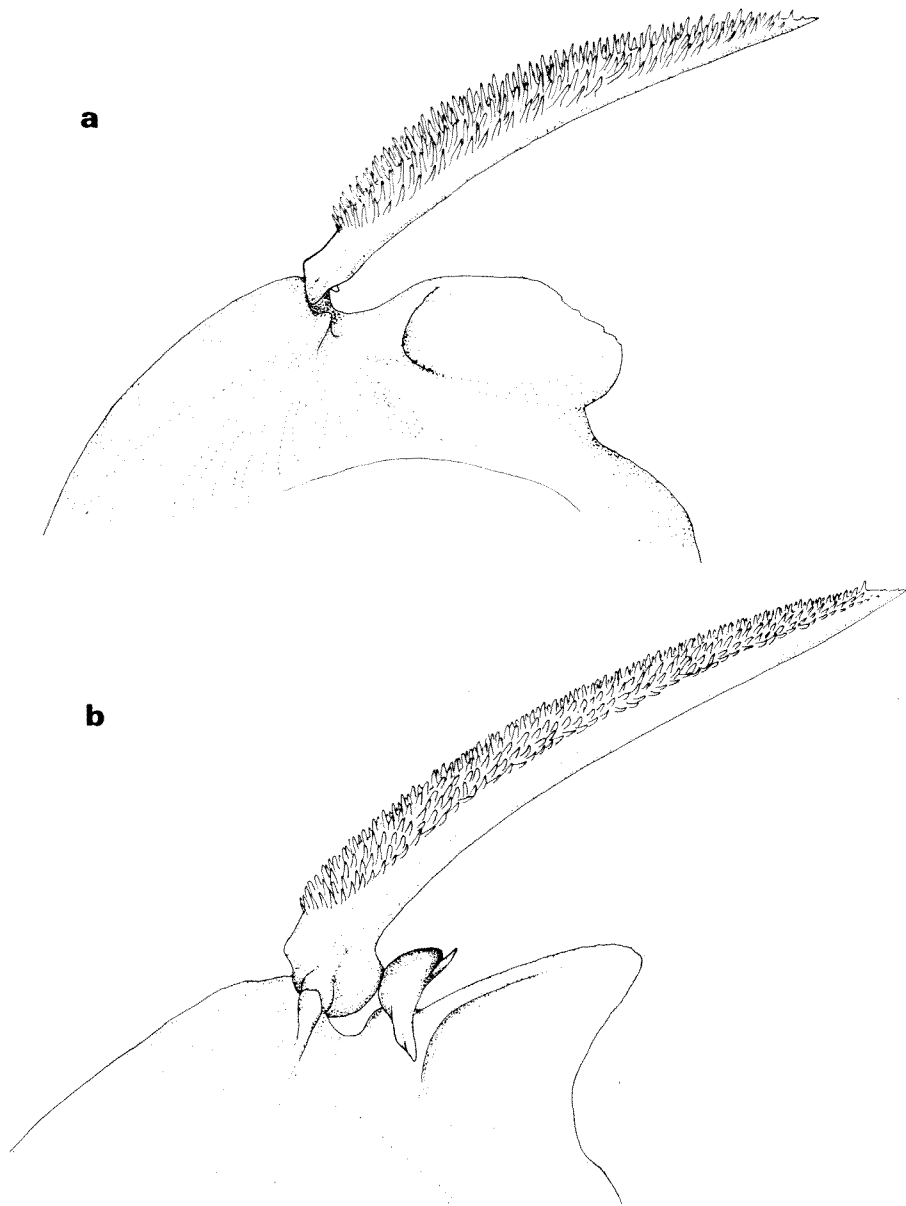
#### Diagnosis

This genus is distinguished from all other monacanthid genera by its ability to greatly inflate the abdomen (*Paraluteres* Bleeker can also inflate its abdomen, but to a far lesser extent). Other diagnostic features include an almost circular lateral profile, no pelvic fin rudiment and the gill opening placed well above the pectoral fin base (positioned lower down and in advance of the pectoral fin base in most other genera).

#### Description

Dorsal fin rays I or II, 23-30; anal fin rays 20-27; pectoral fin rays 10-12; caudal fin rays 12; vertebrae 20; branchiostegals 5.

Body deep and compressed, depth 1.1-1.5 in SL; head short and deep, length 2.4-3.3 in SL; lateral profile of snout straight to prominently concave, length 3.9-4.9 in SL; ventral profile of head and breast rounded, degree of roundness depending on extent of inflation of abdomen; width of abdomen increases greatly upon inflation (see Figure 1); eye diameter 2.5-3.9 in head length and 1.3-1.8 in interorbital width; gill opening a short slit positioned above pectoral fin base, length 4.1-7.8 in head length; pelvic flap small to very large.



**Figure 2** Diagram showing the dorsal spines and part of the cranium in lateral view of a, *Brachaluteres jacksonianus*, WAM P.28258-001, 38 mm SL, and b, *B. taylori*, WAM P.28254-001, 38 mm SL (camera lucida drawings of cleared and stained material, anterior end facing towards left hand side of page).

Mouth small, terminal, lips not obviously fleshy; dentition consists of three outer and two inner teeth on each side of upper jaw; extremities of inner teeth usually notched and projecting a little between outer teeth; two or three teeth on each side of lower jaw (posterior tooth absent in *B. jacksonianus* and *B. taylori*, and condition not known for *B. fahaqa*).

First dorsal spine slender, sometimes with a skinny tip, originating over posterior half of eye, but occasionally behind eye, especially in juveniles; small second dorsal spine which locks first spine upright present in *B. ulvarum* and *B. taylori* (Figure 2b) but absent in *B. jacksonianus* (Figure 2a) (condition not known for *B. fahaqa* but second spine expected to be present); shallow groove located in back for partly receiving folded first dorsal spine, or groove absent; first dorsal spine with rounded anterior face, covered with numerous fine upward-directed spinules, increasing in number with age; no spinules or laterally-directed barbs on posterior face of dorsal spine; soft dorsal and anal fins not elevated anteriorly, about equal in height, outer margins rounded; base of pectoral fin located below posterior quarter of eye to well behind eye; all fin rays except those of caudal normally unbranched; pelvic fin rudiment absent; pelys without dorsal lobe.

Scales on side of body small, roughly circular in outline, each with one slender spinule, although one to three additional spinules may be present, particularly on ventral flaps of larger specimens; spinules vertical or directed posteriorly, except those on caudal peduncle of adult male which are prominently curved, the extremities directed forward; extremities of spinules generally pointed, although those on dorsal and ventral profiles of head may possess flanges for supporting the fleshy cap which generally surmounts each spinule (these flanges are particularly well developed in specimens of *B. jacksonianus* from New South Wales).

### Remarks

*Brachaluteres* is a well known monacanthid genus because of the relative abundance of its type species *B. jacksonianus* in coastal waters of southern Australia. However this species is the most atypical member of the genus as it possesses one dorsal spine only, at least two of the other three species having two dorsal spines (the condition in *B. fahaqa* is not known but it is expected to have two spines). All other monacanthid genera, with the exception of the highly specialised *Anacanthus* Gray, have two dorsal spines (see Tyler 1980). The first is generally a strong spine of moderate length tapering to a point, while the second spine is very small, knoblike, and located at the rear base of the first (in some genera, the second spine is difficult to detect without magnification or dissection). *Anacanthus*, like *Brachaluteres jacksonianus*, has only a single spine. Figure 2 illustrates the differences between the dorsal spines of *B. jacksonianus* and *B. taylori* (*B. ulvarum* is almost identical to the latter [see Matsuura 1979: 177, fig. 44A]). Besides lacking a second dorsal spine, *B. jacksonianus* has lost

the swollen base of its first spine. In the typical two dorsal spine condition of monacanthids, both the anterior face of the second spine and the posterior face of the first spine's swollen base possess roughened surfaces. In life, these surfaces can be brought together or moved apart by the musculature of the second spine. When in contact, the frictional force produced acts as a strong locking mechanism on the first spine, enabling it to be locked in any position from fully upright (about 90° to the fish's horizontal axis) to completely relaxed (0°-10°). This locking action is released when the second spine is moved slightly to the rear. Thus *B. jacksonianus*, in contrast to the other members of the genus, is unable to lock its dorsal spine in the erect position due to the absence of the second spine.

Why should a genus with all members essentially identical in both body form and habitat preference possess one species so radically different from the rest with regards to its dorsal spine structure and function? Matsuura (1979) and Tyler (1980) have shown the significance in balistoid phylogeny of the reduction in number of the spinous dorsal elements. Both workers ranked *Brachaluteres* as a highly advanced monacanthid, the most advanced, according to Matsuura, being the single-spined *Anacanthus*. The only known member of the latter genus, *A. barbatus* Gray, is a very elongate monacanthid which resembles a blade of sea grass. As it is a poor swimmer, this fish relies almost entirely on camouflage for protection from predators. Its dorsal spine is very short and extremely feeble, and appears to have little functional significance in the life of this species. Most other monacanthids can lock the first dorsal spine erect in times of danger, which, together with the pelvis extended downwards makes them appear larger and more difficult to swallow. Some species, particularly those that inhabit coral reefs, are able to wedge themselves in reef holes by using the erect dorsal spine and extended pelvis. The first dorsal spine is also used for displays of aggression, both at the inter and intra-specific levels. The spine is rapidly raised and lowered repeatedly, which, together with other body movements, makes the aggressor's intention clear. It is obvious that *A. barbatus* would be unable to use its dorsal spine effectively in the ways described above, with the possible exception of aggressive displays with members of its own species. Similarly, *Brachaluteres jacksonianus* is a poor swimmer and relies on camouflage for protection, in addition to the ability to inflate its abdomen. The dorsal spine of this species is short, and, as for *Anacanthus barbatus*, probably only useful for intra-specific displays of aggression (aquarium maintained individuals are aggressive towards other members of the species but not other monacanthids). The remaining members of the genus possess relatively larger dorsal spines which, when locked in the upright position, may afford some form of protection.

Therefore, it appears that *Brachaluteres* is a highly advanced monacanthid genus which unlike most of the other genera, relies heavily on both camouflage and the ability to inflate its abdomen for survival. The dorsal spine has a much

lower level of importance with the result that one species has lost the capacity to lock the spine upright.

**Key to the Species of *Brachaluteres***

- 1a Soft dorsal rays 23-24 (for specimens over 15 mm SL); anal rays 20-22 (Red Sea) ..... *B. fahaqa*
- 1b Soft dorsal rays 24-30 (for specimens over 15 mm SL); anal rays 22-27 ..... 2
- 2a Small second dorsal spine absent (Figure 2a); no thin dark longitudinal lines on side of body, although dark stripes often present (southern Australia) ..... *B. jacksonianus*
- 2b Small second dorsal spine present (Figure 2b); numerous thin dark longitudinal lines on side of body ..... 3
- 3a Caudal peduncle relatively small, length 3.5-5.2 in head length (Queensland, Lord Howe Island, New Guinea and Marshall Islands) ..... *B. taylori*
- 3b Caudal peduncle more prominent, length 2.5-3.7 in head length (Japan) ..... *B. ulvarum*

***Brachaluteres jacksonianus* (Quoy and Gaimard, 1824)**

Figures 1, 2a, 3, 4; Table 1

*Balistes jacksonianus* Quoy and Gaimard, 1824: 209 (Port Jackson, New South Wales).

*Canthidermis gaimardii* Swainson, 1839: 325 (new name for *B. jacksonianus* Quoy and Gaimard).

*Aleuterius trossulus* Richardson, 1846: 68, pl. 40, figs 5, 6 (Western Australia).

*Aleuterius? baueri* Richardson, 1846: 68 (Australia).

*Aluterus ventricosus* Hollard, 1855: 7. Nomen nudum.

*Monacanthus oculatus* Günther, 1870: 235 (Port Lincoln, South Australia).

*Monacanthus distortus* Castelnau, 1873: 146 (Fremantle, Western Australia).

*Brachaluteres fidens* Whitley, 1931: 333 (Shell Harbour, New South Wales).

*Brachaluteres wolfei* Scott, 1969: 39, fig. 2 (Schouten Passage, Tasmania).

**Diagnosis**

This species is best distinguished from other members of the genus by the absence of the small, second spine of the first dorsal fin (condition not known for *B. fahaqa*). It is easily separated from *B. ulvarum* and *B. taylori* by the absence

of thin dark lines (dark lines, if present, are much wider and more stripe-like in *B. jacksonianus*).

### Description

Dorsal fin rays I, 24-29; anal fin rays 22-28; pectoral fin rays 10-12; head length 2.4-3.2, body depth 1.1-1.5, snout length 3.9-4.9, and length of soft dorsal fin base 2.1-2.7, all in SL; eye diameter 2.6-3.9, gill slit length 4.1-7.8, first dorsal spine length 1.0-2.7, interdorsal space 1.1-1.9, longest soft dorsal ray (eight to twelfth) 2.6-3.6, and caudal fin length 0.9-1.4, all in head length; caudal peduncle generally prominent, length 2.2-4.8 in head length and 1.2-2.0 in caudal peduncle depth.

Colour in life (based on colour transparencies of both live and recently collected specimens, see Figure 3): ground colour extremely variable, usually green, brown or orange, but occasionally yellow, pink, blue, purple, black, grey, or white; head and body usually with black spots arranged as in Figure 3, sometimes ocellated with white, spots decreasing in size and increasing in number with increasing SL; spots sometimes absent or in the form of short dashes forming lines on body; dark stripes often present on sides and across interorbital as in Figures 3a and 3b; occasionally small white blotches which tend to form lines also present on sides; mature individuals with blue lines and spots, the former usually following ventral profile of head and body (individuals from eastern Australia usually possess more blue spots on midside of body than those from southern and western Australia); dark circular blotch usually present on side of adult just behind pectoral fin; small white tentacles occasionally on body; first dorsal spine generally same as ground colour, integument similarly coloured or more dusky; soft dorsal, anal and pectoral fin rays greenish, membranes of first two each with one to two yellow lines following contour of fin base, those of last hyaline; caudal fin rays greenish, membranes of posterior half yellowish with rows of pale blue spots forming curved cross bars, and membranes of anterior half hyaline to dusky with a line of dark brown spots or short bars along either side of each fin ray (juvenile fin membranes usually not marked).

Colour in alcohol: pale brown to dark brown, usually with dark spots and/or stripes as described above; caudal fin of adults sometimes with dark spotting as above, and rear margin occasionally dusky.

### Distribution

*Brachaluteres jacksonianus* is known from Moreton Bay (27° 14' S, 153° 07' E), southern Queensland, along the southern Australian coastline to Lancelin (31° 01' S, 115° 20' E) in Western Australia.

### Remarks

Quoy and Gaimard's (1824) description of *Balistes jacksonianus* has been ignored by most workers investigating Australian monacanthids, as it had been



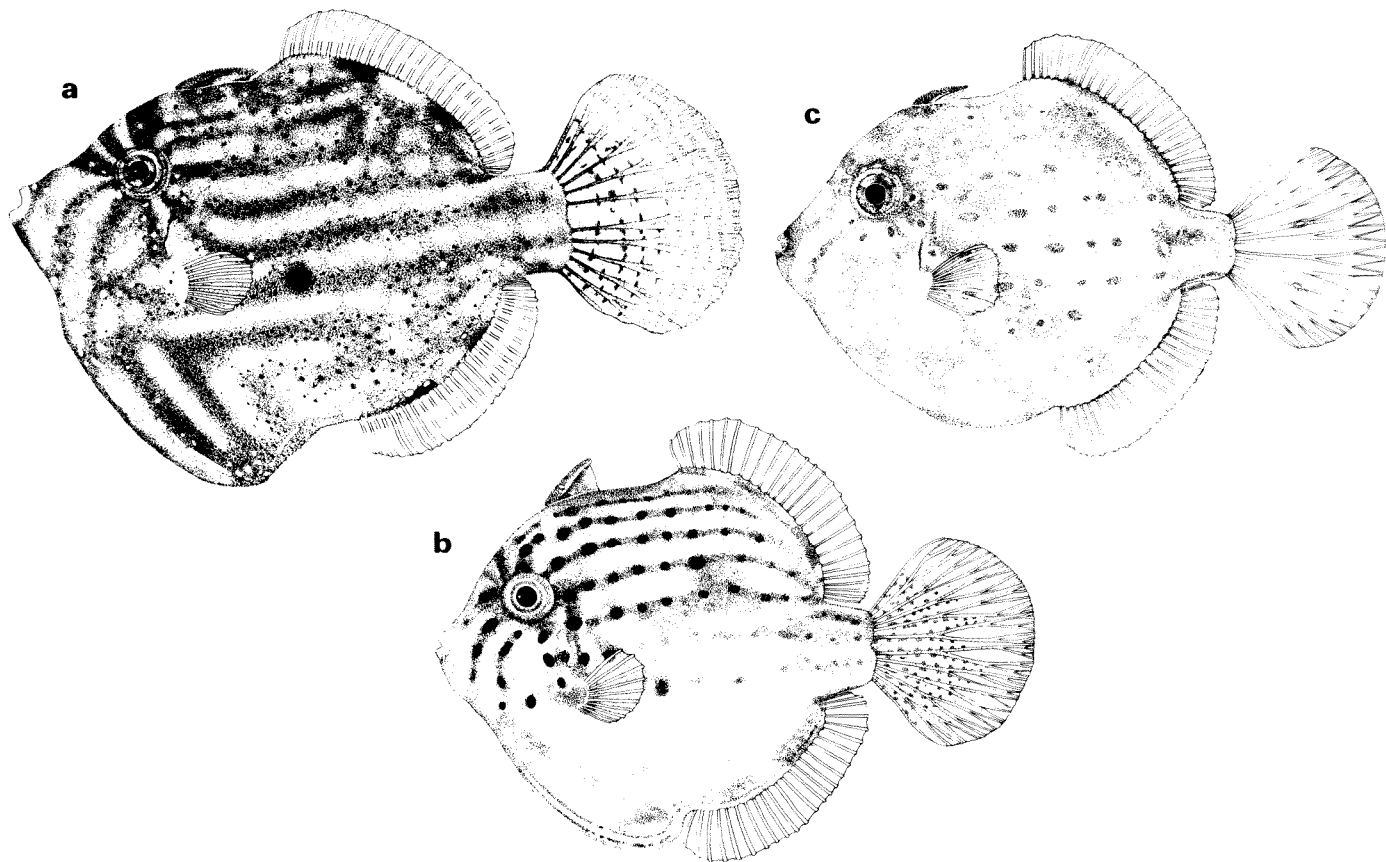


Figure 3 *Brachaluteres jacksonianus*, showing several of its colour patterns in life: a, composite made from WAM P.27098-001, 51 mm SL and an underwater colour transparency of a similarly sized fish at Port Stephens, New South Wales; b, based on an underwater transparency of a 35 mm SL (approx.) individual at Rottnest Island, Western Australia; and c, composite made from WAM P.27099-016, 37 mm SL and an underwater colour transparency of a similarly sized fish at Port Stephens, New South Wales.

supposed that the species belonged to the triggerfish family Balistidae (Swainson 1839; Günther 1870; McCulloch 1922, 1929). Marshall (1953) resurrected this name for a monacanthid, namely *Brachaluteres jacksonianus*, when recording the species as a new record for Queensland, a move followed by Whitley (1964), Allen *et al.* (1976) and Hutchins (1977). Quoy and Gaimard's description of a 32 mm fish from Port Jackson leaves no doubt that their specimen was the common *Brachaluteres* of southern Australia, with the exception of the pectoral fin ray count. Their count of 15 rays is unusually high for most monacanthids, including *Brachaluteres* which normally possesses 10-12 pectoral rays. However, it is not uncommon for fin rays of monacanthids to split lengthwise in two, particularly in poorly preserved specimens, to give the impression of two rays instead of one. Thus Quoy and Gaimard's unusually high count may have resulted from several split rays being included as separate units in their pectoral fin count. Unfortunately the type was not examined as it appears to have been lost (according to Le Danois (1961) the specimen is not at MNHN).

*Aleuterius trossulus* was described by Richardson (1846) from a particularly dark 58 mm specimen from Western Australia with 'some minute darker specks and dots of a pale colour scattered over the body. . .'. While this colour pattern is not unusual — fish inhabiting areas with dark surroundings such as mussel beds are sometimes bluish black with numerous black and white spots — *Brachaluteres* from Western Australia are more often pale coloured with darker stripes and spots typical of *B. jacksonianus* from other southern Australian states. (Richardson's type has apparently been lost [Günther 1870]).

In the publication containing his description of *Aleuterius trossulus*, Richardson (1846) described *Aleuterius? baueri* from a painting by Ferdinand Bauer. This illustration, based on a specimen from the 'Coast of Australia', was not included with the type description, an omission which has led to a good deal of confusion. Subsequently Waite (1903) accurately described and figured as *Brachaluteres baueri* a specimen from Lord Howe Island characterised by numerous thin dark lines on the head and body. Unfortunately he was not able to compare his fish with Bauer's illustration. Later workers followed Waite in applying *B. baueri* to the lined species from Lord Howe Island, Queensland and New Guinea. During the present study, a black and white photograph of Bauer's painting (Figure 4) was obtained from the British Museum (Natural History) through the courtesy of Dr P. Whitehead. It clearly shows a species of *Brachaluteres* with dark stripes on the sides, more in agreement with the colour pattern of *B. jacksonianus* than with the Lord Howe Island species. In addition, the caudal fin pattern depicted by Bauer is closer to that of the former species than the latter. Thus we believe that Waite was in error in applying the name *B. baueri* to his Lord Howe Island specimen, and we here relegate Richardson's name to the synonymy of *B. jacksonianus*. Waite's specimen therefore represented, at the time, an undescribed species which was subsequently described by Woods (1966) as *B. taylori* (see also Remarks in the following species account).

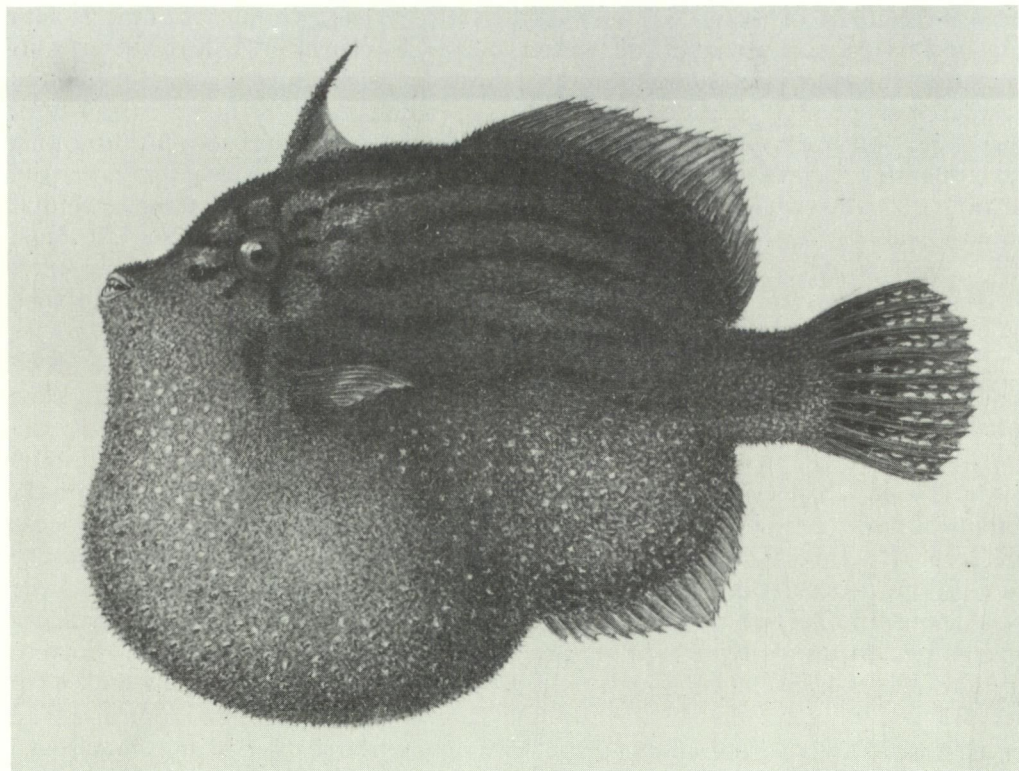


Figure 4 Photograph of Ferdinand Bauer's painting on which Richardson based his 1846 description of *Aleuterius? baueri* (= *Brachaluteres jacksonianus*).

Günther's 1870 description of *Monacanthus oculatus* was made from a 38 mm specimen from South Australia. The distinguishing feature was the 'irregular longitudinal rows of purplish ocelli edged with white, and about as large as the pupil of the eye' on the side of the body. However, as Waite (1903: 40) pointed out, this is one of the numerous colour patterns possessed by *Brachaluteres jacksonianus* (see Figure 3c), the ocelli becoming smaller with increasing SL.

*Monacanthus distortus* Castelnau (1873) was described from a 68 mm specimen from Western Australia. Its specific name refers to the distorted appearance caused by the prominently 'elevated and gibbous' back, a feature often found in large females of *Brachaluteres jacksonianus*. The holotype is deposited at MNHN (A.4564).

Whitley (1931) described *Brachaluteres fidens* to distinguish the New South Wales form from Richardson's *Aleuterius trossulus* of Western Australia. (Whitley was unaware at the time that Quoy and Gaimard's *Balistes jacksonianus* was available for specimens from New South Wales, see above discussion.) Whitley

believed that the prominent flanges on the scale spinule extremities of his 63 mm specimen separated it from the western form, Richardson's illustration of *A. trossulus* showing pointed extremities. However, New South Wales specimens also possess pointed spinules, the flanged spinules generally being confined to the upper and lower profiles of the head (the fleshy cap which usually surmounts each spinule can make it difficult to determine if the spinule extremity is flanged or pointed, although these caps are usually lost after long preservation). A similar situation also occurs in Western Australian specimens of *Brachaluteres*, although the flanges tend to be less prominent than those on New South Wales material. Thus both forms represent the one species, that is, *B. jacksonianus* (the type of *B. fidens* is at AM and registered IA.1822).

Scott's (1969) description of *Brachaluteres wolfei* was made from two specimens, 24.42 mm SL, collected from eastern Tasmania. He considered that the position of their dorsal spines — originating behind the eye instead of above the eye — warranted specific ranking. However the position of the dorsal spine is variable in all species of *Brachaluteres*, the point of origin for *B. jacksonianus* ranging from over the centre of the eye to a short distance behind the eye. Scott also reported that the colour pattern of *B. wolfei* was notable 'by the absence of anything more definite. . . than a dark circumoral band extending as a saddle over snout and several obscure dark patches elsewhere'. This lack of dark spots and stripes on the body may be due to the possibly bland nature of the bottom from which the specimens were dredged (camouflage is an important factor for the survival of members of the genus). Thus Scott's specimens appear to be representatives of *B. jacksonianus*, the only distinctive feature being the absence of stripes and spots (the types were stated to have been made available by the Fisheries Division, but their present whereabouts is unknown to us).

#### Material Examined

Ninety-four specimens, 6.69 mm SL. Queensland: QM I.10714, 2 specimens, 27.40 mm SL, off Redcliffe. New South Wales (unless otherwise designated all at AM): IB.5274, 61 mm SL, Port Jackson, 4 April 1961; IB.7341, 63 mm SL, Port Jackson, 11 January 1965; I.15352-002, 47 mm SL, Port Jackson, 25 October 1968; I.16498-008, 4 specimens, 20.31 mm SL, Port Jackson, 9 May 1965; I.16849-010, 55 mm SL, Jervis Bay, 30 October 1971; I.16863-004, 51 mm SL, Jervis Bay, 2 May 1972; I.16893-002, 2 specimens, 37.64 mm SL, Jervis Bay, 23 September 1971; I.16899-004, 3 specimens, 35.51 mm SL, Jervis Bay, 24 August 1971; I.17019-011, 8 specimens, 18.40 mm SL, Long Reef, 27 March 1973; I.17791-013, 15 mm SL, Port Jackson; I.21335-002, 15 mm SL, Bondi, 1977; I.23838-007, 40 mm SL, Jervis Bay, 9 July 1981; WAM P.27098-001, 51 mm SL, Port Hacking, 28 January 1981; WAM P.27099-016, 37 mm SL (cleared and stained), Port Hacking, 28 January 1981; WAM P.28249-001, 30 mm SL, Port Jackson, 26 July 1970. Victoria (all at NMV): A.3311, 65 mm SL, off Lakes Entrance, 6 June 1948; A.3312, 41 mm SL, Newport, 12 September 1947; A.3313, 33 mm SL, Limeburners Bay, 6 February 1958.

Tasmania (all at TM unless otherwise designated): AM I.17547-005, 36 mm SL, Margate Beach Park, 1 December 1972; AM I.17549-010, 4 specimens, 25.33 mm SL, Oyster Cove, 1 December 1972; D.82, 48 mm SL, no other data; D.119, 2 specimens, 55.69 mm SL, Ocean

Pier, Hobart, 20 July 1952; D.654, 36 mm SL, wharves area, Hobart, 23 October 1937; D.656, 58 mm SL, no other data.

South Australia (all at SAM unless otherwise designated): F.4782, 39 mm SL, Point Giles Jetty, 22 May 1981; F.4783, 5 specimens, 27-40 mm SL, Point Turton Jetty, 22 May 1981; F.4784, 11 specimens, 23-45 mm SL, Edithburgh Jetty, 23 May 1981; WAM P.28258-001, 2 specimens, 38-46 mm SL (both cleared and stained), Edithburgh Jetty, 23 May 1981.

Western Australia (all at WAM): P.8619, 3 specimens, 46-60 mm SL, Albany, 1959; P.8622, 37 mm SL, King George Sound, 12 June 1959; P.21582, 22 mm SL, Geographe Bay, February 1972; P.22584, 28 mm SL, Rockingham, 10 March 1973; P.24574, 46 mm SL, Cottesloe Beach, 13 May 1974; P.25258-005, 2 specimens, 23-34 mm SL, Cockburn Sound, 29 April 1975; P.25343-008, 22 mm SL, off Fremantle, 24 June 1975; P.25506-004, 39 mm SL, Geographe Bay, 5 November 1975; P.26455-007, 2 specimens, 18 mm SL, Geographe Bay, 25 December 1977; P.26599-002, 11 mm SL, Albany, 11 April 1980; P.26604-002, 45 mm SL, Albany, 15 April 1980; P.26622-012, 31 mm SL, Rottneest Island, 16 June 1980; P.28244-001, 2 specimens, 27-35 mm SL, Rockingham, March 1976; P.28245-001, 17 mm SL, Geographe Bay, March 1976; P.28246-001, 39 mm SL, Geographe Bay, 2 November 1975; P.28247-001, 4 specimens, 13-25 mm SL, Geographe Bay, January 1972; P.28248-001, 6 mm SL, off Triggs, 21 January 1984; P.28250-001, 37 mm SL, Whitfords Beach, 30 April 1982; P.28251-001, 41 mm SL, Garden Island, 2 February 1977; P.28252-001, 3 specimens, 9-21 mm SL, Geographe Bay, May 1972; P.28253-001, 4 specimens, 26-31 mm SL, Geographe Bay, 13 April 1976.

**Table 1** Fin ray counts for species of *Brachaluteres* (15 mm SL and over)

	Soft dorsal rays								Anal rays							Pectoral rays					
	23	24	25	26	27	28	29	30	20	21	22	23	24	25	26	27	10/10	10/11	11/11	11/12	12/12
<i>B. jacksonianus</i>		1+	7	29	29	23	2			2+	3	23	43	17	5		8	7	63	7	4
<i>B. taylori</i>					10	7	1				2	10	5		2		2	1	11	1	
<i>B. ulvarum</i>					1	3	1					2	1	2			1*	1	2	1	
<i>B. fahaqa</i>	1+	1+							1+	1+	1+						3+*				

+ Counts from the literature

\* Counts made from one side only

### *Brachaluteres taylori* Woods, 1966

Figures 2b, 5, 6; Table 1

*Brachaluteres baueri* (non Richardson, 1846) — Waite, 1903: 38, pl. 3, fig. 2.

*Brachaluteres braueri* (sic) — Tortonese, 1964: 85.

*Brachaluteres taylori* Woods, 1966: 97, fig. 154 (Rongelap Atoll, Marshall Islands).

### Diagnosis

This species is best distinguished from the closely related *B. ulvarum* by its less prominent caudal peduncle (length 3.5-5.2 in head length v. 2.5-3.7). It differs from *B. jacksonianus* in possessing a second dorsal spine and thin dark

lines along side of body (latter lacks a second dorsal spine, and dark lines on side, when present, are usually much wider and more stripe-like); *B. fahaqa* has lower fin ray counts (D.23-24, A.20-22 v. 27-29 and 23-27 respectively).

### Description

Dorsal fin rays II, 27-29; anal fin rays 23-27; pectoral fin rays 10-12; head length 2.5-3.2, body depth 1.1-1.3, snout length 4.1-4.7 and length of soft dorsal base 1.9-2.3, all in SL; eye diameter 2.5-3.0, gill slit length 5.3-6.3, first dorsal spine length 1.1-1.9, interdorsal space 1.1-1.7, longest soft dorsal ray (eighth to tenth) 3.3-3.9, and caudal fin length 0.9-1.3, all in head length; caudal peduncle rather short, length 3.5-5.2 in head length and 1.3-1.9 in caudal peduncle depth.

Colour in life (based on a colour transparency of a freshly collected Queensland specimen, 40 mm SL, see Figure 5): yellowish green with numerous thin dark brown lines and spots on side of head and body arranged as in Figure 5 (lines not always wavy as depicted on midside of body); spots on lower side of body and near ventral profile of head mostly with pale blue centres; small dark brown circular blotch on body behind pectoral fin; membranes of both soft

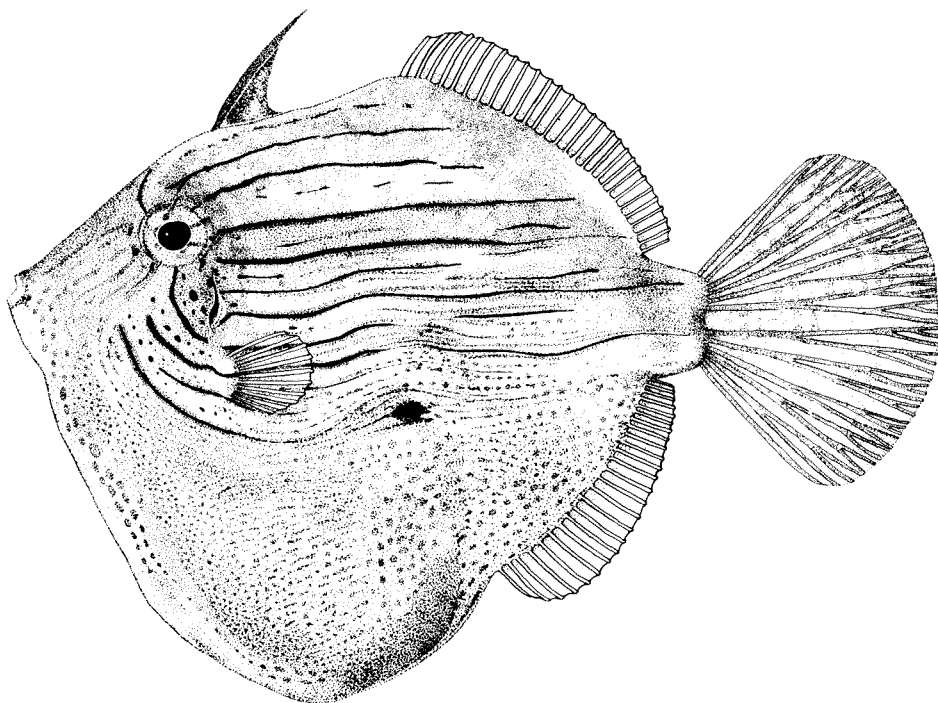


Figure 5 *Brachaluteres taylori*, showing colour pattern when freshly collected (based on a colour transparency of a specimen, approximately 40 mm SL, taken near Lizard Island, Queensland).

dorsal and anal fins pale yellow with two rows of pale blue spots parallel to fin base; caudal fin membrane pale yellow with many small pale blue spots which form numerous curved cross bars; first dorsal spine yellowish green, pectoral fin hyaline; iris yellow with dark brown radiating bars.

Colour in alcohol: pale greyish brown to brown with dark brown lines and spots similar to those illustrated in Figure 5. In some smaller specimens the lines include spaced dark brown spots.

### Distribution

*Brachaluteres taylori* is found along the east coast of Queensland, Lord Howe Island, New Guinea and the Marshall Islands.

### Remarks

The identity of *Brachaluteres taylori* has long remained obscure for two reasons. Firstly, Australian specimens of *B. taylori* have usually been incorrectly identified as *B. baueri* (see Remarks in previous species account on *B. jacksonianus*). Secondly, Woods' 1966 description of *B. taylori* was made from a 14 mm prejuvenile specimen from the Marshall Islands with unusually low fin ray counts (soft dorsal 23, anal 20) (the description of a silvery white ventral surface indicates that the fish had not yet settled). The early life stages of many monacanthids are difficult to relate to the adult, and thus Woods' name has not been used by subsequent workers. During the present study, two small specimens (approximately 4-12 mm SL) of a *Brachalutere* from Lizard Island, Queensland, were kindly sent to us by Dr J. Leis (AM) for identification. He had collected them from plankton tows around the island where the species then referred to as *B. baueri* was known to occur. However, he was confused by the low fin ray counts, the smaller specimen having 20 soft dorsal rays and 19 anal rays, and the larger having 25 and 22 respectively. Our examination revealed that these specimens closely resemble the type illustration of *B. taylori* (Figure 6) in general body shape, coloration and the low fin ray counts (the pattern of spots on the larger Queensland specimen is almost identical to that depicted for *B. taylori*). In particular, the caudal peduncles are similarly shaped. Thus we believe that the three individuals are conspecific, and the species often referred to as *B. baueri* should now be called *B. taylori*. The low fin ray counts for these prejuvenile specimens indicate that the full complement of rays (see Table 1) probably does not develop until after settling (the posterior rays tend to be more crowded together where developing rays can be observed).

New Guinea records of *Brachaluteres taylori* [as *B. braueri* (*sic*)] by Tortonese (1964) and Munro (1967) are both based on a specimen (C.E. 38356) collected from Katau Island by D'Albertis in 1876 and deposited in the Natural History Museum of Genoa (Munro, pers. comm.). When Tortonese first examined this monacanthid, he tentatively identified it as *B. trossulus* (= *B. jacksonianus*) (see Munro, 1967: 586). Subsequently he changed the name to *B. braueri*, a

move suggesting to us that he had been able to compare the specimen with Waite's 1903 description and figure of *B. baueri*. On the basis of this record, we therefore tentatively accept the presence of *B. taylori* in New Guinea. A specimen examined during the present study supposedly from Port Moresby (AM I.6639) agrees better with *B. jacksonianus* from southern Australia, so the accuracy of its collection data is suspect.

The holotype of *Brachaluteres taylori* (catalogue number 140643), from a lagoon 3.2 kilometres west of Bush Island, Rongelap Atoll, is at USNM.

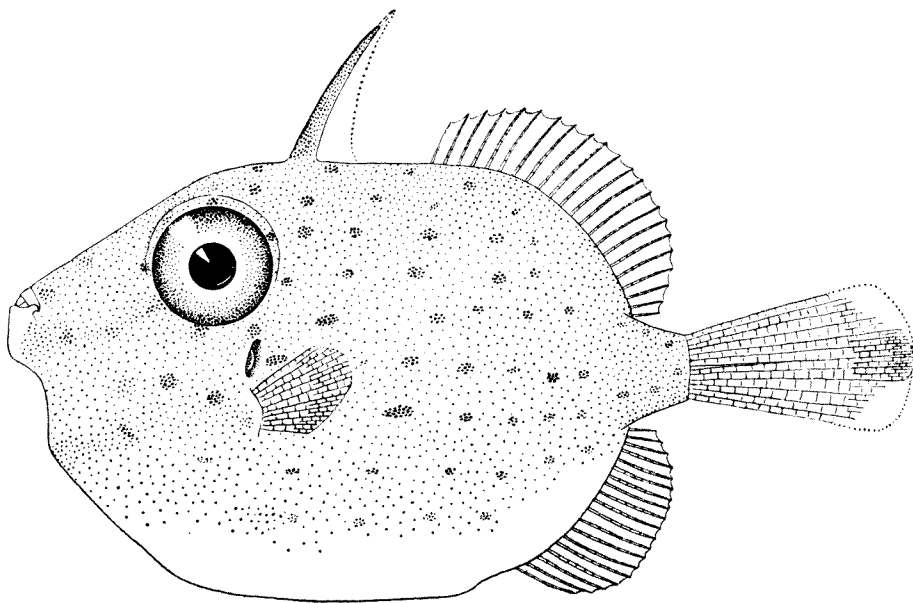


Figure 6 *Brachaluteres taylori*, holotype, USNM 140643, 14 mm (after Woods, 1966).

#### Material Examined

Twenty specimens, 4-48 mm SL. Lord Howe Island (all at AM): A.12281, 37 mm SL, 1882; I.3365, 34 mm SL, 1895; I.5131, 48 mm SL, 1901; I.13891, 27 mm SL, 1916; IA. 1412, 42 mm SL, 1923. Queensland: AM I.19108-017, 8 mm SL, Lizard Island, 1975; AM I.19169-001, 25 mm SL, Lindeman Island, 1936; AM I.20751-038, 2 specimens, 38-39 mm SL, off Lizard Island, 8 February 1979; AM I.20753-017, 45 mm SL, off Nymph Island, Lizard Island area, 8 February 1979; AM I.20754-019, 4 specimens, 28-43 mm SL, same data as for previous specimen; AM I.23127-004, 4 mm SL (approx.), cleared and stained, Lizard Island area, 1982; AM I.23098-004, 12 mm SL, Lizard Island area, 1982. QM I.10005, 32 mm SL, off Point Cartwright; QM I.10712, 44 mm SL, Percy Island; QM I.12374, 46 mm SL, off Cape Capricorn, 29 July 1958; WAM P.28254-001, 38 mm SL, cleared and stained, same data as for AM I.20754-019.



*Brachaluteres ulvarum* Jordon and Snyder, 1902

Figure 7; Table 1

*Brachaluteres ulvarum* Jordan and Snyder (in Jordan and Fowler), 1902: 271, fig. 5 (Misaki, Japan).

**Diagnosis**

This species is best distinguished from the closely related *B. taylori* by its more prominent caudal peduncle (length 2.5-3.7 in head length v. 3.5-5.2). It differs from *B. jacksonianus* in possessing a second dorsal spine (absent in latter), and has more fin rays than *B. fahaqa* (see Table 1).

**Description**

Dorsal fin rays II, 27-30; anal fin rays 24-26; pectoral fin rays 10-12; head length 2.8-3.3, body depth 1.4-1.5, snout length 4.0-4.8, and length of soft dorsal base 2.1-2.3, all in SL: eye diameter 2.6-3.4, gill slit length 4.2-5.9, first dorsal spine length 1.2-1.5, interdorsal space 1.2-1.5, longest soft dorsal ray (eighth) 2.9-4.3, and caudal fin length 1.0-1.3, all in head length; caudal peduncle prominent, length 2.5-3.7 in head length and 1.3-1.4 in caudal peduncle depth.

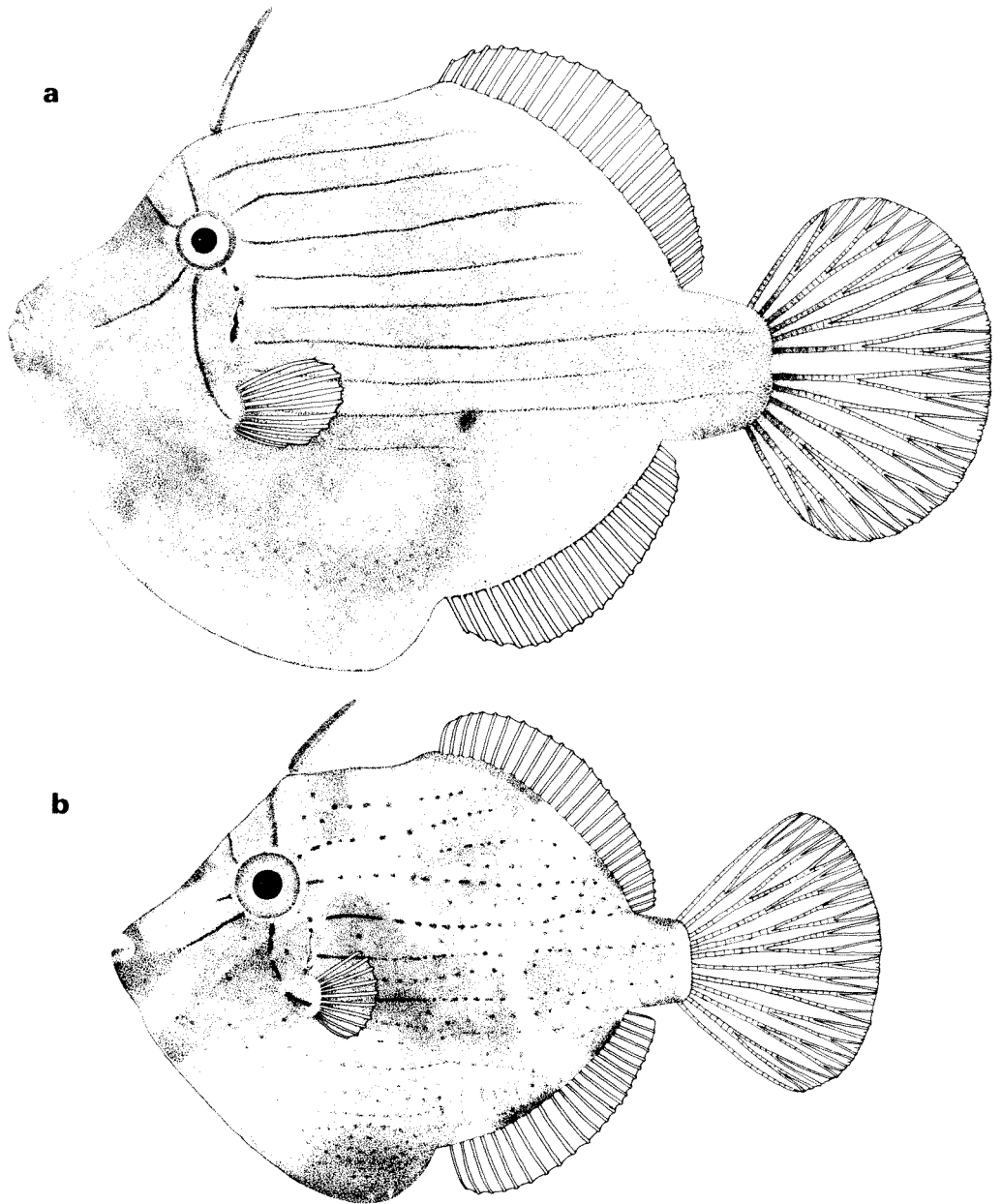
Colour in life: Masuda *et al.* (1975: 330) described the colour of *B. ulvarum* as 'variable according to habitat', and in Plate 136-D presented a colour photograph of an approximately 35 mm SL specimen. Its ground colour is brown with many small dark spots on the sides, those on upper two-third's of body forming numerous thin longitudinal lines (similar to Figure 7B). The first dorsal spine is brown while the other fins are hyaline. Colour in alcohol: pale brown to brown, with or without the darker blotches as shown in Figure 7b; dark brown lines and spots arranged on sides as illustrated in Figure 7, although the lines and spots on one specimen have faded considerably.

**Distribution**

*Brachaluteres ulvarum* is known only from Japan, from Sagami Bay (35° 10'N, 139° 40'E) to Misaki (35° 15'N, 133° 33'E).

**Remarks**

This species is closely related to *B. taylori* but is best separated as indicated in the Diagnosis. In addition, the colour patterns of the two differ primarily in the path of the ventralmost line radiating from the eye. In *B. ulvarum*, this line extends downwards, curving posteriorly to pass through the pectoral fin base (Figure 7). In *B. taylori*, the line passes above the pectoral fin base (Figure 5). Also the body is not as deep in *B. ulvarum* (1.4-1.5 in SL) as in *B. taylori* (1.1-1.3). *B. fahaqa* is also probably a close relative but until specimens become available for study, this is only conjectural.



**Figure 7** *Brachaluteres ulvarum*: a, composite made from WAM P.28235-001, 62 mm SL and Jordan and Snyder's illustration of a syntype of *B. ulvarum*, SU 7128, 60 mm SL; and b, NSMT P.19079, 36 mm SL.

The two syntypes (60-73 mm SL), originally housed at the Leyland Stanford Junior University Museum, are now at CAS. They still retain the original registration number of SU 7128.

#### Material Examined

Five specimens, 36-62 mm SL: NSMT P.19079, 36 mm SL, east coast of Izu Peninsula, Japan, no other data; WAM P.28235-001, 4 specimens, 43-62 mm SL, Japan, no other data.

### *Brachaluteres fahaqa* Clark and Gohar, 1953

Figure 8; Table 1

*Brachaluteres baueri fahaqa* Clark and Gohar, 1953: 45, fig. 11 (Al Ghardaqa, Red Sea).

#### Diagnosis

This species is best distinguished from other members of the genus by its lower soft dorsal and anal fin ray counts (23-24 and 20-22 v. 24-30 and 22-27 respectively for specimens over 25 mm SL, see Table 1).

#### Description

The following account is based on the type description and illustration.

Dorsal fin rays I (II?), 23-24; anal fin rays 20-22; pectoral fin rays 10; head length 2.7-2.9, body depth 1.2-1.3, snout length 4.5, and length of soft dorsal base 2.2, all in SL; eye diameter 2.7-3.0, first dorsal spine length 1.5, interdorsal space 1.4, and caudal fin length 1.4, all in head length; caudal peduncle prominent, length 3.5 in head length and 1.4 in caudal peduncle depth.

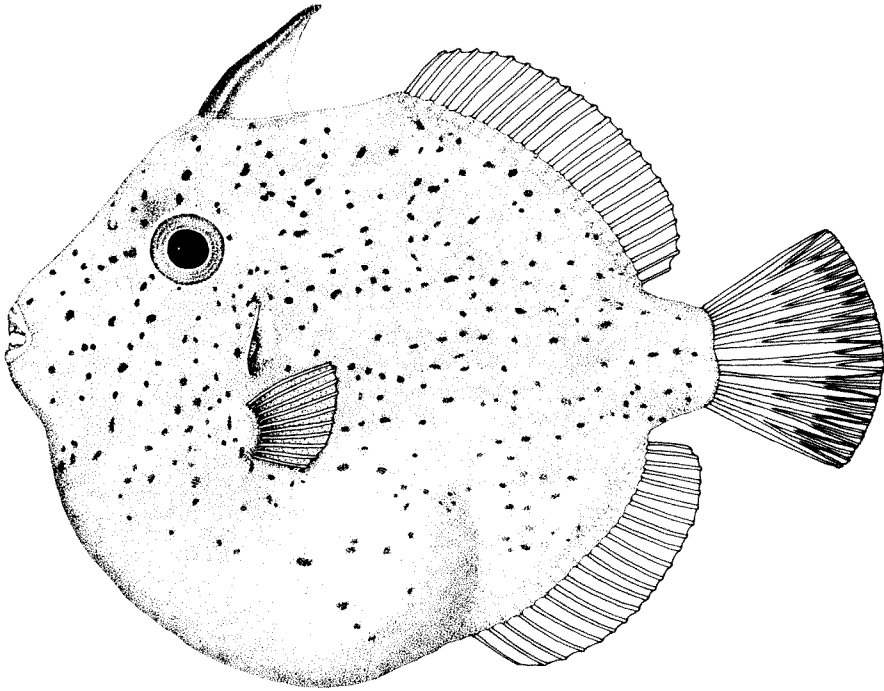
Colour in formalin: head and body pale with numerous small dark spots arranged as in Figure 8. Clark and Gohar's description states that these spots are 'in the form of about seven to ten horizontal lines on body and eight or nine lines radiating from the eye'. However their illustration — reproduced in Figure 8 — does not show this linear arrangement (see Remarks below).

#### Distribution

*Brachaluteres fahaqa* is so far known only from the Red Sea, near Al Ghardaqa, Egypt (27° 17' N, 33° 47' E).

#### Remarks

Little can be said with confidence about the status of this species. The three types, 27-32 mm SL, are in the collections of the Marine Biological Station, Al Ghardaqa (Dr E. Clark, pers. comm.) but are unavailable for study. We were unable to locate additional material of this species. However, a very small 9 mm SL specimen of undetermined status from the Maldives (BMNH 1901.12.31.149) was examined. It possesses a soft dorsal count of 25 (anal fin damaged) which



**Figure 8** *Brachaluteres fahaqa*, holotype, 32 mm SL (based on Clark and Gohar's illustration of the type).

suggests that its final fin ray count would be considerably higher than that of *B. fahaqa* (see Remarks in preceding species account on *B. taylori*). Until further material is made available from either the Red Sea or the Maldives, the relationships between these two forms remains obscure. Nevertheless, *B. fahaqa* appears to be more closely related to *B. ulvarum* and *B. taylori* than to *B. jacksonianus* because of its more finely spotted coloration and more elongate first dorsal spine (the discovery of a second dorsal spine in *B. fahaqa* would prove this relationship more conclusively). Clark and Gohar's description of small dark spots forming lines on the head and body shows a close resemblance to that found in similarly sized specimens of *B. ulvarum* (Figure 7b); however, their illustration shows no such linear arrangement of spots. In contrast the spots of *B. fahaqa* appear to be more randomly arranged (see Figure 8). It might be possible that the other two specimens not illustrated possess a more linear arrangement of spots, or that the artist did not accurately depict the colour pattern. Whatever the situation, we still believe that *B. fahaqa* is a valid species for the following reasons. Firstly, a majority of monacanthids inhabiting the Red Sea area are endemic (two species of *Thamnaconus*, one *Pervagor*, one *Paraluteres*, one *Oxymonacanthus*,

and at least two *Paramonacanthus*). Secondly, *B. fahaqa* possesses the lowest fin ray counts of the genus (see Table 1). Thirdly, its caudal fin is considerably shorter when compared with similarly-sized specimens of *B. ulvarum* and *B. taylori*. Finally, its coloration appears to be considerably different for all other known members of the genus.

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