

# Revision of the ariid catfish genus *Galeichthys* Valenciennes (subfamily Galeichthyinae), with description of a new species from South Africa and designation of a neotype for *G. ater* Castelnau

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**ABSTRACT.** The ariid catfish genus *Galeichthys* Valenciennes is re-diagnosed and four species are recognised. Among ariids, *Galeichthys* is most readily distinguished by a long and narrow supraoccipital process that is easily detected through the skin. A neotype is designated for *G. ater* and one new species is described. *Galeichthys trowi* sp. nov. is distinguished externally by colouration, length of the dorsal and pectoral fin spines, and adipose fin shape. Notes on sexual dimorphism and osteological features that contribute to specific identity of the four species are included in the descriptions and diagnoses. Synonymies, a brief nomenclatural history, and a key to the species of *Galeichthys* are provided.

**RÉSUMÉ.** L'espèce poisson chat du genre *Galeichthys* Valenciennes (Ariidae) est diagnostiquée et quatre autres espèces sont aussi diagnostiquées. Parmi ces espèces Ariidae, *Galeichthys* est le plus facilement distinctif par une longue et étroite forme occipitale que l'on découvre facilement à travers la peau. Un nouveau type est désigné sous *G. ater* et une autre nouvelle espèce est décrite. *Galeichthys trowi* sp. nov. se distingue extérieurement par sa couleur, sa longueur des épines dorsales et pectorales et sa forme fine et adipeuse. Les notes sur son dimorphisme sexuel et ses traits ostéologiques contribuent à l'identification spécifique des quatre espèces dont les diagnostics et les descriptions sont incluses. Une brève nomenclature historique et une clé d'identification des espèces *Galeichthys* sont disponibles.

**KEYWORDS:** Ariidae, *Galeichthys trowi* new species, Eastern Pacific Ocean, taxonomy, Western Indian Ocean.

## INTRODUCTION

Species of the genus *Galeichthys* Valenciennes (in Cuvier & Valenciennes, 1840) are medium-sized ariid catfishes occurring in coastal and estuarine waters of southern Africa (three species) and in coastal waters of Peru (one species). All species of *Galeichthys* are male-mouthbrooders of eggs and embryos (Tilney & Hecht, 1993; this work), which is a diagnostic character of the family Ariidae (Rimmer & Merrick, 1983; Kailola, 2004; Acero & Betancur-R., 2007). *Galeichthys* species are common fishes in their respective ranges, having some (largely unquantified) commercial value, since they are taken as a by-catch with a variety of gear in commercial and artisanal fisheries. Ariids are phenotypically similar fishes and their character-states tend to be conservative, leading to difficulty for taxonomists (Kailola, 1991). Thus, the genus *Galeichthys* constitutes a group of morphologically similar species within a family of morphologically similar fishes. At times in its nomenclatural history, *Galeichthys* has been variously extracted from and included in the speciose type genus

*Arius* Valenciennes (1840) which, as recognised at present, certainly remains paraphyletic (Taylor, 1987; Burgess, 1989; Kailola, 1991 and 2004). The valid genus *Galeichthys* has also been referred to as *Tachysurus* Lacepède, which is considered a nomen dubium and an invalid genus (Wheeler & Baddockwaya, 1981).

Since studies on the biology and ecology of the type species *G. feliceps* Valenciennes during the 1980s, an undescribed species of *Galeichthys* from the east coast of South Africa has been recognised (see Tilney & Hecht, 1990; Branch, 1994; Smale, Watson & Hecht, 1995; King, 1997; P.C. Heemstra, pers. comm.). Differences in morphology, osteology and habitat between the two forms are consistent with an uncommon geographic range. This new species is described from 50 specimens collected from coastal areas of KwaZulu-Natal Province and the Transkei region of the Eastern Cape Province.

Acero & Betancur-R. (2007) have recently described the new subfamily Galeichthyinae, comprising the genus and four species described here, distinguished by one derived morphological state (consisting of the fan-shaped lamina of the postcleithral process); the subfamily Ariinae then includes the remaining ariids.

## MATERIALS AND METHODS

Species descriptions are based on the following material: *G. ater* – 31 specimens (130–320 mm SL) measured and examined, 2 skeletonised, 2 cleared and stained for bone and cartilage, 4 radiographed (inclusive of the neotype); *G. feliceps* – 31 specimens (140–330 mm SL) measured and examined, 4 skeletonised, 2 cleared and stained for bone and cartilage, 4 radiographed; *G. trowi* sp. nov. – 50 specimens (225–480 mm SL) measured and examined, 5 skeletonised, 4 radiographed (paratypes); *G. peruvianus* – 15 specimens (86–345 mm SL) measured and examined, 2 skeletonised, and 1 skull only (CAS 47043), 2 radiographed, and radiographs of the 2 syntypes.

Methods for counts and measurements follow Hubbs & Lagler (1964), with the following additions: dorsal fin spine length is measured from the base (posterior of the first, rudimentary spine) to the distal bony tip, pectoral fin spine length from the base to the distal bony tip with fin adpressed to the body, and the relative length of

the maxillary barbel in relation to the pectoral fin was approximated with the fin extended. Standard length was obtained using a mm-graduated ruler; other body measurements were made as straight-line distances with dial calipers to the nearest 0.5 mm, and are expressed as a percentage of standard length or head length. Vertebral counts are taken from skeletonized specimens and radiographs of some type material: total vertebral count includes the five vertebrae involved in the anterior complex centrum, and the compound preural-ural centrum is counted as one element. Anal fin ray counts were made from radiographs. Dry skeletons were prepared and the swimbladder and the utricular otoliths of several individuals of each species were removed for examination. Sex was determined by examining the gonads, or, in the case of a few large individuals (after gonads had been removed), by shape of the posterior (humeral) process of the cleithrum. Intra-specific skeletal differences and sexually dimorphic features are included in the diagnoses and descriptions.

**Table 1.** Proportional measurements of specimens of Galeichthys as percentages of the head length (HL) and standard length (SL); significant differences ( $p \leq 0.05$ ) are marked by an asterisk (SD = standard deviation).

	<i>G. ater</i> (n = 31)			<i>G. feliceps</i> (n = 31)		<i>G. peruvianus</i> (n = 15)	
	neotype	range	SD	range	SD	range	SD
SL (mm)	190	130–320	35.3	140–330	45.4	86–345	63
<b>Percent HL:</b>							
Head width	98	85–103	4.0	48–106	9.3	68–87	15.6
Snout length	37	31–48	3.0	31–50	3.4	22–38	15.1
Mouth width	51	46–57	2.8	39–62.5	4.5	36.5–45	26.4
Posterior-nostril to eye	12.5	8.5–40	4.6	11–44	5.6	9.5–34	54.3
Inter-anterior nostril width	31	27–32	1.3	23–45	4.1	19–29	21.0
Interorbital width	55	45–57	2.9	41–66	4.3	46–52	22.5
Eye diameter	18	13–20	1.4	12–22	2.1	13–34	49.1
Maxillary barbel length	86	63–89	6.8	41.5–112.5	13.2	56.5–91	19.0
<b>Percent SL:</b>							
Predorsal length	36	10–40	5.1	9.5–39	4.9	34–40	1.7
Body depth	26	20–27	1.9	17–26	1.8	17–22	14.3
Head length	26	23–31	1.6	20–37	2.6	25.5–31	16.1
Head width	25	22–29	1.5	13–26	2.0	19–23	10.8
Dorsal fin base	9	8.5–11	0.7	8–10	0.6	7–11	9.4
Dorsal spine length	16	13–22.5	1.9	15–21	1.3	14–18	11.1
Pectoral fin base	6	5–7	0.4	4.5–6	0.4	4–7	7.7
Pectoral spine length	19	15–24	2.2	17–24.5	1.8	15–20	15.8
Adipose fin base	11	9–13	1.0	7.5–13.5	1.2	6.5–14	17.8
Adipose fin height	6	4.5–8.5	0.8	4–6.5	0.7	3–6	5.9
Caudal peduncle depth	9	7–14	1.1	6.5–9	0.5	6–11	11.4
Caudal peduncle length	16	13–24.5	2.0	12–22	1.7	15–23	21.7
Upper caudal lobe length	26	18–28.5	1.8	23–30.5	1.9	20.5–29	23.8
Lower caudal lobe length	23	17–25	1.9	20–28	1.6	16–26	22.0

Institutional abbreviations are as listed in Leviton *et al.* (1985); I add DIFS for the Department of Ichthyology and Fisheries Sciences, Rhodes University, Grahamstown, South Africa. Abbreviations used in the text are: A – anal fin, C – caudal fin, D – dorsal fin, FL – fork length, GR – gill-rakers, HL – head length, P – pectoral fin, SD – standard deviation, SL – standard length, and V – ventral fin.

## Genus *Galeichthys* Valenciennes

*Galeichthys* Valenciennes, in Cuvier & Valenciennes, 1840: 21, pl. 424. Type species *Galeichthys feliceps* Valenciennes 1840, by subsequent designation of Bleeker, 1862: 7; Bleeker, 1863: 90; Günther, 1864: 174; Jordan & Evermann, 1896: 119; Boulenger, 1909: 381; Meek & Hildebrand, 1923: 104; Hildebrand, 1946: 119, 123; Taylor, 1986a: 212; Acero & Betancur-R., 2007: 139 (new subfamily).

*Bagrus*, in part., Müller & Troschel, 1849: 6, as *Bagrus bagrus feliceps*.

“*Tachysurus*” Lacepède, 1803: 150, 151. Type species *Tachysurus sinensis* Lacepède (a Latinization of

*Tachysurus chinensis*), by monotypy, from a Chinese painting of a siluroid-like fish, but not identifiable to family; Eigenmann & Eigenmann, 1890: 41 (spelled *Tachisurus*); Jordan & Evermann, 1896: 121; Smith, 1962: 39; Tilak, 1965: 150; Jayaram, 1981: 278.

**DIAGNOSIS.** A genus of fork-tailed catfishes distinguished by the following six characters unique to *Galeichthys* within the Ariidae: 1) externally smooth head at all growth stadia (the striate and rugose head shield covered by skin and muscle); 2) supraoccipital process long and narrow, sides nearly parallel (easily detected through the skin); 3) epioccipital lamellae weakly developed, posteriorly projecting but remote and not contacting expanded parapophyses of vertebrae four and five; 4) one ‘free’ supraneural exposed in dorsal surface between supraoccipital and predorsal plate; 5) Müllerian ramus of vertebra four inflexible and attached midway to posterior facet of ossified Baudelot’s ligament of posttemporo-supracleithrum (elastic spring mechanism absent); and 6) posterior (humeral) process of the cleithrum forming fan-shaped lamina, with posteroventral margin broadly rounded in females and more triangular or angular in males.

## KEY TO SPECIES OF *GALEICHTHYS*

Proportional measurements for the nominal species are presented in Table 1, and those for the new species in Table 2.

- 1a. Caudal fin lobes rounded; caudal peduncle short and thick (peduncle depth > half peduncle length); both belly and underside of head anterior to isthmus densely covered with fine brown specks.....*Galeichthys ater*
- 1b. Caudal fin lobes pointed; caudal peduncle somewhat slender (peduncle depth ≤ half peduncle length); belly white, pearly, cream, tan to yellowish; speckled only laterally, or with fine brown specks on belly posterior to isthmus only (underside of head without specks).....2
- 2a. Head with narrow and shallow dorsomedian groove; palatal tooth patches separated at midline; silvery lateral stripe and belly cream-coloured; maxillary barbels not reaching pectoral fin spine origin; anterior nostrils ovate; swimbladder heart-shaped but with angular antero-lateral margins, longitudinal septum of posterior chamber traversed by one small septum.....*G. peruvianus*
- 2b. Head without dorsomedian groove; palatal tooth patches slightly separated, touching or united at midline; maxillary barbels extending at least to pectoral fin spine origin; anterior nostrils rounded; swimbladder heart-shaped and anterior margins well-rounded ..... 3
- 3a. Belly white, sometimes off-white (speckles of violet-brown pigment present laterally, but never mid-ventrally); dorsal fin spine at least 70% of fin height; pectoral fin spine reaching at vertical to, or less than, hind edge of dorsal fin base; free posterior rim of adipose fin relatively short (about equal to one-third length of adipose base); longitudinal septum of posterior chamber of swimbladder without small transverse septum; marine or estuarine habitat ..... *G. feliceps*
- 3b. Belly pale brown, off-white to yellowish and densely covered by fine brown specks (posterior to isthmus only); dorsal fin spine less than 70% of dorsal fin height; pectoral fin spine reaching at vertical to slightly beyond hind edge of dorsal fin base; free posterior rim of adipose fin relatively large (equal to approximately half length of adipose base); longitudinal septum of posterior chamber of swimbladder divided by one small transverse septum; strictly marine..... *G. trowi* sp. nov.

***Galeichthys ater* Castelnau, 1861**

Figs. 1, 2 &amp; 7; Table 1

*Galeichthys ater* Castelnau, 1861: 62 ("mers du Cap": Cape of Good Hope, South Africa). Boulenger, 1911: 382, fig. 296; Gilchrist, 1914: 104 and 1916: 2, 18 (early development); Buxton *et al.*, 1984: 184 (trawl survey); Taylor, 1986a: 212, fig. 59.2 (description, illustration); Hecht & Tilney, 1989: 103 (fishery); Smale & Buxton, 1989: 58 (subtidal community); Tilney & Hecht, 1990: 171, 5 figs. (feeding habits and morphology); M. Wilhelm, 1999, cited in Mann, 2000: 6 (management report); Acero & Betancur-R., 2007: 135, 136, 139, 140, 5 figs. (cranium and cleithrum).

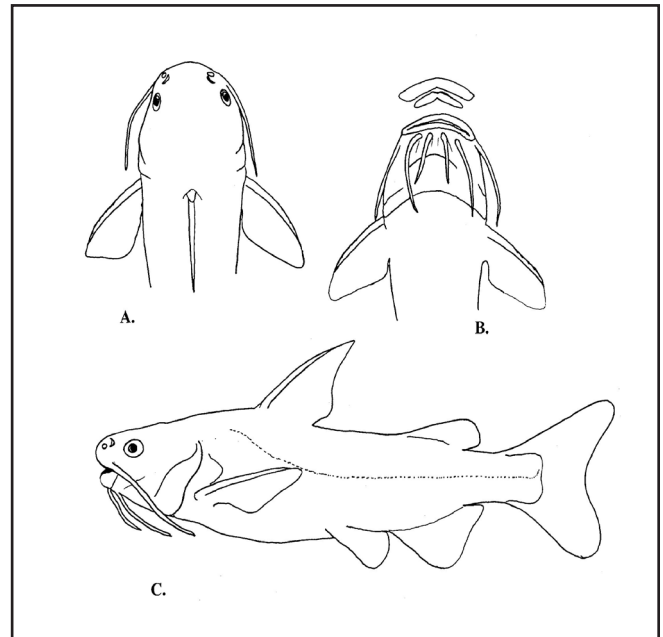
*Galeichthys feliceps* (non Valenciennes): Barnard, 1925: 160 (in part).

*Arius ater*: Burgess, 1989: 168.

*Neotype*. RUSI 63803; 190 mm SL (male), Indian Ocean at Tsitsikamma Coastal Marine Park, Eastern Cape Province, South Africa; collected by R. Tilney and J. Davis, 30 November 1993.

To preserve nomenclatural stability, a neotype is selected for *G. ater*, since no known types exist. Castelnau (1861) described *G. ater* from two specimens collected from Table Bay (Cape Town, South Africa) wherein, although it is less frequent than *G. feliceps*, he erroneously attributed it as 'very rare.' The species is comparatively abundant in the locality where the neotype was collected. The condition of the neotype is very good; the belly is slit longitudinally.

**DIAGNOSIS.** Head short, nearly as broad as long. Snout blunt, well-rounded in lateral profile and dorsally. Palatal tooth patches posterior to premaxillary tooth band meet at midline. Caudal-fin lobes rounded, of near equal length, fin not deeply forked; caudal peduncle short and thick. Underside of body (both



**Fig. 2.** *Galeichthys ater* Castelnau, neotype: line drawing of A) dorsal view of head; B) ventral view of head and belly, and schematic drawing of premaxillary and palatal tooth patch arrangement; and C) lateral view.

head and belly) covered with fine brown specks. Anterior gill-rakers on first arch 10–13 (5 + 5). Pectoral fin rays 9–12 (11); fatty growth along pectoral fin spines of breeding females not present outside spawning season. Dimorphism of posterior (humeral) process of cleithrum obvious externally: fan-shaped in females, triangular in males. Dorsomedian cranial depression on exposed skull smooth, shallow, and posteriorly does not reach supraoccipital process. Total vertebrae 51 (16–17 precaudal, 34–35 caudal).



**Fig. 1.** *Galeichthys ater* Castelnau, neotype, 190 mm SL, male, SAIAB 63803.



**DISTRIBUTION.** Strictly marine and common along the entire south coast of South Africa, from Table Bay, Cape Town (Atlantic Ocean) to the vicinity of East London (Indian Ocean). Less commonly known north of this range, but recorded from the west coast to Walvis Bay, Swakopmund, Namibia (Tilney & Hecht, 1990; RUSI uncatalogued, 3 specimens: skiboat catch of R. Maasden, 1987, re-examined here), and on the east coast to Margate, KwaZulu-Natal Province, South Africa, the northeastern-most record for the species (RUSI 56501, 2).

**COMPARISONS.** In the field, *G. ater* is easily distinguished from the sympatric *G. feliceps*, which has a stark white belly and pointed caudal lobes, and from *G. trowi* sp. nov. which has pointed caudal lobes and no speckling on the underside of the head, but only on the belly. The dentition is similar to *G. feliceps* (see Tilney, 1990, plate II), except that the tooth bands are slightly broader in *G. ater* than in *G. feliceps* (Tilney & Hecht, 1990).

### *Galeichthys feliceps* Valenciennes, 1840

Figs. 5–7; Table 1

*Galeichthys feliceps* Valenciennes, in Cuvier & Valenciennes, 1840: 29, pl. 424 (“environs du Cap”: Cape of Good Hope, South Africa). Syntypes mounted (5), MNHN A.9361–A.9365 [not examined]; Castelnau, 1861: 62; Günther, 1864: 175; Weber, 1897: 186, 191; Boulenger, 1891: 148 (eggs); Boulenger, 1911: 381, fig. 295; Gilchrist, 1914: 104; Gilchrist, 1916: 2, 18; Barnard, 1925: 160; Poll, 1953: 166, 258, fig. 67; Taylor & Van Dyke, 1981, fig. (FAO species identification sheets); Buxton *et al.*, 1984: 158 (trawl survey); Coetzee & Pool, 1985: 33 (diet); Rucabado, 1986: 227; Taylor, 1986a: 213 (description, illustration); Bennett, 1989: 164 (diet); Hecht & Tilney, 1989: 103 (fishery); Taylor, 1990: 233 (checklist); Tilney & Hecht, 1990: 171, 5 figs. (feeding habits and morphology); Marais & Venter, 1991: 149 (body composition); Tilney & Hecht, 1993: 183 (ontogeny); Whitfield *et al.*, 1994: 182, fig. 9 (estuarine survey); Whitfield, 1998: 63; R. L. Tilney, 1999, cited in Mann, 2000: 8 (management report); Marceniuk & Menezes, 2007: 61, 62, 2 figs.

*Pimelodes fossor* Lichtenstein, 1823: 112 (*nomen dubium*; Cape of Good Hope, South Africa). Holotype lost; based on a specimen of *Galeichthys* but the description does not clearly distinguish between the two southern African species (*G. ater* and *G. feliceps*) (Taylor, 1986b); Peters, 1868: 455, in synonymy of *G. feliceps*; Ferraris, 2007: 431 (type catalogue; species inquirenda in Siluriformes); Kailola, 2004: 127, 136, and Marceniuk & Menezes, 2007: 63, in possible synonymy of *G. feliceps*.

*Bagrus capensis* Smith, 1838–47 [1840]: pl. 8 (Cape of Good Hope, South Africa). Holotype (dry mount), BMNH 1857.6.13.147 [not examined]; Pappe, 1853: 29; Smith, 1838–47: pl. 8; Taylor, 1986b: 158; Taylor,

1990: 234; Kailola, 2004: 136; Ferraris, 2007: 43 (type catalogue); Marceniuk & Menezes, 2007: 63.

*Pimelodus peronii* Valenciennes, in Cuvier & Valenciennes, 1840: 161 (Indian Ocean). Holotype (unique): MNHN 0000-1207. Bertin & Estève, 1950: 13 (type catalogue); Kailola, 2004: 136, and Ferraris, 2007: 43, in synonymy of *G. feliceps*.

*Bagrus bagrus feliceps*: Müller & Troschel, 1849: 6.

*Ariodes polystaphylodon*: Fermor, 1913: 196, 3 figs. (skull).

*Galeichthys ocellatus* Gilchrist & Thompson, 1916: 60, fig. (Swartkops River, Algoa Bay, South Africa). Holotype, RUSI 60956, 140 mm SL; Thompson, 1916: 74; Barnard, 1925: 161.

*Tachysurus feliceps*: Fowler, 1936: 330, 333; Smith, 1949: 109, fig. 165; Smith, 1975: 20; Hecht & Hecht, 1978: fig. 6 (otolith); Marais, 1981: 144 (estuarine survey); Marais & Baird, 1980: 68 (estuarine survey); Hecht & Hecht, 1981: 404, fig. 4–6 (otoliths); Marais, 1983: 96 (seasonal abundance); Marais, 1984: 210 (estuarine feeding ecology).

*Tachysurus fossor* (? non *Pimelodes fossor* Lichtenstein, 1823): Smith, 1962: 39; Smith & Smith, 1966: 36, fig.

*Arius feliceps*: Van der Elst, 1981: 342, fig.

**Type material.** *G. feliceps* was well-described by Valenciennes from an unspecified number of specimens taken from Table Bay (Cape Town, South Africa), but he did not designate type material. Five dry-mounted syntypes were subsequently chosen by Bleeker (1862) when he designated *G. feliceps* as the type species of *Galeichthys*. The syntypes are deposited in the MNHN; although these were not re-examined for this study, the species as described here can be confidently matched to the original descriptions by Valenciennes and Bleeker. The collection locality given in those early descriptions matches the known range of the species and is outside of the range of the new species from the Eastern Cape and KwaZulu-Natal provinces (and formerly identified as *G. feliceps*). The lost holotype of *G. ocellatus* has been relocated and is catalogued as RUSI 60956.

**DIAGNOSIS.** Head longer than, or nearly as long as, broad. Tooth patches posterior to premaxillary band touch at midline. Maxillary barbel relatively long, thin, and extending at least to pectoral fin spine origin (longer in females). Dorsal fin spine length more than 70% of dorsal fin height. Pectoral-fin spine at vertical extends at most to hind edge of dorsal fin base. Caudal fin deeply forked, with moderately slender, pointed lobes, upper lobe longer; caudal peduncle approximately twice as long as deep. Gill-rakers on anterior face of first arch 11–14. Upper two-thirds of body darkened, some lateral speckling and belly stark white. Median anterior cranial fontanelle (of exposed skull) elongate and bullet-shaped; median cranial depression smooth, shallow, and deepest posteriorly at frontal/supraoccipital suture. Pectoral fin rays 10–12. Dimorphism of posterior (humeral) process of cleithrum obvious externally: fan-

shaped in females, triangular in males. Total vertebrae 51–52 (17 precaudal, 34–35 caudal).

**DISTRIBUTION.** From Walvis Bay, Namibia to the vicinity of East London, South Africa; especially abundant along the entire southern coast, from Cape Town to Port Alfred. North-easterly limit: Mbashe River mouth (32°S, 28°E), known from numerous estuarine surveys north of the Kei River mouth (Plumstead, 1984; Plumstead, 1985 and 1989; Branch & Grindley, 1979). Thus, there is probably little or no distributional overlap with the entirely marine *G. trowi* sp. nov.

**COMPARISONS.** See comments for *G. ater*, above. More is known of the biology and ecology of *G. feliceps* than of any other species of the genus. *G. feliceps* is the only *Galeichthys* species occurring in both marine and estuarine habitats.

### *Galeichthys peruvianus* Lütken, 1875

Fig. 7; Table 1

*Galeichthys peruvianus* Lütken, 1875: 205 in Vol. I for 1874 (Callao, Peru). Syntypes (2), ZMUC 150 and 490. Steindachner, 1875: 34 (Callao, Peru; Panama Bay; and Altata, Mexico); Jordan & Evermann, 1896: 122; Gilbert & Starks, 1904: 21; Regan, 1908: 125; Evermann & Radcliffe, 1917: 31, pl. 4; Nichols & Murphy, 1922: 506; Meek & Hildebrand, 1923: 105; Tortonese, 1939: 230; Hildebrand, 1946: 123; Chirichigno, 1974: 129, fig. 145; Kailola & Bussing, 1995: 882, fig; Acero & Betancur-R., 2007: 139 (molecular data).

*Tachisurus peruvianus*: Eigenmann & Eigenmann, 1888: 140, fig. 7 (teeth), and 1890: 51 (Callao, Peru).

**Type material.** The existing type series for *G. peruvianus* consists of the two syntypes (270 mm and 260 mm SL) deposited with the ZMUC. Both are alcohol preserved and in good condition, but that the dorsal and pectoral fins are cut off just above the base in each (J. Nielsen, ZMUC, pers. comm.); radiographs of those specimens were examined for this study. The publication date of the original description has often been given as 1874; in such cases the year should be emended to 1875.

**DIAGNOSIS.** Head and body slender; body posteriorly well tapered. Caudal fin lobes pointed, upper lobe longer; caudal peduncle long and narrow. Lateral body with silvery to reddish stripe. Tooth patches posterior to premaxillary tooth band slightly separated at midline. Anterior gillrakers on first arch 13–15. External skull with shallow, narrow dorsomedian groove, extending from interorbital area to base of supraoccipital. Cranial fontanelles (of exposed skull) set within steeply-welled median cranial depression, or fissure, with nearly parallel sides. Skull rugose, striate and tuberculate in part. Swimbladder angularly heart-shaped and anterior margins more triangular than rounded; longitudinal

septum of posterior chamber of swimbladder traversed by one smaller septum. Aortic canal on ventral side of Weberian apparatus uncovered by lamellae (no aortic tunnel formed). Müllerian ramus of fourth vertebra with irregularly textured, ovoid, concave facet on ventral side. Posterior (humeral) process of the cleithrum broad, blade-like.

**DISTRIBUTION.** Coastal marine; not known to enter estuaries. Currently known as abundant only from the coast of northern Peru (Taylor, 1986a; Kailola & Bussing, 1995), with frequent catches historically recorded from the Bay of Callao (Lima). (Several early descriptions have attributed this species' distribution to include a more northerly range, e.g., "Pacific coast of Mexico to Peru, rather rare," in Jordan & Evermann, 1896; "Altata, Mexico, Panama to Callao, Peru," in Meek & Hildebrand, 1923. However, such distributional records are more likely based on hearsay rather than reports of actual capture localities, or they may be misidentifications with *Arius* species, particularly, "*Arius*" *seemanni* Günther [= *Arius jordani* Jordan & Evermann], which it superficially resembles.

**COMPARISONS.** *G. peruvianus* is a smaller-sized, narrow-bodied species of *Galeichthys*. It is well distinguished from other co-occurring ariids by its long, slender supraoccipital process (which can be detected through the skin), and from other *Galeichthys* species by the silvery lateral stripe, palatal tooth patches invariably separated at the midline, shallow dorsomedian head groove, and, on the exposed cranium, the steep-walled cranial depression (within which the cranial fontanelles are set). The sexual dimorphism of the humeral process of the cleithrum (but less pronounced than that found in *G. ater* and *G. feliceps*) and the configuration of the small transverse septum of the posterior chamber of the swimbladder (resulting in two pairs of bipartite posterior chambers) resembles that of the new species, *G. trowi*. Kailola (1991) proposed that an open aortic canal (here, unique to *G. peruvianus* within the genus) represents the primitive condition in catfishes (cf. partially covered canal in *G. ater* and *G. feliceps*, and the aortic tunnel being most extensive in *G. trowi*).

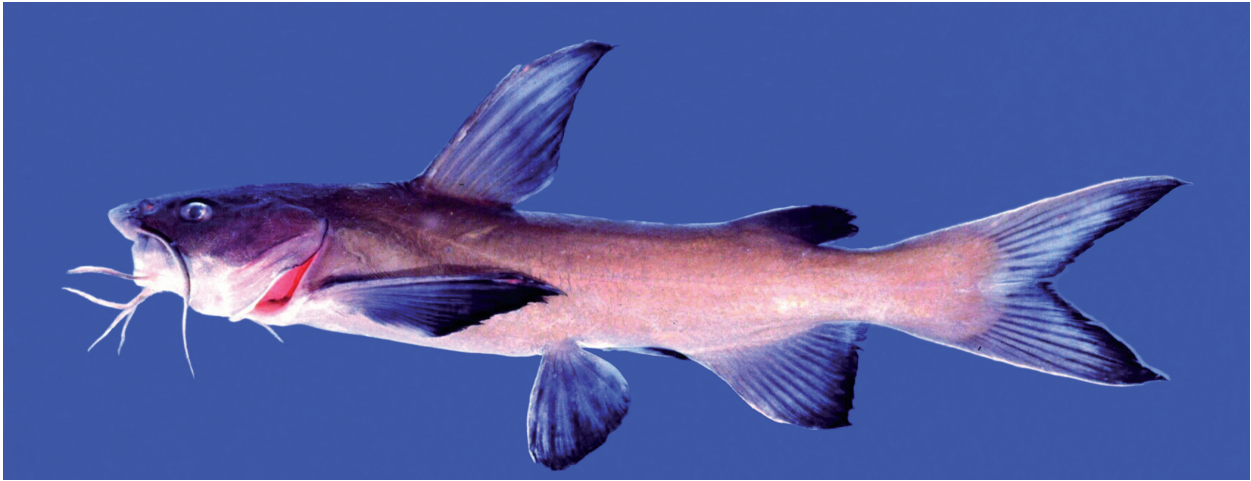
### *Galeichthys trowi* sp. nov.

Figs. 3–7; Table 2

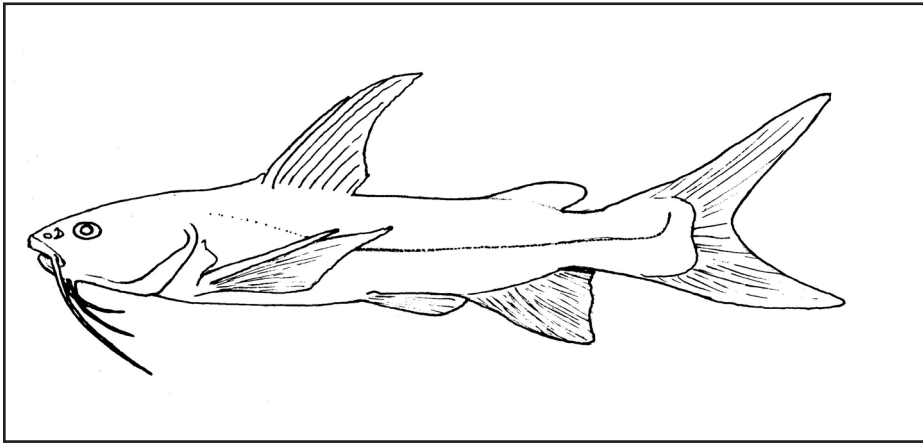
*Galeichthys feliceps*: Taylor, 1986a: 213 (in part); Taylor, 1986b: 158 (in part) (checklist).

*Galeichthys* sp.: Branch *et al.*, 1994: 224, pl. 105.1; King, 1997: 18, pl.; Smale, 1995: 24, pl. 8 (otolith); Beckley & Fennessy, 1996: 191 (fishery).

**Holotype.** SAIAB 60957, male, 435 mm SL, Coffee Bay (31°59'14" S, 29°09'14" E), Eastern Cape Province, Indian Ocean, South Africa, trawl at 31-m depth, 6 Nov. 1994, collected by Eugene Trow Sr.



**Fig. 3.** *Galeichthys trowi*, paratype, 350 mm SL, SAIAB 45967, Anchor reef, KwaZulu-Natal (P.C. Heemstra).



**Fig. 4.** *Galeichthys trowi* paratype, drawing of SAIAB 45967, juvenile male, 145 mm SL.

*Paratypes.* SAIAB 45967, male, 350 mm SL, KwaZulu-Natal Province, Jan. 1994, collected by P.C. Heemstra; SAIAB 60958, male, 435 mm SL, same data as holotype; SAIAB 60959, female, 450 mm SL, same data as holotype; SAIAB 63227, male: dry skeleton, 355 mm SL, Coffee Bay, Eastern Cape Province, Oct. 1993, collected by Tom Hecht/DIFS; AMNH 250602; 440 mm FL; Transkei coastline, Eastern Cape Province, 1985, collected by E. Trow Sr.; AMS I.45060-001; 355 mm FL; Coffee Bay, Transkei coastline, Eastern Cape Province, 1984, collected by E. Trow Sr.; BMNH 2010.4.19.347, 420 mm FL, Transkei coastline, Eastern Cape Province, 1985, collected by E. Trow Sr.; CAS 229110, 450 mm FL, Transkei coastline, Eastern Cape Province, 1985, collected by E. Trow Sr.; MZUSP 104605, 420 mm SL, Coffee Bay, Transkei coastline, Eastern Cape Province, 1984, collected by E. Trow Sr.; USNM 396993, 440 mm SL, Transkei coastline, Eastern Cape Province, 1985, collected by E. Trow Sr.

*Additional material.* RUSI 40640 (2), males, 314 and 322 mm SL, KwaZulu-Natal Province, Park Rynie,

Landers reef, 4 km offshore, 5 Aug. 1992, collected by C. Buxton, P.C. Heemstra and others; RUSI 43345 (11), 225–435 mm SL, Scottburgh (KwaZulu-Natal Province) to Port Edward (Eastern Cape Province), from shore, 2–3 Oct. 1993, collected by Rudy Van der Elst for the Oceanographic Research Institute (ORI), Durban; RUSI 63684 (3), 390–410 mm SL, Transkei coastline, Eastern Cape Province, 1983, collected by E. Trow Sr.; RUSI 63685 (3), 395–445 mm SL, Coffee Bay, Transkei coastline, Eastern Cape Province, 1984, collected by E. Trow Sr.; RUSI 63686 (6), 305–450 mm SL, Transkei coastline, Eastern Cape Province, 1985, collected by E. Trow Sr.; RUSI 63687 (7), 335–470 mm SL, same data as holotype.

**Type material.** Condition of the holotype is good, but that the body is slightly curved and the barbels somewhat dehydrated and stiff; the belly is longitudinally slit on the left side, as the stomach, intestines and gonads had been removed shortly after collection. The dry skeletal paratype is nearly complete except for the anal fin, left pectoral fin rays, and pleural ribs. The small juvenile specimen is in excellent condition. Other paratypes are



in similar condition to the holotype, but some specimens have flesh removed from over the hypural plate, left side, and some have guts and gonads intact.

**DIAGNOSIS.** Total vertebrae 55–57 (19–21 precaudal, 36 caudal) and 15 pleural ribs attached to parapophyses of vertebrae 6 through 20; pectoral fin rays I, 12–13; anal fin rays 19–20. Eyes small, ovate; dorsolaterally placed. Vomerine tooth patches slightly separated at midline, continuous with lateral patches that taper at edges. Premaxilla plates with pointed anterolateral corners. Gill-rakers on anterior face of first arch 12–13. Anterior dorsomedian cranial fontanelle constricted midway, approximating elongate hourglass-shape; remnant posterior fontanelle relatively large. Dorsal fin spine approximately two-thirds length of dorsal fin height (= longest dorsal ray). Pectoral fin spine extending slightly beyond dorsal fin base at vertical; humeral process of cleithrum with second, smaller blunt process on border between blade and prong. Adipose fin moderately large, with free posterior rim about half into length of adipose-fin base, and darker in colour than upper body. Fourth neural spine with thin anterior laminar keel and moderately elevated forward ridge extending to third neural spine; Müllerian ramus of fourth vertebra with acute transverse edge on ventral side. Pterotic with diminutive antrorse, pterotic spine. Lateral line with short, oblique venules emanating both upward and downward along its length. Swimbladder heart-shaped and anterior margins rounded; the longitudinal septum of the posterior chamber traversed by one small septum. Dorsal and lateral body colour (in life and alcohol) medium brown to deep brown; underside paler or yellowish, belly pigmented by fine brown specks posterior to isthmus only; fins blackish; barbels brown.

**DESCRIPTION.** Based on 50 specimens, inclusive of the holotype, paratypes and additional material.

A large, robust species of *Galeichthys*, commonly attaining over 40 cm FL. Head broad, moderately long. Head shield smooth externally. Greatest body depth just anterior to dorsal fin spine origin. Predorsal profile gently sloping to straight; interorbital region flat. Eyes ovate, relatively small at all stadia. Snout somewhat flat, broad, and rounded to slightly squarish. Mouth wide, nearly straight, subterminal to slightly inferior; lips equally thick and fleshy at front of jaws and sides of mouth, upper lip thickest and crenulate (especially in larger fish). Nostrils rounded; anterior nostrils positioned just slightly lateral to posterior ones; posterior nostrils covered by a flap. Gill openings wide, membranes meeting well forward at 90-degree angle, attached to isthmus, and with short, free posterior margin.

Premaxillary and palatal tooth patches of equal length and divided by (broad) velum approximately equal to width of premaxillary tooth patch. Barbels thin and tapered; maxillary barbel longest and reaching origin of pectoral fin spine. Dorsal fin base relatively wide.

Caudal fin deeply forked; caudal lobes pointed, broad basally and slender distally, upper lobe longer and more slender in small- and medium-sized individuals, but lobes of more-or-less equal size and shape in very large individuals; caudal peduncle long, moderately broad and slightly laterally compressed. Free posterior rim of adipose fin equal to approximately half length of fin.

Lateral line curving over shoulder area, then straight, and briefly turned dorsad at caudal base; skin venulose over operculum, upper surface and sides of head and snout, and also near lateral line at its anterior-most section (i.e., opposite dorsal fin base); short oblique venules emanate downward along length of lateral line, and upward along entire length or (in smaller stadia) at least to vicinity opposite adipose fin.

Colour in life and alcohol varies from reddish-brown to dark golden-brown both dorsally and laterally, and yellowish to cream ventrally. Belly densely covered with fine brown speckles, unevenly with increasing body size; speckles absent from underside of head. All fins blackish, darker distally; paired fins darker dorsally. Lips yellowish. Barbels brown, darker dorsally. Peritoneum cream-coloured to transparent.

**SALIENT OSTEOLOGY.** Dorsal surface of skull with smooth striae and some rugose areas in otic region; anterior dorsomedian cranial fontanelle constricted midway, approximating elongate 'hourglass'-shape, and distinct, separated from relatively large remnant posterior fontanelle by a well-ossified epiphyseal bar; fontanelles extending from interorbital area nearly to base of supraoccipital. Müllerian ramus tapering and pointed, curving ventrad and posteriad slightly at tip; fourth neural spine with low to moderate forward ridge and thin, anterior-facing keel. Subvertebral cone moderately high and pointed, with aortic canal sealed (by lamellae) from immediately posterior to tip of cone to fifth vertebral centrum medially (i.e., moderately extensive aortic tunnel). Posterior projection of tripus crescent-shaped, moderately wide and strong. Dorsal surface of supraoccipital process with longitudinal striae, flat or slightly convex in large individuals. Posterior border (or blade) of humeral process moderately ossified, smooth, fan-shaped and sexually dimorphic: broad (semi-circular) in mature females, and dorsoposterior shaft short; blade smaller and more angular than rounded in males, and shaft longer than posteroventral border.

Utricular otolith (lapillus) angular, thick and bulbous, with anteroventral projection and low posteroventral spur often evident. Mesial surface convex and smooth; lateral side convex, uneven and bumpy with some raised, radiating grooves. Short groove present near spur on flattened posteroventral margin. Margin smooth or slightly irregular.

**SEXUAL DIMORPHISM.** Most aspects of sexual dimorphism noted in other species of *Galeichthys* are present, in



**Table 2.** Proportional measurements of specimens of *Galeichthys trowi* sp. nov. as percentages of the head length (HL) and standard length (SL), and meristic data for the type specimens ( $n$  = sample size; SD = standard deviation).

Character	Holotype	All specimens			
		$n$	Mean	Range	SD
SL (mm)	435	50	384	225–480	
<b>Percent of HL:</b>					
Head width	88	50	86.3	79–95	3.8
Snout length	38	50	38.9	36–44	1.6
Mouth width	50	50	47.9	41–59	3.3
Inter-anterior nostril width	28	50	27.7	25–34	1.4
Interorbital width	51	50	46.9	42–52	2.3
Eye diameter	13	50	12.9	11–15.5	0.9
Maxillary barbell length	59	50	66.2	55–80	5.0
<b>Percent of SL:</b>					
Predorsal length	37	50	37.3	35–55	2.8
Head length	29	50	28.6	26–42	2.1
Head width	26	50	24.7	22–36	1.9
Body depth	24	50	23.0	19–32	1.9
Dorsal-fin base	9	50	10.2	8.5–14	0.9
Dorsal spine length	18	46	18.3	16–28	1.8
Pectoral-fin base	6	50	5.9	5–9	0.6
Pectoral spine length	22	50	21.8	19–35	2.3
Adipose base	9	49	8.8	6–11.5	1.1
Adipose height	5	49	4.9	3.5–8	0.7
Caudal peduncle depth	9	50	8.7	8–12	0.7
Caudal peduncle length	13	50	14.8	12.5–20	1.3
Upper caudal lobe length	25	45	26.1	20–42	3.2
Lower caudal lobe length	24	49	23.6	19–37	2.7
<b>Counts</b>		<b>Holotype</b>	<b>Paratypes</b>		
Gillrakers (anterior, 1 <sup>st</sup> arch, right side)	6+7	6+7 ( $n = 6$ )			
Anal fin rays	20	Range: 19–20 ( $n = 4$ )			
Pectoral fin rays	13	Range: 12–13 ( $n = 6$ )			
Total vertebrae	57	Range: 55–57 ( $n = 4$ )			

some form, as features of *G. trowi*. Posterior (humeral) process of the cleithrum is fan-shaped in both sexes, but broadly so (semi-circular) in mature females, with the posteroventral margin of this bone appearing stronger and better defined through the skin than appears in males. The ventral fins are equally long in males and females (cf. visibly or quantifiably longer in females of other species of *Galeichthys*: Lütken, 1875; Tilney, 1990; this study) and in both sexes extending to the first rays of the anal fin. The ventral fins are broad and spatulate in females, narrow with angular outer margins in males. The maxillary barbel and the pectoral fin spine are discernibly longer in females than in like-sized males; likewise, the adipose fin height is greater in females than in males.

**ETYMOLOGY.** From the Latinization of Trow, a tribute to the late Eugene Trow Jr., a student studying the

biology and ecology of *Galeichthys* species in South Africa, who recognised the probable distinctiveness of this new species, and to his late father, Eugene Trow Sr., who collected many of the specimens upon which the description is based.

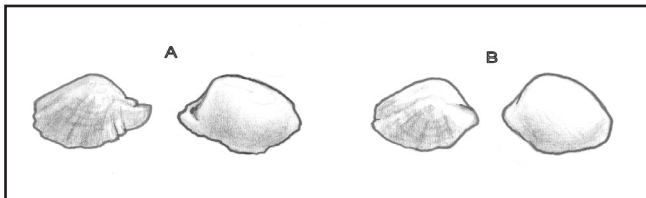
**COMPARISONS.** Taylor's (1986a) brief diagnosis for members of the genus *Galeichthys* is appropriate for *G. trowi* except for the total number of vertebrae, as more abdominal vertebrae and ribs are associated with a greater vertebral count in *G. trowi*.

*G. trowi* resembles *G. feliceps*, with which it is parapatric. Several superficial differences, such as adult body size, colour and some aspects of morphology, easily distinguish the two species. Either fresh or alcohol-preserved specimens of the new species and *G. feliceps* can be separated according to the following morphological and colour differences: viewed laterally,

*G. trowi* is uniformly dark and the belly yellowish and pigmented by fine brown specks, whereas *G. feliceps* is obviously 'two-toned' (i.e., its dark dorsal colour grades to pale ventral colour along the length of the body), the belly is stark white to cream and without pigment specks, and the anterior portion of the lateral line (below the dorsal fin base) is often lightened. The adipose fin colour of *G. trowi* is clearly demarcated (blackish) from its brown body colour, more so than normally appears in *G. feliceps*, while the adipose fin of the former is relatively large and the free posterior margin proportionately larger (Fig. 5). The angle of the posteroventral border of the opercle (easily seen through the thin skin) curves midway to near horizontal in *G. feliceps*, while the slope is gentle (diagonal), and the bone's concave dorsal margin is greater (visible in dissection) in the new species. The pectoral fin spine extends at vertical to slightly beyond the dorsal fin base in *G. trowi* but never beyond the dorsal fin base in *G. feliceps*. The dorsal fin spine is at most approximately



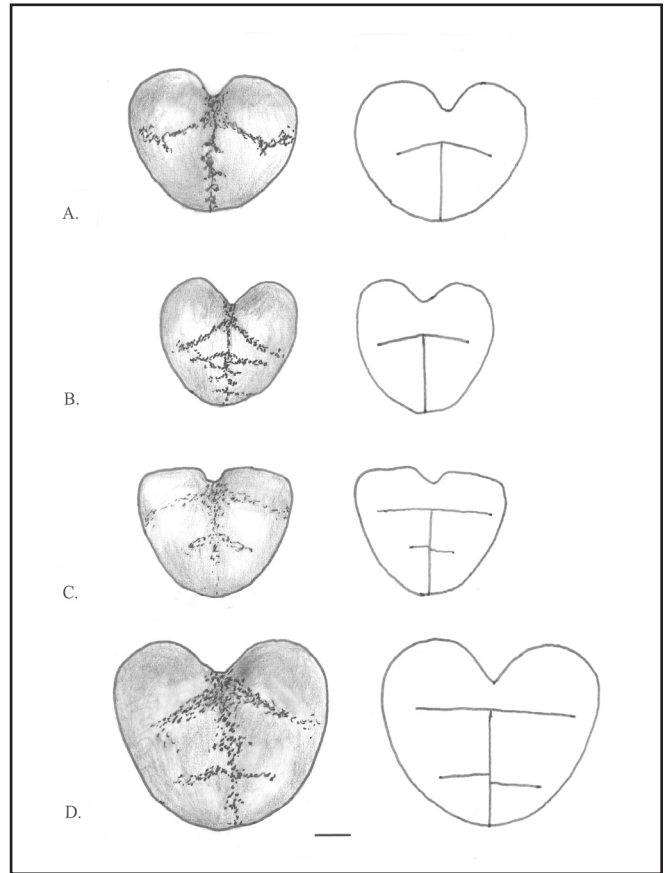
**Fig. 5.** Relative shape of the adipose fin of A) *Galeichthys trowi* sp. nov., and B) *G. feliceps*.



**Fig. 6.** Left lapillus of A) *Galeichthys trowi* sp. nov., and B) *G. feliceps*, lateral and mesial surfaces.

two-thirds the height of the dorsal fin in *G. trowi*, but at least three-fourths the dorsal fin height in *G. feliceps*. *G. trowi* is also distinguished from *G. feliceps* by its dorsolaterally set eyes (entirely visible from above), laterally compressed caudal peduncle, premaxillary tooth patches pointed at their anterolateral corners, and a thinner band of palatal tooth patches that are slightly separated over the vomer. The utricular otolith of *G. feliceps*, as previously described by Frost (1925) and Hecht & Hecht (1978), is similar to that of *G. trowi*. However, Smale, Watson & Hecht (1995) refer to the lapillus of 'G. sp.' as typically more angular or boxish, with a posteroventral projection (spur), and a greater anteroventral protrusion on the anterior margin – observations that agree with mine (Fig. 6). Meristic differences are found in the number of pectoral fin rays (I, 12–13; cf. I, 9–12 in *G. feliceps*) and number of free

BERTIN, L. & ESTEVE, R. 1950. *Catalogue des types de*



**Fig. 7.** Swimbladder of the four species of *Galeichthys* in dorsal view (left column) and schematic drawing showing internal septa and chambers in cross-section (right column): A) *G. ater* (from specimen 250 mm SL); B) *G. feliceps* (187 mm SL); C) *G. peruvianus* (285 mm SL); and D) *G. trowi* sp. nov. (370 mm SL); scale bar = 1 cm.

vertebrae (50–52; cf. 45–48 in *G. feliceps*). *G. feliceps* is in some features it shares with the South American species, *G. peruvianus*.

*G. trowi* is dissimilar to the other African species in some features it shares with the South American species, *G. peruvianus*. These are a swimbladder with two bipartite posterior chambers (Fig. 7), palatal tooth patches slightly separated at the midline, ovate eyes, and a somewhat laterally compressed caudal peduncle.

**BIOLOGY AND ECOLOGY.** *G. trowi* inhabits the relatively warm, shallow coastal waters of the east coast of South Africa, and is not known to enter estuaries. Tilney (1990) proposed that its southern range may be limited by water temperature. *G. trowi* is likely to utilise both rocky reef and soft substratum environments (Tilney, 1990) and is probably inactive by day, remaining in caves and other forms of refuge offered by reefs (Van der Elst, 1981).

Aspects of this species' biology and ecology that might further distinguish it from *G. feliceps* – other than

that it attains a larger size and does not enter estuaries – are not known. It feeds on small fish and crabs (King, 1997) and is preyed on by a large variety of sharks (J. Cliff, Natal Sharks Board, pers. comm. cited in Tilney, 1990). Gut contents in several specimens prepared for osteological study contained substantial amounts of crustaceans (prawn and crab) as well as small fish. Two females, 435 and 450 mm SL, had more than 50 ripe eggs in each ovary, measuring up to approximately 1.7 cm in diameter.

**SIZE.** Recorded to 50 cm SL (Taylor, 1986b) [non *G. feliceps*], at least to 57 cm [TL?] (Smale, Watson & Hecht, 1995), and 58 cm FL, from a survey of shore anglers (A. MacDonald, Rhodes University, South Africa, pers. comm.).

**DISTRIBUTION.** East coast of South Africa (Indian Ocean), from northern KwaZulu-Natal Province to the Kei River, Eastern Cape Province. Observed as far north as Kosi Bay (B. Mann, Oceanographic Research Institute, pers. comm.), but frequently caught in the southern part of its range, from remote coastal areas between Port Edward and East London. *G. trowi* has never been taken from rivers or estuaries in this range, as recorded in checklists compiled by Whitfield (1980: Kosi, Sodwana, St Lucia estuaries), Harrison & Whitfield (1995: KwaZulu-Natal coastline) and Plumstead *et al.*, (1989: Mbashe River, approaching the southern-most border of the Transkei region).

Sympatric in at least the southern half of its range with the smaller, also marine species *G. ater* (the later infrequently recorded north of East London), and apparently parapatric with the morphologically similar, but smaller-sized, marine-estuarine species *G. feliceps*, at the southern end of its range.

**FISHERIES.** '*G. sp.*' is recorded in the catches of the beach-seine fishery at Durban, 50–300 m offshore (Beckley & Fennessy, 1996). Large specimens (>40 cm FL) are commonly caught from shore by hook-and-line anglers (mostly subsistence fishers), from Port Edward to Xora (unpublished surveys: S. Brouwer and A. MacDonald, Rhodes University, South Africa, pers. comm.).

### BRIEF NOMENCLATURAL HISTORY OF THE SPECIES

The past nomenclature of the three valid, previously described species is relatively uninvolved, and, with the exception of Barnard's (1925) work (see below), no question of the specific distinctiveness of these fishes has arisen. Smith (1838–47) considered that the species he newly described as *Bagrus capensis* may have been one already described (= *Galeichthys feliceps*).

Gilchrist & Thompson (1916) based a description of *G. ocellatus* on a single specimen with a 'mottled colour' taken from the Swartkops River (Algoa Bay,

Port Elizabeth, South Africa). Since the holotype had been lost, it was subsequently assumed that the authors had described a specimen of *G. feliceps* because of the locale and habitat from which it was taken. Later, Barnard (1925) attempted to give evidence in favour of uniting *G. feliceps*, *G. ater* and *G. ocellatus* under the name *G. feliceps* – contrary to differences he otherwise observed in colour, caudal peduncle depth, and width of the premaxillary tooth patch. Barnard's (1925) decision to synonymise these had been misled by his re-examination only of specimens in the South African Museum, which he found to be inventoried as *G. feliceps* all males, and *G. ater* all females. My re-examination of the lost *G. ocellatus* holotype (in fair condition) reveals numerous characters that distinguish it as *G. feliceps* (e.g., shape of the head, caudal peduncle and opercle; adipose fin size; length of dorsal fin spine and maxillary barbel) and that the patterned skin of this individual may be an artefact of the mechanical means of its capture. Lütken (1875) stated in his original description of *G. peruvianus* that he could not assert the most characteristic differences between that species and *G. feliceps* (known to him only through the literature) yet he has successfully described the species' most salient features. Several later descriptions of *G. peruvianus* can be found in the works of Hildebrand (Hildebrand, 1925 and 1946; Meek & Hildebrand, 1923), wherein the species is correctly distinguished from many sympatric ariids (some having an uncertain specific status, even at present) and the unjustified generic designation '*Tachisurus*,' briefly used by Eigenmann & Eigenmann (1888 and 1890), is disregarded. Some more recent descriptions of *G. feliceps* (e.g., Taylor, 1986a and 1986b) have included the newly described *G. trowi*. Although *G. ater* has been known from regions of South Africa along with *G. feliceps* since the 19th century, it has escaped the generic designations *Tachisurus* and *Arius*.

### MATERIAL EXAMINED

Abbreviations for preparations are: A – alcohol preserved; C&S – cleared and stained for bone and cartilage; O – utricular otoliths removed; R – radiographed; DS – dry skeleton; SB – swimbladder removed.

#### *Galeichthys ater*

DIFS uncatalogued, (1, C&S) male, 205 mm SL, Indian Ocean, Plettenburg Bay, Eastern Cape Province.

DIFS uncatalogued, (1, C&S) 130 mm SL; Indian Ocean, Port Alfred, Eastern Cape Province.

DIFS uncatalogued, (1, partial DS) male, 235 mm SL, Port Alfred, Eastern Cape Province.

INVEVAR PEC 6799, (A with SB removed) female, 239 mm SL, same data as for RUSI 63673.

MZUSP [gift to A. Marceniuk], (2, A) male 175 and female (with large eggs), 245 mm SL, same data as for RUSI 63673.

RUSI 11507, (1, A) female, 240 mm SL, Indian Ocean, Algoa Bay, Eastern Cape Province: Pollack Beach, 20m



RUSI 12770, (2, A) males, 205 and 245 mm SL, Indian Ocean, Plettenburg Bay, Eastern Cape Province.  
 RUSI 17086, (1, A) male, 165 mm SL, Indian Ocean, Lubanzi, Eastern Cape Province.  
 RUSI 34259, (2, A, from which 1, SB removed) females, 245 and 320 mm SL, Atlantic Ocean, Olifantsbos, Western Cape Province.  
 RUSI 56581, (2, A) male 200 mm SL and female 230 mm SL, Indian Ocean, Margate, KwaZulu-Natal Province, 36-39 m trawl.  
 RUSI 63226, (1, DS) female, 222 mm SL, Indian Ocean, Port Alfred, Eastern Cape Province.  
 RUSI 63672, (1, A) male, 232 mm SL, Indian Ocean, Hamburg: pool at Keiskamma River mouth, Eastern Cape Province.  
 RUSI 63673, (4, A, from which 2, SB removed) 170-255 mm SL, Indian Ocean, Tsitsikamma National Marine Reserve: Groot Bank, Station 93-6,9, Eastern Cape Province.  
 RUSI 63674, (8, A) 210-262 mm SL, Indian Ocean, Port Alfred, Eastern Cape Province.  
 RUSI 63675, (1, A) female (with gonads removed), 265 mm SL, Indian Ocean, Port Alfred, Eastern Cape Province.  
 RUSI 63676, (1, A) female, 222 mm SL, Indian Ocean, Kenton-on-Sea, Eastern Cape Province.  
 RUSI 63677, (2, A) male 170 mm SL, and female 220 mm SL (with SB removed), Indian Ocean, Tsitsikamma National Marine Reserve, Eastern Cape Province.  
 RUSI 63803, NEOTYPE, (A/R) male, 190 mm SL, Indian Ocean, Tsitsikamma National Marine Reserve, Eastern Cape Province.  
 RUSI uncatalogued, (3, A), Atlantic Ocean, Namibia, 1987, skiboat catch of R. Maadsen.

### *G. feliceps*

DIFS uncatalogued, (1, C&S) 140 mm SL, Colchester: Sundays River, Eastern Cape Province.  
 DIFS uncatalogued, (1, C&S; SB removed) male, 220 mm SL, Swakopmund River, Namibia.  
 DIFS uncatalogued, (2, DS) male 290 mm SL and female 330 mm SL, Indian Ocean, Port Alfred, Eastern Cape Province.  
 MZUSP 87694, (2, A) female 180 mm SL and male 235 mm SL, same data as for RUSI 63681.  
 RUSI 41951, (3, A) 230-238 mm SL, Port Alfred, Eastern Cape Province.  
 RUSI 60956, HOLOTYPE (A) of *G. ocellatus* Gilchrist & Thompson, 1916, 190 mm SL.  
 RUSI 63225, (1, DS) male, 315 mm SL, Port Alfred: Kowie River, Eastern Cape Province.  
 RUSI 63678, (1, A) male, 187 mm SL, Indian Ocean, Knysna, Eastern Cape Province.  
 RUSI 63679, (1, A) female, 230 mm SL, Indian Ocean, Port Alfred, Eastern Cape Province.  
 RUSI 63680, (2, A) females, 260 mm SL (w/ large eggs) and 295 mm SL, Swakopmund River, Namibia.  
 RUSI 63681, (4, A, from which 2, SB removed) 170-285 mm SL, Atlantic Ocean, Swakopmund, Namibia.  
 RUSI 63682, (5, A, from which 1, SB removed) females,

285-315 mm SL, Indian Ocean, Port Alfred, 40m depth, Eastern Cape Province.  
 RUSI 63683, (3, A) females, 230-238 mm SL, Indian Ocean, Kenton-on-Sea, Eastern Cape Province.

### *G. peruvianus*

AMNH 7939, (1, A/R) female, 222 mm SL, Pacific Peru, 1919, collected by R.C. Murphy.  
 AMNH 7963, (1, A) female (with ripe eggs), 345 mm SL, same data as AMNH 7939.  
 CAS 11942, (1, A/R) male, 250 mm SL, Bay of Callao (Lima), Peru, Dec. 1896-Jan. 1897, collected by L.A. Beardslee.  
 CAS 11962, (2, A/R) male 255 mm SL and female 285 mm SL, same data as for CAS 11942.  
 CAS 34326, (1, A) female, 310 mm SL, Bay of Callao (Lima), Peru, Nov. 1974, collected by F.B. Steiner.  
 CAS 47043, (1) male (DS only).  
 MCZ 7654, (1, A) female, 235 mm SL, Bay of Callao (Lima), Peru, May 1872, collected by Hassler expedition.  
 MCZ 7692, (1, A) 235 mm SL, same data as MCZ 7654.  
 RUSI 60955, (5, A from which: 2, SB and O removed; 1, C&S and O removed) 86-230 mm SL, Bay of Callao (Lima), Peru, March 1995, collected by Walter Elliott.  
 USNM 077693, (1, A/R) male, 285 mm SL, Bay of Callao (Lima), Peru, July 1916, collected by R.E. Coker.  
 USNM 083138, (1, A/R) female, 220 mm SL, Pacific Peru, Feb. 1919, collected by Wilkes expedition.

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