Identification of *Ambassis* species (Pisces : Perciformes, Ambassidae) from South Africa

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The taxonomy of the genus *Ambassis* from South Africa was revised and an identification key, using external features of their cranial osteology was constructed. Whereas previous authors list four species, this study shows that *Ambassis commersoni* is absent and only *Ambassis productus, A. natalensis* and *A. gymnocephalus* occur in South African waters. The three species are redescribed. Diagnostic features of *Ambassis* otoliths and their use as an aid to species identification are described.

Die taksonomie van die genus *Ambsssis* van af Suid-Afrika word hersien en 'n identifikasiesleutel is opgestel deur gebruik te maak van die eksterne kenmerke van hul skedelbene. Terwyl vorige skrywers vier spesies aanteken, toon hierdie studie dat *Ambassis commersoni* afwesig is en slegs *Ambassis productus, A. natalensis,* en *A. gymnocephalus* kom in Suid Afrikaanse waters voor. Die drie spesies word herbeskryf. Diagnostiese kenmerke van *Ambassis*-otoliete en hul gebruik as 'n hulpmiddel om spesies te identifiseer word beskryf.

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Introduction

Ambassid fishes, commonly known as glassy perchlets, glassfish or glassies, are common and widespread throughout shallow waters of the Indo-Pacific region. The family comprises at least 40 species of small fishes; some species are found in the sea or estuaries, but others are known only from freshwater habitats (Smith 1961; Munro 1967; Allen 1982).

During the course of a study of the biology of the *Ambassis* species occurring in Natal estuaries (Martin 1983), the senior author found that, although he could distinguish three species in his material, the key given by Smith (1961) was inadequate for the identification of these species. Misidentification of species owing to inadequate keys, poor descriptions, and nomenclatural errors, has caused a great deal of confusion in the taxonomy of the Ambassidae. There is no recent agreement on the family in which the genus *Ambassis* should be placed. Munro (1955) and J.L.B. Smith (1961) included *Ambassis* in the family Ambassidae, while Greenwood, Rosen, Weitzman & Meyers (1966), Smith (1975) and Nelson (1976) included *Ambassis* in the Centropomidae, whereas Munro (1967) recognized the Latidae and Chandidae (= Ambassidae) as separate families. Greenwood (1976) restricted the family Centropomidae to the genera *Centropomus, Psammoperca* and *Lates,* but he was undecided about whether Ambassidae or Chandidae should be used for the family comprising *Ambassis, Chanda* and related genera. The family name Ambassidae (derived from Ambassoidei of Klunzinger, 1870) seems to have priority over Chandidae, which appears to have been first used by Fowler and Bean (1930).

Fraser-Brunner (1954) reviewed the Chandinae, which he recognized as a subfamily of the Centropomidae, and removed some of the difficulties in the identification of genera and species. The following eight genera comprising some 39 species were considered valid by Fraser-Brunner (1954): *Ambassis, Chanda, Denariusa, Gymnochanda, Hamiltonia, Synechopterus, Tetracentrum,* and *Velambassis.* In Opinion 1121 of the International Commission on Zoological Nomenclature (*Bull. Zool. Nomen.,* 35(4): 222), the species *Chanda nama* Hamilton-Buchanan, 1822 was designated as the type-species of *Chanda,* and the genus *Hamiltonia* was placed on the Official Index of Rejected and Invalid Generic Names in Zoology. Two other genera, *Xenambassis* Schultz, 1945 and *Parambassis* Bleeker, 1874, were recognized by Munro (1967).

In view of the uncertainty in *Ambassis* classification, this paper seeks to clarify the status of the family Ambassidae occurring in South African waters and to provide an unambiguous key for identifying each species.

Materials and methods

Specimens were collected over a three-year period from sixteen estuaries on the Natal, Transkei and eastern Cape coasts (Table 1).

Cranial osteology as an aid to species identification

A sample of 250 preserved specimens collected at the beginning of the project was compared with the Ambassidae collection at the J.L.B. Smith Institute of Ichthyology (Grahamstown).

The presence and number of exposed spines on cranial

Table 1 Collecting localities and numbers of specimens studied. Ap = *Ambassis productus*, An = *A. natalensis*, Ag = *A. gymnocephalus*; *n* = number of specimens studied; SL = standard length

Estuary	Species	*n*	Size range (mm SL)
Kosi	Ap	985	15–134
(26°47'S / 32°47'E)	An	1076	9– 97
St Lucia	Ap	234	23–123
(28°23'S / 32°26'E)	An	556	17– 89
	Ag	2864	18– 63
Mlalazi	Ap	9	47– 78
(28°58'S / 31°48'E)	An	263	29– 59
	Ag	3020	25– 56
Tongati	Ap	128	48– 87
(29°40'S / 31°06'E)	An	67	47– 55
Mdloti	Ap	387	41–109
(29°41'S / 31°06'E)	An	324	34– 67
Durban Bay	An	446	21– 59
(29°51'S / 31°00'E)	Ag	4486	18– 69
Fafa	Ap	37	71–143
(30°21'S / 30°39'E)			
Mtamvuna	Ap	36	56–115
(31°04'S / 30°12'E)			
Mzamba	An	22	21– 47
(31°05'S / 30°10'E)			
Mntafufu	Ag	44	19– 39
(31°33'S / 29°38'E)			
Mgazana	An	42	23– 48
(31°42'S / 29°25'E)	Ag	29	28– 43
Mdumbe	Ag	21	34– 42
(31°56'S / 29°11'E)			
Mtata mouth	Ap	17	27– 59
(31°57'S / 29°11'E)	An	27	37– 43
	Ag	54	29– 47
Bashee	An	36	33– 54
(32°16'S / 28°54'E)	Ag	33	19– 33
Sundays	Ag	12	12– 29
(33°42'S / 25°51'E)			
Swartkops	An	7	16– 25
(33°51'S / 25°38'E)			

bones (Figure 1) together with predorsal scale counts and tooth distribution were noted and used to determine meristic variation between specimens. Specimens were then grouped into species, each species was described and a key to the species constructed.

The presence or absence of spines on certain bones of the head (Figure 1) has been used by previous authors (Fraser-Brunner 1945; Munro 1955, 1967) to distinguish species. Although this is a useful character, one must be aware of intraspecific variation in the development and number of these spines.

Otoliths as an aid to species identification

Sagittal otoliths were removed from 30 fresh specimens of each species and stored in alcohol. Species specific characters of otoliths were identified (Table 2) and used to provide further diagnostic features for aiding species identification, particularly in cases where specimens were small or were obtained from stomach contents of piscivores.

Teleost otoliths are structures of the nervous system and their morphology is known to be species specific. In recent years they have gained importance as taxonomic aids. Of the three otoliths on either side of the neurocranium in teleosts, the sagitta is the best developed, except in the Cypriniformes and Siluriformes where the largest otoliths are the astericus and lapillus respectively (Hecht 1977). The sagitta is used for taxonomic purposes in all other teleost groups because it shows more recurring features for comparative description than either the lapillus or astericus (Hecht 1979). In this account 'otolith' refers only to the sagitta. Otoliths are also used to identify fish remains in the stomach contents of piscivores (Whitfield 1977) and to estimate prey size (Cyrus 1980).

Results

Of the 15 262 specimens inspected from 16 estuaries (Table 1) three species of *Ambassis* were identified using the key developed by the authors (Heemstra & Martin 1986) given below.

Key to the species of *Ambassis* from South Africa

1a Lateral line interrupted; predorsal scales 13–16; preorbital bone with exposed, posteriorly directed rostral spine below anterior nostril ..... *A. gymnocephalus*

1b Lateral line more or less continuous; no exposed rostral spine 2

2a Hind margin of preopercle serrate; 2 or 3 rows of cheek scales 3

2b Hind margin of preopercle entire; 1 row of cheek scales; 1 or 2 supraorbital spines; 8–10 predorsal scales; preopercle ridge serrate ..... *A. commersoni* Cuvier, 1828 (Seychelles, may occur in South African waters)

3a Preopercle ridge smooth except for 2–4 spines posteriorly; predorsal scales 9–11; band of villiform teeth on vomer and palatines..... *A. natalensis*

3b Preopercle ridge completely serrate; predorsal scales 14–18; one row of minute teeth on vomer and palatines ..... *A. productus*

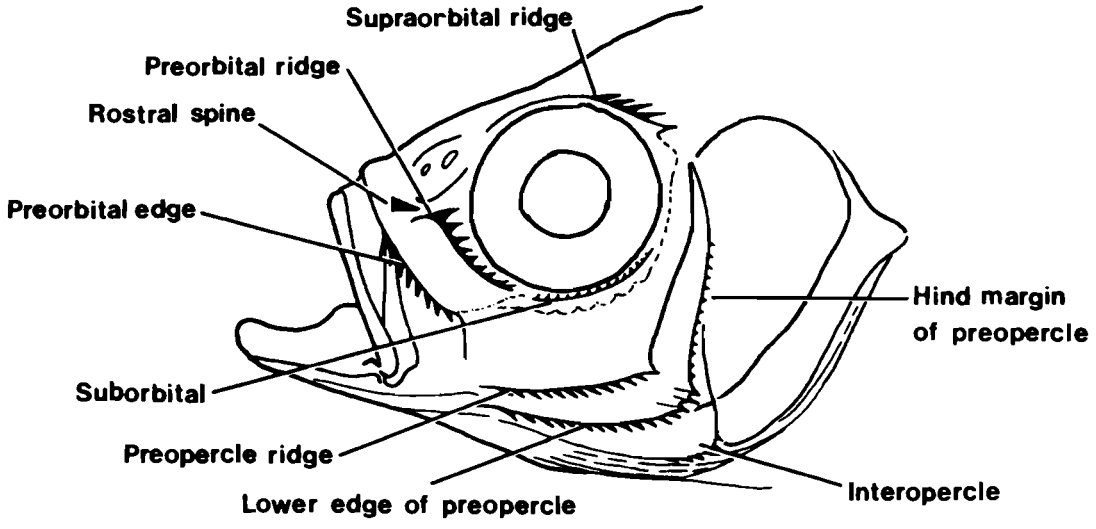

Figure 1 Head of Ambassidae showing ridges and edges of bones where spines of taxonomic importance occur (after Fraser-Brunner, 1956).

Table 2 Diagnostic features of *Ambassis* otoliths

Sagittal feature	*A. productus*	*A. natalensis*	*A. gymnocephalus*
Rostrum	prominent	prominent	reduced
Superior cristae	prominently ridged	ridged	slightly ridged
Excisura ostii	well defined	moderate	reduced
Dorsal margin	denticulate to lobed	slightly lobed	entire
Anterior margin	convex and lobed	almost straight & slightly lobed	straight to concave and entire
Posterior margin	denticulate	lobed	slightly lobed to entire
Ventral margin	completely serrate	serrate anteriorly	slightly lobed

Ambassis gymnocephalus (Lacepede, 1801) Figure 2

Lutianus gymnocephalus Lacepede, 1801: Pl. 23, Fig. 3, 1802: pp. 181, 216 (Indo-Pacific). *Ambassis gymnocephalus*: Smith, 1961 : 246; Hill, 1966: 22; Winterbottom, 1976: 62.

Dorsal fin VI-VII/I, 8–10; anal fin III, 8–10; pectoral fin 14–15; lateral line interrupted, with 27–29 scales; gill-rakers (8–10) + (22–25); 2 rows of cheek scales. Body depth 2,6–2,9, head length 2,7–2,9 in SL; eye diameter 3,1–3,4 in head length. Supraorbital spines 1–5 (usually 3 or 4); lower edge and angle of preopercle serrate; dorsal ⅔ of vertical preopercle edge smooth; preopercle ridge completely serrate along lower limb; a large retrorse spine on preorbital just below anterior nostril; preorbital ridge smooth or serrate; interopercle smooth except for 1 or (rarely) 2 small spines. A row of minute teeth on vomer, palatines and tongue. Attains 10 cm. Tropical waters of Indian Ocean, Indonesia and Philippines; extends south on the South African coast to at least Algoa Bay.

Ambassis natalensis Gilchrist and Thompson, 1908 Figure 3

Ambassis natalensis Gilchrist & Thompson, 1908: 148 (Durban Harbour); Wallace, 1975: 15; Blaber, 1978: 34, 40. *Ambassis sagfa:* Smith, 1961: 245; Hill, 1966: 23; Day, 1974: 95. ?*Ambassis urotaenia:* Smith, 1961: number 246.

Dorsal fin VII/I, 9–11; anal fin III, 9–11; pectoral fin 14–15; lateral line usually continuous, with 27–29 scales; predorsal scales 9–11; gill-rakers (8–9) + (19–22); 2 rows of cheek scales. Body depth 2,5–2,8, head length 2,8–3,0 in SL; eye diameter 3,1–3,6 in head length. Supraorbital spines 1–4; vertical and lower edge of preopercle serrate; propercle ridge smooth except for 2 to 4 spines posteriorly; preorbital ridge entire or serrate; interopercle with 1–4 tiny spines posteriorly. Band of villiform teeth on jaws, vomer and palatines. Attains 9 cm. Natal south to Algoa Bay; reported from East Africa by Fraser-Brunner (1954).

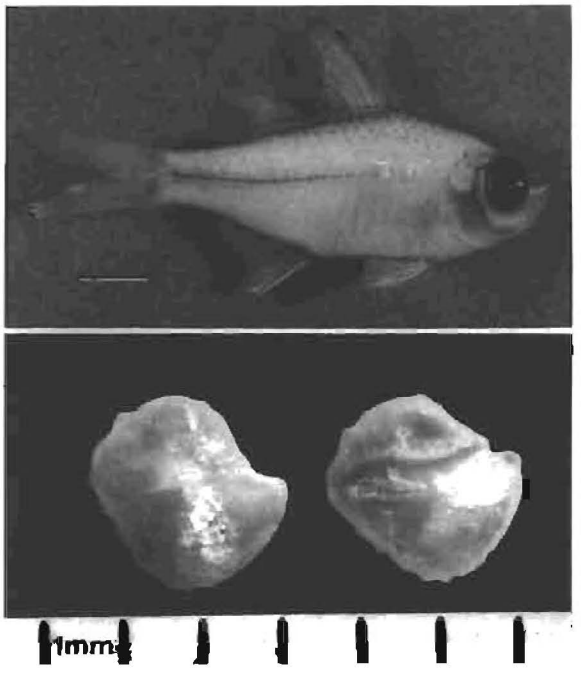

Figure 2 *Ambassis gymnocephalus* (scale bar = 10 mm) with left and right otoliths shown below.

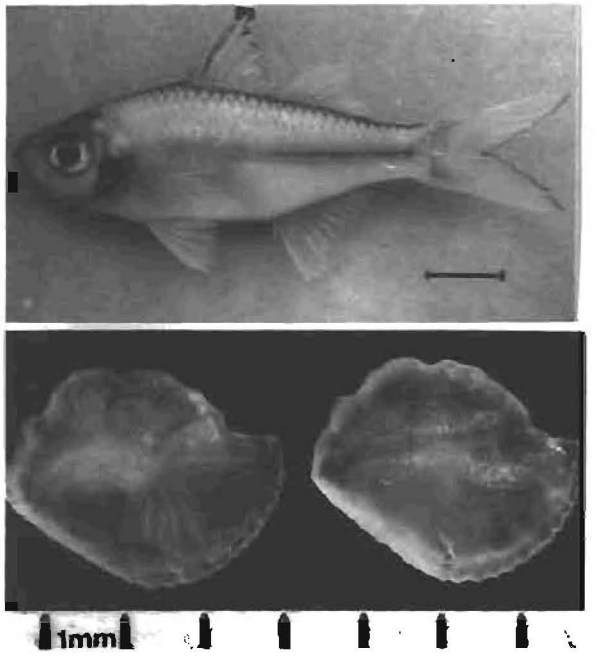

Figure 3 *Ambassis natalensis* (scale bar = 10 mm) with left and right otoliths shown below.

Ambassis productus Guichenot, 1866 Figure 4

Ambassis productus Guichenot, 1866: 130 (Madagascar). *Ambassis commersoni (non* Cuvier): Smith, 1961: 245, Hill, 1966: 22, Wallace, 1975; Day, 1974: 95; Blaber, 1978: 34, 40.

Dorsal fin VII/I, 9–10; anal fin III, 9–11; pectoral fin 14–15; lateral line usually continuous, with 28–29 scales; predorsal scales 14–18; 2 or 3 rows of cheek scales; gill-rakers (8–10) + (20–23). Body depth 2,3–2,8, head length 2,5–2,6 in SL; eye diameter 3,1–3,7 in head length. Supraorbital with one spine; vertical and lower edges of preopercle serrate; preopercle ridge serrate; preorbital and suborbital ridges serrate or entire; interopercle with 3–7 serrae. Band of minute teeth in upper jaw, 2 rows in lower jaw, 1 row on palatines, and a discontinuous series on vomer.

Attains 15 cm. Madagascar and east African coast to at least Umtata River.

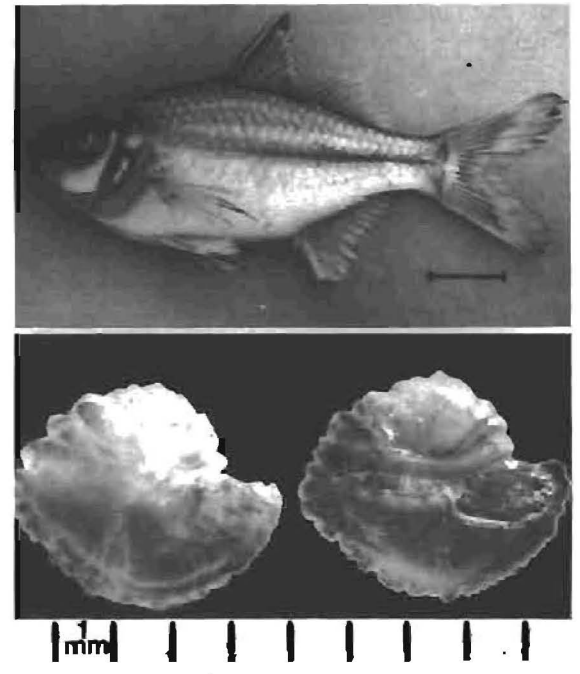

Figure 4 *Ambassis productus* (scale bar = 20 mm) with left and right otoliths shown below.

Morphology of *Ambassis* otoliths

The close relationships between the three *Ambassis* species treated here is emphasized by the similarity of several specific and usually diagnostic, features of their otoliths. Superficially the three species all have similar, diamond-shaped otoliths with a prominent sulcus acusticus. The ostium is large and oval while the cauda is comparatively narrow (Figure 5). In addition the colliculum is divided into anterior and posterior sections.

Species specific characters are present at an early age in *Ambassis* otoliths, and with practice are recognizable in post larvae of 16 mm standard length. It is only in the adult fish, however, that interspecific differences in otoliths are obvious.

From the schematic drawing of an *Ambassis* sagitta (Figure 5) and the features listed in Table 2, interspecific differences can be recognized in Figures 2, 3 and 4 for the three species. Several features of the otolith margins are diagnostic. Firstly, the otolith of *A. productus* (Figure 4) has distinctly denticulate dorsal and posterior margins. In contrast, the margins in *A. natalensis* (Figure 3) are lobed and in *A. gymnocephalus* (Figure 2)

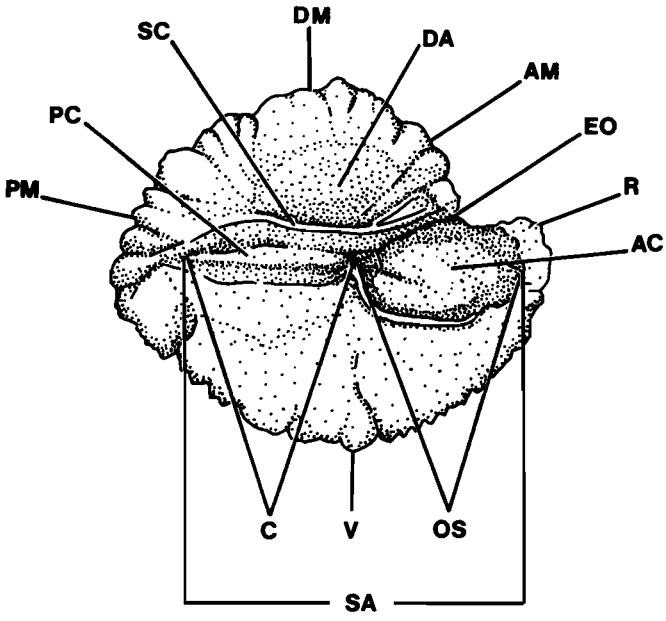

Figure 5 Schematic sagitta of *Ambassis* spp. illustrating the following features: AC, anterior colliculum; AM, anterior margin; C, cauda; DA, dorsal area; DM, dorsal margin; EO, excisura ostium; OS, ostium; PC, posterior colliculum; PM, posterior margin; SA, sulcus acusticus; SC, superior crista; V, ventral margin.

are almost entire. Secondly, the anterior margin of the otolith in *A. productus* is convex and lobed and curves down into a well-defined excisura ostii, whereas in *A. natalensis* it is almost straight. Finally, the ventral margin in *A. productus* is completely serrate, but only serrate anteriorly in *A. natalensis* and slightly lobed in *A. gymnocephalus*.

Discussion

J.L.B. Smith (1961) recognized four species of *Ambassis* from the coast of Natal: *A. commersoni* Cuvier, 1828; *A. gymnocephalus* (Lacepede, 1801); *A. sagfa* (Forsskal, 1775); and *A. urotaenia* Bleeker, 1852.

Ambassis commersoni was reported from the Seychelles by Fraser-Brunner (1954). We have not been able to find any specimens of this species from South African waters: it can be distinguished from the three species known from this area as indicated in the key. Fraser-Brunner (1954) regards *A. urotaenia* as a synonym of *A. commersoni*. The description and figure of '*Ambassis commersoni*' given by Smith (1961) are of *A. productus*.

We agree with Fraser-Brunner (1954: 212) that *Sciaena sagfa* Forsskal, 1775 is a *nomen dubium*. The type-specimen is lost, and the original description is not sufficiently comprehensive to determine which species of ambassid Forsskal had in his possession. *Ambassis natalensis* is the proper name for the species that was described as *Ambassis sagfa* by Smith (1961). The species *Ambassis urotaenia (non* Bleeker): Smith (1961) is also apparently *A. natalensis*.

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