

Ammodytoides xanthops, a new species of sandlance (Perciformes: Ammodytidae) from Mozambique

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ABSTRACT. The sandlance *Ammodytoides xanthops* is described as a new species from 19 specimens, 104–122 mm SL, collected by trawl off Mozambique from 26–62 m. It is distinct from the other species of the genus in the following combination of characters: dorsal rays 48 or 49; anal rays 23 or 24; pectoral rays 15 or 16; lateral-line scales 106–112; no small scales dorsally on opercle; vertebrae 57–59; body depth 10.0–11.7% SL; eye diameter 3.3–3.5% SL; a blackish posterior border on caudal fin, broader toward lobe tips; a series of 6 or 7 black spots at edge of dorsal fin; no black dots in fins; interorbital and most of head anterior to eye yellow in life.

KEYWORDS: Ammodytidae, *Ammodytoides*, new species, Mozambique

INTRODUCTION

The small slender fishes of the family Ammodytidae, popularly known as sandlances, feed in aggregations on zooplankton over open sand bottom. Adaptations for zooplankton feeding include a protrusible premaxilla, relatively short snout for close binocular vision, reduced to absent dentition, and long gill rakers. When threatened, they form compact schools that swim at remarkable speed. Their specializations for swift swimming include their streamlined elongate body, protective adipose eyelid, forked caudal fin, and low dorsal and anal fins that fit into a groove. Their eyes near the centre of the head enable them to view predators above and below. As a last resort to escape a predator, they dive into the sand, aided by their pointed projecting lower jaw and having their fins fold into grooves.

As scuba divers, we have known the frustration of trying to collect sandlances. The first author shot an explosive-tipped spear at the sand near a school, expecting the fish to be killed or stunned. The result was only an increase in speed. Later it was determined that sandlances lack a swim bladder (fishes with this gas-filled sac are vulnerable to an explosion).

The Ammodytidae consists of eight genera and 25 species (Ida et al. 1994; Collette & Randall 2000; Randall & Earle 2008). In addition to the characters mentioned above, they have small cycloid scales partly fused to form oblique scale rows, no spines in the fins, a long dorsal fin, relatively short anal fin, and no pelvic fins (except for one species with rudimentary pelvics).

The genus *Ammodytes* Linnaeus, from temperate

and cooler seas of the North Atlantic and North Pacific, contains six species. It was the largest genus, but recent discoveries of new species of *Ammodytoides* Duncker & Mohr from the Indo-Pacific region have made it the largest genus, with eight species.

Bean (1895) described the first species of *Ammodytoides* as *Bleekeria gilli* from an unknown locality in the Pacific Ocean. Collette & Robertson (2001) redescribed the species and determined its range from Baja California to Ecuador and Islas Galápagos. They also showed that *Ammodytes lucasanus* Beebe & Tee-Van 1938 is a junior synonym. McCulloch & Waite (1916) described the second species as *Bleekeria vaga* from a single specimen of unknown habitat from Lord Howe Island. Duncker & Mohr (1939) concluded that this species does not belong in *Bleekeria* and proposed the genus *Ammodytoides*, with *B. vaga* as the type species. Unaware of *Ammodytoides*, Smith (1957) named the third species *Bleekeria renniei* from the east coast of South Africa at Pekwini (33°25'S) from three specimens found on the beach after the onset of cold weather. Pietsch & Zabetian (1990) published an osteological study of the family Ammodytidae, featuring *Embolichthys mitsukurii* (Jordan & Evermann). Ida & Randall (1993) described *Ammodytoides kimurai* as a fourth species of the genus from six specimens collected in the Ogasawara Islands. The fifth, *A. pylei*, was described by Randall et al. (1994) from 10 specimens from the Hawaiian Islands; these authors also provided information on feeding and spawning. Ida et al. (1994) revised the generic classification of the family, adding two new genera and recognizing *Bleekeria* for three species, *B. kallelepis* Günther, *B. mitsukurii*, and *B. viridianguilla* Fowler.

Collette & Randall (2000) described *A. leptus* as a sixth species of the genus from 23 specimens taken at Pitcairn Island in the South Pacific. Collette in Carpenter & Niem (2001) followed Ida et al. (1994) in recognizing *Bleekeria* as distinct from *Ammodytoides* by the presence of teeth in the jaws and the continuous subocular sensory canal. Randall & Earle (2008) added two new species, *A. idai* from seven specimens collected in the D'Entrecasteaux Islands, Papua New Guinea, and *A. praematura* from one specimen from the Chagos Archipelago. We suspect that more species of these elusive fishes remain to be discovered.

The second author and Elaine Heemstra participated in a recent expedition in the western Indian Ocean aboard the R/V *Fridtjof Nansen*. On 16 October 2007 they collected a surprising 18 specimens of a species of *Ammodytoides* in one otter trawl haul in 26–28 m at hours 0715–0742 off the coast of Mozambique. The specimens are ripe males and females, the ova of the females fully hydrated. The Hawaiian *A. pyle* is known to commence spawning 1.5 hours before sunset. It might also spawn at the same light level in early morning. Ordinarily, we would expect species of this genus to escape an advancing trawl by either speed or taking refuge in sand. While spawning, however, they swim higher in the water column and would be more vulnerable to capture by trawl. On 19 October an additional specimen was collected by trawling in 62 m. We describe this species here, following a key to the species of *Ammodytoides*.

MATERIALS AND METHODS

Type specimens are deposited in the Australian Museum, Sydney (AMS); Bernice P. Bishop Museum, Honolulu (BPBM); California Academy of Sciences, San Francisco (CAS); Muséum National d'Histoire Naturelle, Paris (MNHN); National Museum of Nature and Science, Tokyo (NSMT); Royal Ontario Museum, Toronto (ROM); South African Institute for Aquatic Biodiversity, Grahamstown (SAIAB); and the National Museum of Natural History, Washington, D.C. (USNM).

Lengths recorded for specimens are standard length (SL), measured from the front of the upper lip in the median plane to the midbase of the caudal fin (end of hypural plate). Body depth is the maximum depth from the base of the dorsal fin to the ventralmost edge of the abdomen, and body width is the greatest width. Head length (HL) is taken from the front of the upper lip to the posterior end of the opercular membrane. Orbit diameter is the maximum fleshy diameter (measured to edges of the adipose eyelid), and interorbital width is the least fleshy width. Caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear end of the anal fin and the caudal-fin base. Lengths of dorsal and anal rays are measured from tip to the body contour (not to their bases within the groove into which the fins fold).

Caudal-fin length is measured horizontally from the caudal-fin base to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the longest and shortest caudal rays.

Gill-raker counts were made on the first gill arch and include rudiments; the raker at the angle is contained in the lower-limb count. Vertebral counts include the hypural.

Data in parentheses in the description of the new species refer to paratypes. Proportional measurements in the text are ratios with the standard length, body depth, and head length, rounded to the nearest 0.05.

KEY TO THE SPECIES OF *AMMODYTOIDES*

- 1a Dorsal rays 48–53; lateral-line scales 104–118..... 2
- 1b. Dorsal rays 44–48; lateral-line scales 85–107..... 7
- 2a. Body very slender, the depth 8.6–9.5% SL; vertebrae 61–63; dorsal rays 50–53; no dark markings on fins (Pitcairn Island) *leptus*
- 2b. Body less slender, the depth 9.5–11.7% SL; vertebrae 56–61; dorsal rays 48–51; dark markings on fins present or absent 3
- 3a. No small scales dorsally on opercle 4
- 3b. Two to four small scales dorsally on opercle (may be embedded) 5
- 4a. Eye diameter 2.8–3.3% SL; a broad blackish zone at base and middle of each caudal lobe; vertebrae 59–61; lateral-line scales 104–109 (Ogasawara Islands) *kimurui*
- 4b. Eye diameter 3.3–3.5% SL; a broad blackish zone on outer third to half of each caudal-fin lobe; vertebrae 57–59; lateral-line scales 106–112 (Mozambique) *xanthops*, new species
- 5a. A curved blackish submarginal bar across each caudal-fin lobe; numerous black dots in dorsal and anal fins; vertebrae 56–58 (southeastern Africa) *renniei*
- 5b. No blackish submarginal bar across each caudal lobe (caudal lobe tips may be broadly blackish); no black dots in dorsal and anal fins; vertebrae 58–60 6
- 6b. Lateral-line scales 109–116; vertebrae 59–60; pectoral-fin length 8.4–9.2% SL; interorbital width 3.5–4.1% SL; a row of prominent blackish spots at edge of dorsal fin, and caudal fin with a broad dusky posterior margin (Hawaiian Islands)..... *pylei*
- 6b. Lateral-line scales 107; vertebrae 58; pectoral-fin

- length 10.0% SL; interorbital width 4.3% SL; no dark markings in fins (one specimen, Lord Howe Island) *vagus*
- 7a. Head length 25.4–27.8% SL; predorsal length 25.1–26.9% SL; pectoral-fin length 9.9–11.1% SL; lateral-line scales 85–98; no small scales dorsally on opercle (Baja California to Ecuador and Islas Galápagos) *gilli*
- 7b. Head length 23.9–25.3% SL; predorsal length 23.2–25.3% SL; pectoral-fin length 9.0–9.6% SL; lateral-line scales 103–107; two to four small scales dorsally on opercle 8
- 8a. A row of about 10 black spots at margin of dorsal fin except posteriorly; caudal fin with a dusky posterior margin that broadens toward lobe tips, at least in males; body width 8.0–8.8% SL; longest dorsal ray 5.2–5.6% SL; longest anal ray 5.9–6.7% SL (Papua New Guinea) *idai*
- 8b. No black spots at margin of dorsal fin; caudal fin with a curved blackish bar across each lobe; body width 6.9% SL; longest dorsal ray 6.9% SL; longest anal ray 8.2% SL (one 61-mm specimen, Chagos Archipelago) *praematura*



Fig. 1. Holotype of *Ammodytoides xanthops*, SAIAB 80762, 120 mm SL, Mozambique (photo by P.C. Heemstra).

Ammodytoides xanthops, sp. nov.

Fig. 1; Table 1

Holotype. SAIAB 80762, male, 120 mm SL, Mozambique, 20°33.3'S, 35°47.6'E–20°34.8'S, 35°47.6'E, 62 m, otter trawl, R/V *Fridtjof Nansen* Station 75, 19 October 2007.

Paratypes. AMS I.44650-001, 121 mm; BPBM 40904, 4: 106–122 mm; CAS 227043, 114 mm; MNHN 2008-1232, 110 mm; NSMT- P 91026, 118 mm; ROM 83933, 112 mm; SAIAB 80761, 7: 104–122 mm; USNM 393562, 2: 107–121 mm, all from Mozambique, 22°34.0'S, 35°34.0'E–22°35.4'S, 35°34.1'E, 26–28 m, otter trawl, R/V *Fridtjof Nansen* Station 62, 16 October 2007.

DIAGNOSIS. Dorsal rays 48 or 49; anal rays 23 or 24; pectoral rays 15 or 16 (usually 15); lateral-line scales 106–112; no small scales dorsally on opercle; gill rakers 5–6 + 22–25; vertebrae 57–59; body depth 10.0–11.7% SL; eye diameter 3.3–3.5% SL; colour when fresh dark purplish gray dorsally, pale silvery blue on sides and ventrally; interorbital and most of head anterior to eye yellow; front of snout and tip of lower jaw dusky; a series of six or seven black spots at edge of dorsal fin; no black dots in fins; caudal fin with a broad blackish posterior border; largest specimen, 122 mm SL.

DESCRIPTION. Dorsal rays 48 (48 or 49), the first two rays unbranched; anal rays 23 (23 or 24), the first three rays unbranched; pectoral rays 16 (15 or 16), the upper two and lowermost rays unbranched; no pelvic fins; principal caudal rays 15, the middle 13 branched; upper and lower procurrent caudal rays about 15, the

posterior three segmented; lateral line incomplete, the tubed scales 109 (106–112) + 4 (3–6) pored (non-tubed) scales to caudal-fin base; predorsal scales 11; gill rakers 6 + 24 (5 or 6 + 22–25); branchiostegal rays 7; vertebrae 58 (57–59); predorsal vertebrae 6; postdorsal vertebrae 10; vertebrae posterior to anal fin 8; first two dorsal pterygiophores in space between fourth and fifth neural spines; third dorsal pterygiophore in following space, next two pterygiophores in space between fifth and sixth neural spines, and remaining pterygiophores single in a space.

Body depth 10.0 (8.5–9.6) in SL; body width 1.45 (1.2–1.5) in body depth; head pointed, its length 4.25 (4.15–4.3) in SL; snout length 3.25 (3.2–3.45) in HL; eye diameter (maximum to edges of adipose eyelid) 7.15 (6.85–7.2) in HL; interorbital width 5.85 (5.65–5.9) in HL; caudal-peduncle depth 5.0 (4.95–5.4) in HL; caudal-peduncle length 2.3 (2.2–2.4) in HL.

Lower jaw strongly projecting, sharply pointed, ending in a cartilaginous knob; maxilla narrowing posteriorly, reaching slightly posterior to a vertical at anterior edge of eye, the upper-jaw length 2.8 (2.8–3.1) in head length; premaxilla protrusible; mouth slightly oblique, forming an angle of about 15° to horizontal axis of body; no teeth in jaws or on palate.

Gill opening broad, the dorsal end at level of upper edge of eye, the anterior end reaching a vertical through centre of eye. Gill membranes not attached to isthmus. Gill rakers slender, the longest as long as gill filaments.

Nostrils small, dorsally on snout, the anterior a narrow, oblique aperture with a slight dorsoposterior rim, midway between a vertical at fleshy edge of orbit

and tip of lower jaw; posterior nostril smaller, less oblique, without a rim, and nearly directly behind anterior nostril; internarial distance and distance between posterior nostrils equal to pupil diameter. Cephalic sensory canals and pores essentially the same as illustrated for *Ammodytoides kimurai* Ida & Randall (1993: fig. 2) and *A. pylei* Randall, Ida & Earle (1994: fig. 2 A); subocular canal interrupted below eye.

No spine on opercle; margins of opercular bones smooth; opercular flap extending to or slightly posterior to a vertical at base of lower pectoral-fin rays.

Scales on body small, thin, cycloid, and joined in straight oblique rows with only posterior margin free (except above lateral line where upper and lower edges of scales more evident); head naked; scales dorsally on nape extending slightly anterior to a vertical at upper free end of preopercle; tubed scales of lateral line ascending from upper end of gill opening to within a pupil diameter of origin of dorsal fin, passing posteriorly parallel to dorsal contour of body, and

ending on caudal peduncle three to six scale rows before base of caudal fin (these posterior scales with a few tiny pores); fins naked except for a sheath of specialized scales extending out on caudal rays about three-fourths length of fin.

Origin of dorsal fin above twelfth lateral-line scale, the predorsal length 4.15 (4.1–4.4) in SL; first dorsal ray short, 6.9 (5.95–8.0) in HL; longest dorsal ray (sixth-from-last in holotype) 4.15 (4.0–4.4) in HL; first anal ray short, slender, and closely spaced to second ray 9.4 (6.6–9.45) in HL; third or fourth anal ray longest, 3.55 (3.3–3.7) in HL; caudal fin forked, 1.9 (1.85–2.0) in HL; caudal concavity 3.9 (3.7–4.0) in HL; pectoral fins short and pointed, the third or fourth ray longest, 2.45 (2.4–2.55) in HL.

Colour of holotype in alcohol: light grayish brown, paler ventrally; head anterior to posterior edge of preopercle translucent grey, the light brown brain visible; dorsal half of snout from posterior nostrils forward blackish, as well as tip of lower jaw; fins

Table 1. Proportional measurements of type specimens of *Ammodytoides xanthops* as percentages of the standard length.

Table 1

| | <i>Holotype</i> | | | | <i>Paratypes</i> | | | |
|------------------------|-----------------|----------------|----------------|----------------|------------------|----------------|----------------|----------------|
| | SAIAB 80762 | SAIAB 80761 | SAIAB 80761 | SAIAB 80761 | SAIAB 80761 | SAIAB 80761 | SAIAB 80761 | SAIAB 80761 |
| Standard length (mm) | 120 | 104 | 106 | 109 | 113 | 117 | 120 | |
| Sex | male | male | female | female | male | female | male | |
| Body depth | 10.0 | 10.4 | 11.3 | 10.5 | 11.5 | 11.7 | 11.6 | |
| Body width | 6.9 | 8.5 | 8.5 | 8.4 | 8.0 | 8.5 | 8.5 | |
| Head length | 23.5 | 23.7 | 24.0 | 24.2 | 23.2 | 23.7 | 23.3 | |
| Snout length | 7.2 | 7.2 | 7.1 | 7.0 | 7.2 | 7.3 | 7.1 | |
| Orbit diameter | 3.3 | 3.5 | 3.5 | 3.4 | 3.3 | 3.3 | 3.3 | |
| Interorbital width | 4.4 | 4.0 | 4.1 | 3.9 | 4.1 | 4.2 | 4.1 | |
| Upper-jaw length | 8.5 | 7.8 | 7.9 | 7.8 | 7.9 | 8.4 | 8.1 | |
| Caudal-peduncle depth | 4.7 | 4.8 | 4.7 | 4.5 | 4.6 | 4.4 | 4.6 | |
| Caudal-peduncle length | 10.1 | 10.7 | 9.9 | 10.4 | 10.5 | 10.0 | 10.5 | |
| Predorsal length | 24.0 | 24.1 | 24.3 | 23.0 | 22.9 | 24.4 | 22.7 | |
| Preanal length | 66.0 | 64.2 | 66.1 | 64.5 | 66.3 | 65.5 | 64.3 | |
| First dorsal-fin ray | 3.4 | 4.0 | 3.9 | 2.9 | 2.9 | 3.3 | 3.4 | |
| Longest dorsal-fin ray | 5.7 | 5.4 | 5.6 | 5.5 | 5.5 | 5.8 | 5.8 | |
| First anal-fin ray | 2.5 | 2.9 | 2.8 | 3.5 | 3.5 | 3.7 | 3.2 | |
| Longest anal-fin ray | 6.6 | 6.7 | 6.6 | 6.5 | 7.0 | 6.5 | 6.6 | |
| Caudal-fin length | 12.3 | 12.2 | 12.5 | 12.3 | 12.1 | 12.1 | 11.6 | |

translucent grey, with a prominent black spot distally between dorsal rays 2–4, 7–8, 12–14, 18–19, 24–24 and 27–28; caudal fin with a broad blackish posterior margin except principal and median rays, the dark pigment on distal half of outer rays, and one-third of inner rays. Colour when fresh as in Fig. 1

ETYMOLOGY. This species is named *Ammodytoides xanthops* from the Greek *xanthos* for yellow and *ops* for face, in reference to the dominant yellow colour of the head dorsally and anterior to the eye.

REMARKS. The holotype is a mature male. It was the only specimen caught by the trawl haul of 19 October 2007. No colour photograph or colour note was made of the 19 specimens that were collected in the trawl haul of 16 October. As mentioned, these 19 fish are fully ripe males and females and may have been reproductively active at the time of capture. Randall et al. (1994: 86–87) described the spawning of *Ammodytoides pylei*. The head of some, if not all of the fish, was yellow at this time. The colour of the female holotype of *P. pylei* was described as follows: “dorsal part of head and nape yellow with dusky markings.” The yellow colouration is much more extensive on the head of *A. xanthops*.

Ammodytoides xanthops is clearly distinct from the two other species of the genus known for the western Indian Ocean, *A. renniei* (Smith) from the east coast of Africa south of 33°S, and *A. praematura* Randall & Earle, described from one specimen from the Chagos Archipelago. It has fewer dorsal rays and more lateral-line scales than *A. renniei*, and more pectoral rays and lateral-line scales than *A. praematura*, along with colour differences from both. It is most similar to *A. idai* Randall & Earle from Papua New Guinea, *A. kimurai* Ida & Randall from the Ogasawara Islands, and *A. pylei* Randall, Ida & Earle from the Hawaiian Islands, all of which share a series of black spots at the margin of the dorsal fin, a broad blackish zone in the caudal fin, and essentially the same fin-ray and lateral-line scale counts. *Ammodytoides idai* and *A. pylei* have small scales dorsally on the opercle, which are lacking in *A. kimurai* and *A. xanthops*. As shown in the key, *A. xanthops* is differentiated from *A. kimurai* by having a larger eye, modally 58 compared to 60 vertebrae, and the blackish pigment in the outer part of the caudal fin.

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