

NEW RECORDS OF *ALDROVANDIA OLEOSA* (NOTACANTHIFORMES: HALOSAURIDAE) FROM THE EASTERN NORTH PACIFIC OCEAN

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The teleost family Halosauridae includes seventeen species in three genera distributed throughout the oceans of the world. The elongate body is covered with large scales and ends in a strongly tapered tail. The small dorsal fin originates close to the pointed head, which is largely scaleless; the slender pectoral fins and the anal fin are long; and, the mouth is large with the upper jaw extending beyond the lower jaw.

The genus *Aldrovandia* currently includes at least five species, and is diagnosed within the family by the lack of scales on the vertex of the head, the lack of a distinct row of lateral-line scales, and by the heavily pigmented pyloric caeca aligned in a single row (McDowell 1973, Sulak 1977). Species of *Aldrovandia* are diagnosed by the coloration of the anal opening, morphometrics, meristics, and by the size and relative position of the palatine and pterygoid tooth patches. Members of this genus tend to be widespread, and at least three species (*A. oleosa*, *A. affinis*, and *A. phalacra*) are known from both the Atlantic and Pacific basins.

Aldrovandia oleosa was described from 26 specimens taken from the Tongue-of-the-Ocean, a deep trench in the Bahamas. This species has a trans-Atlantic distribution, occurring in the western Atlantic from Canada to Venezuela and Guyana and in the eastern tropical Atlantic in the Gulf of Guinea (Sulak 1977). It has been recorded from Saya-de-Malaya Bank and the East Indian Range in the Indian Ocean (Filatova 1985) as well as the eastern central Pacific and waters off of Chile (Froese and Sampang 2004). Historical records of specimens matching Sulak's (1977) description of *A. oleosa* within this range were attributed to the closely related *A. phalacra* (McDowell, 1973).

Since 1998, scientists from the National Marine Fisheries Service's Northwest Fisheries Science Center (NWFSC), Fisheries Resource Analysis and Monitoring Division (FRAM), along with the West Coast commercial fishing industry have conducted an annual

cooperative trawl survey between May and October to assess fisheries resources in the eastern North Pacific Ocean. The survey area extends from Cape Flattery, Washington (48.3°N), to the U.S.-Mexico Border (32.6°N) in depths of 50-1250 m. During the 2007 survey a specimen of *Aldrovandia oleosa* was captured in a deep trawl off southern California. The only specimens of *Aldrovandia* previously reported from this region were listed by Love et al. (2005) as “Unidentified *Aldrovandia*,” and were collected off the coast of northern British Columbia in 2004. This report summarizes the morphological details of the specimen recently collected off California as well as the specimens from British Columbia. For all specimens examined, measurements were recorded to the nearest 0.1 mm using dial calipers. Snout-vent length (S-V) is used throughout. Fin-ray counts were made with the aid of digital radiographs, and do not include the short spine at the origin of the dorsal fin or the fulcral spines in the pectoral and pelvic fins.

The most recent specimen (UW 117961) was collected on 18 July 2007 aboard the *F/V MS. JULIE* using a non-closing “Aberdeen” style bottom trawl with a small-mesh codend liner (1.5-in or less stretched measure) deployed just north of the U.S. - Mexico border (32.7 N, 118.2 W). The tow duration was approximately 15 minutes, had an average depth of 1080 m, and an average bottom temperature of 3.8 C. The specimen, frozen at sea, was later transferred to 70% ethanol, and deposited in the University of Washington (UW) fish collection. Two other specimens of *A. oleosa*, Royal British Columbia Museum (RBCM) 004-00067-006 and RBCM 004-00076-009, were collected in separate tows in the Queen Charlotte Islands by the Canadian Coast Guard Ship (CCGS) *W. E. Ricker* in September 2004. All three specimens were collected at depths ranging from 819-2014 m, which closely matches the depth range (1184–1910 m) reported for this species by Sulak (1977).

All three specimens, UW 117961, RBCM 004-00067-006, and RBCM 004-00076-009, are in fair condition. The filamentous end of the tail is broken off of UW 117961. RBCM 004-00067-006 has been eviscerated and much of the skin and body musculature are torn. The scales have been stripped from all three specimens. Although many of the scale pockets are still visible, lateral-line scales are not visible in any of the specimens, nor are scales or scale pockets visible on the vertex of the head. The head is darkly pigmented (Figure 1), while the



Figure 1. *Aldrovandia oleosa* (UW 117961, 160 mm S-V) collected off southern California July 18, 2007. Photograph by Victor Simon (NWFSC FRAM).

body is medium brown in color and the fins are lightly pigmented. The anal opening is white, surrounded by a ring of darkly pigmented tissue, and the stomach, pyloric caeca, and peritoneum are black. The preoral portion of the snout is short, approximately one-third the total snout length. In two specimens (UW 117961 and RBCM 004-00067-006) the anterior nostril opens through a darkly pigmented tube, indicating that these specimens are males. In the third specimen (RBCM 004-00076-009), a female with clearly visible eggs, the anterior nostril tube is unpigmented. The palatine tooth patches are small and somewhat triangular in the two male specimens, and even smaller and nearly oval in the female (Figure 2). The pterygoid tooth patches are long and narrow in all three specimens, with teeth situated in

two or three irregular rows. The right and left palatine tooth patches are separated by a distance 0.8 – 4.4 times palatine length, and the palatine and pterygoid tooth patches are separated by a distance 1.2 – 4.3 times palatine length.

These specimens are identified as members of the genus *Aldrovandia* by the lack of scales on the head and by having an indistinct lateral line. Within the genus *Aldrovandia*, only three species (*A. affinis*, *A. phalacra*, and *A. oleosa*) are known to have a white anal opening surrounded by a dark field (Figure 3). Within this group, *Aldrovandia oleosa* is the only species with the palatine tooth patches well separated medially and the palatine tooth patch widely separated from the pterygoid tooth patch. In addition, *A. oleosa* has fewer pectoral-fin rays (9 – 11) than *A. phalacra* (11 – 13) and more gill rakers (19 – 23) than *A. affinis* (13 – 15), and is generally more darkly pigmented than either of these congeners. Meristics and morphometrics of the specimens examined for this study (Table 1) generally fall within the ranges presented for *A. oleosa* by Sulak (1977) and Filatova (1985), with the exception of preoral snout length, which is slightly shorter in one specimen (UW 117961) than in those previously reported.

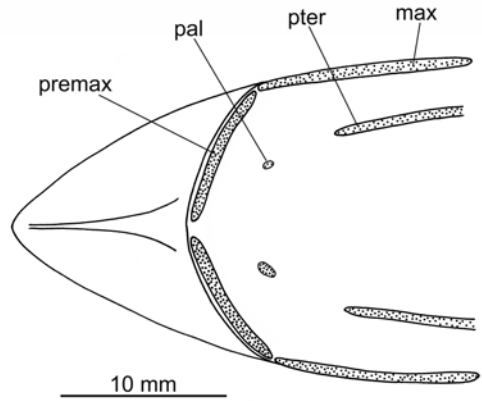


Figure 2. Dentition of the upper jaws and palate of *Aldrovandia oleosa* (RBCM 004-00076-009, 180 mm S-V) collected off the Queen Charlotte Islands, September 10, 2004. Premax = premaxilla; pal = palatine; pter = pterygoid; max = maxilla.



Figure 3. Three species of *Aldrovandia* with a white anal opening surrounded by a dark field (top to bottom): *Aldrovandia affinis* (CAS-SU 25245, 156 mm S-V), *Aldrovandia phalacra* (CAS-SU 9449, 147 mm S-V), and *Aldrovandia oleosa* (UW 117961, 160 mm S-V). Photograph by Duane E. Stevenson.

These records extend the known range of *A. oleosa* into the eastern North Pacific, more than 11,000 km from the closest previously reported record in the western Central Pacific (Parin 1990). To date, *A. oleosa* is the only halosaur known from this region, although *A. affinis* is known from the western North Pacific (Fujita and Kamei 1984) and *A. phalacra* is known from the central tropical Pacific (Sulak 1977).

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MATERIAL EXAMINED

- Aldrovandia affinis*. — California Academy of Sciences (CAS) SU 23198, 1, 138 mm S-V, western North Pacific, off Japan. CAS SU 23199, 3, 150–170 mm S-V, western North Pacific, 33.4° N, 135.6° E, 649 fm, 29 August 1906. CAS SU 25245, 3, 123–155 mm S-V, western North Pacific, 33.4° N, 135.6° E, 649 fm, 29 August 1906.
- Aldrovandia oleosa*. — RBCM 004-00067-006, 1, 145 mm S-V, eastern North Pacific, Queen Charlotte Islands, CCGS W. E. RICKER tow 31, 52.7° N, 132.4° W, 819–936 m, 7 September 2004. RBCM 004-00076-009, 1, 180 mm S-V, eastern North Pacific, Queen Charlotte Islands, CCGS W. E. RICKER tow 40, 54.1° N, 134.1° W, 1915–2014 m, 10 September 2004.

UW 117961, 1, 160 mm S-V, eastern North Pacific, off southern California, *F/V MS. JULIE* tow 181, 32.7° N, 118.2° W, 1080 m (avg. depth), 18 July 2007.

Aldrovandia phalacra.— CAS SU 9449, 1, 147 mm S-V, western North Atlantic, 32.7° N, 76.8° W, 649 fm, 6 May 1886. CAS 57172, 1, 55 mm S-V, western North Atlantic, off Bermuda, 32.2° N, 64.6° W, 1646 m, 16 July 1929. CAS 90595, 2, 83–85 mm S-V, South Pacific, off New Caledonia, 24.2° S to 24.3° S, 167.6° E to 167.6° E, 1128–1150 m, 21 November 1996.

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