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First Record of a Slickhead (Alepocephalidae) from Hawaiian Waters

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Abstract Two alepocephalid psecimens were captured in 1973, approximately 2000 m depth off the west coast of the island of Hawaii. The specimens, tentatively identified as *Alepocephalus blanfordii* Alcock, represent the first record of the family from Hawaiian waters.

Introduction

Two large specimens of slickhead were captured off the west coast of the island of Hawaii during the Kona Expedition of the R/V Alpha Helix. The fish were caught on two 30-hook bottom setlines with a wire-mesh trap at one end; the rigs were fished as free-vehicles (see Phleger and Soutar, 1971). Both vehicles were set out at about 0200 hrs. PST, 17 October 1973, with magnesium release links that gave an approximate bottom time of 4～6 hours. (Bottom depth, about 2000 meters; lat. 19°28′N, long. 156°02′W, about 10 km due west of Kealakekua Bay, Kona District, Hawaii). The first vehicle to rise was retrieved at about 0630 hrs. An alepocephalid of 54 cm SL was captured on that vehicle. The second vehicle was retrieved at 0700 hrs. It had attached on a lower hook an alepocephalid of 57.5 cm SL (Fig. 1); a *Synaphobranchus affinis* Günther, 1877, of 75 cm SL was captured in the trap. The heart, blood, and the left gills were extracted from the second slickhead for biochemical and physiological studies (in both slickheads the heart still retained a weak beat).

Description

The slickheads are tentatively identified as *Alepocephalus blanfordii* Alcock, 1892, a species known previously only from the holotype taken in the Indian Ocean. The remains of the first specimen and the partly dissected second specimen have been deposited in the collections of the California Academy of Sciences (cat. no. 30095). Meristic and morphometric data from the two specimens follow.

Measurements (in mm followed in parentheses by the percentage of standard length; data for the smaller specimen are given first): standard length 540, 575; total length 630, 645; head length 157, 154 (29.2, 26.8); orbit diameter 33, 33 (6.1, 5.7); snout length 49, 45 (9.1, 7.8); interorbital width 38, 39 (7.0, 6.8); length upper jaw 57, 50 (10.5, 8.7); postorbital length of head 77, 77 (14.5, 13.4); distance orbit to angle of preopercle 49, 43 (9.1, 7.5); predorsal length 380, 400 (70, 70); preanal length 380, 400 (70, 70); prepelvic length 275, 300 (51, 52); body depth 120, 112 (22, 19.5); depth caudal peduncle 35, 40 (6.5, 7.0); head depth 87, 78 (16.1, 13.6); head width 60, 62 (11.1, 10.8); length pectoral fin 62, 56 (11.5, 9.8); length pelvic fin 34, 36 (6.3, 6.3); length base dorsal fin 71, 81 (13.2, 14.2); length base anal fin 76, 86 (14.1, 14.9).

Counts: (rudimentary fin rays indicated by i; data for smaller specimen first; "—" indicates count not taken): dorsal fin rays iiii12, iiiii12; anal fin rays iiii13, iiii13; pectoral fin rays ii9, 11; pelvic fin rays i5, 7; gill rakers on first (outer) arch —, 8+1+16; gill rakers on second arch —, 10+1+19; precaudal vertebrae 23, 24; caudal vertebrae 31, 30; pyloric caeca 14, 14; longitudinal scale rows —, 73; pored lateral line scales —, 59; scale rows, pelvic origin to lateral line —, 16; scale rows above anal origin —, 16; scale rows below dorsal origin (counting forward and downward) —, 12～13, (counting backward and downward) —, about 16; scale rows before dorsal fin —, about 60.

Body shape and fin positions as in Fig. 1. Head smoothly covered by membranous black skin which overlies thin layer of gelatinous tissue. Bony ridges of head not prominent in fresh specimens, but appear markedly so with shrinkage

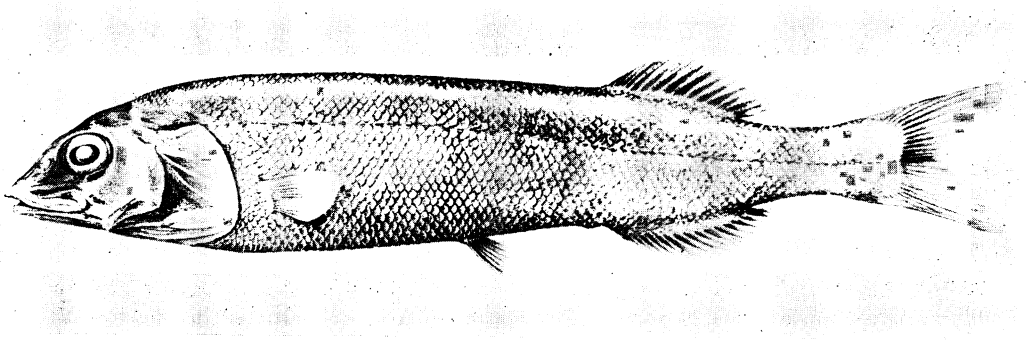

Fig. 1. *Alepocephalus blanfordii* Alcock. CAS cat. no. 30095, 57 cm in standard length, from off Hawaii in approximately 2000 meters. Fins and scales partially reconstructed.

caused by preservation in alcohol. No papillae nor prominent mucous pores apparent on fresh specimens. Orbits round, pupil broadly elliptic, measuring 21 mm long by 11.5 mm high in 575-mm specimen. (The aphakic pupil and the "channel" in the contours of the head anterior to the orbits probably allow good binocular vision.) Preopercle narrowly free along posterior and ventral margins. Gill membranes free from isthmus, not joined, left overlapping right. Maxillary and two supramaxillaries (Fig. 2A) form most of broad upper jaw. Premaxillary narrow, closely attached anteriorly to tip of snout where broad frenum present. Lower jaws much included; symphysis with a stout ventral point. Very small, conical teeth in single row on premaxillary, dentary, and palatine bones, but none on maxillary. Dorsal and anal fins low and rounded, height about equal to caudal peduncle depth. Dorsal fin with four or five rudimentary rays followed by one long but unbranched ray and 11 branched rays. Anal fin with four rudimentary rays followed by one long unbranched ray and 12 branched rays. Pelvic fin short, length about equal to orbit diameter. Pectoral fin short, length about 2.5 in head length; base broad and steeply oblique. Scales moderate in size, covering entire body but completely lacking on head. Median fins with scales on base; paired fins completely scaleless. Gill rakers broad, flat, tapering to sharp point distally; length of longest raker on outer arch of 575-mm specimen 12 mm, or about equal to diameter of pupil. Pseudobranchial filaments well developed, about 15～16. Pyloric caeca 14, long, simple (Fig. 2B), longest measuring 45 mm in 575-mm specimen, 55 mm in 540-mm specimen. Paired

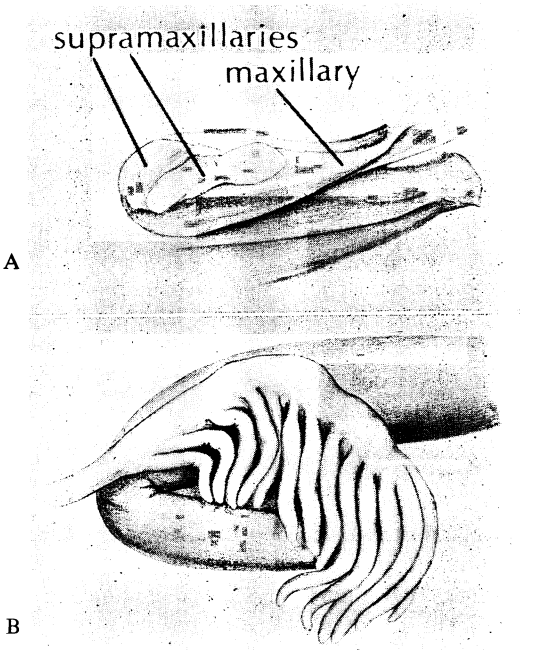

Fig. 2. (A) Diagrammatic illustration of right lateral view of maxillary and supramaxillary bones of *Alepocephalus blanfordii*. (B) Right lateral view of pyloric caeca of 54-cm-SL specimen (CAS 30095) of *A. blanfordii*.

ovarian gonads of both specimens large and well developed. Eggs 1～3 mm in diameter, embedded in transverse folds of tissue. Folds arranged along entire length of each gonad.

Comparisons

The two Hawaiian specimens of *Alepocephalus* most closely agree with *A. blanfordii*, although a few points of difference are evident when they are

compared with Alcock's inadequate original description. According to Parr (1952: 258) the type and only specimen of *A. blanfordii* is "no longer available," but Dr. Kaza Rama Rao of the Zoological Survey of India has informed me (pers. comm.) that the type is, in fact, extant. Menon and Yazdani (1968 : 99) have listed it in their "Catalogue of type-specimens in the Zoological Survey of India." Until the holotype is examined for other diagnostic characters, the present specimens cannot be definitely confirmed as representing the species. Characters given in the original description of *A. blanfordii* that differ from those of the Hawaiian specimens include: (1) the length of the snout, (2) the diameter of the orbits, and (3) the width of the interorbital region. Alcock (1892: 357) stated that the snout of his specimen "is barely greater than the diameter of the huge orbit, or two sevenths [27.6 per cent] of the length of the head." The present specimens have snouts measuring 29.2～31.0 per cent of the head length—much longer than the orbit diameters, which measure 21.0 and 21.4 per cent of the head length. Whereas in Alcock's specimen, the "eyes are hardly half a diameter apart," in the Hawaiian specimens the interorbital region is wider (24～25 per cent of head length) than the orbits. Whether these differences are attributable to the larger size of the Hawaiian specimens (Alcock's type specimen was only about 35 cm long) cannot be established without a representative size series. The phenomenon of a relative decrease in the size of the orbits with an increase in the size of the individual is common in many fishes. Related increases in the length of the snout and width of the interorbital region often follow a relative decrease in the orbit size.

One other apparent difference between Alcock's species and the Hawaiian alepocephalid lies in the fewer scale rows below the dorsal. Alcock's (1894: pl. 9, fig. 1) illustration of his specimen shows fewer scale rows below and above the lateral line than found in the Hawaiian specimens. This difference results not from differences in the relative size of the scales, but from the angle of the scale rows. In Alcock's illustration, the scale rows (posteroventrally below the origin of the dorsal fin) are steeply oblique, being 58°～60° from the horizontal. In contrast, the same scale rows are inclined at an angle somewhere between 35° and 40° from the horizontal in the Hawaiian specimens.

Alepocephalus productus Gill, 1883, appears very close to *A. blanfordii*, and Parr (1952: 258) has suggested that they may be conspecific. The chief difference between the two appears to lie in the slightly longer head of *A. productus*. In Table 1, the head lengths of the Hawaiian specimens of *A. blanfordii* are compared with those of *A. productus*. Observed values for the head length of *A. productus* were not always in agreement with predicted values calculated using Parr's (1952: 258) formula for the species. The 304-mm and 290-mm specimens from USNM 212186 had somewhat shorter head lengths than expected, although the 275-mm specimen from that same lot had a head length value about as predicted. Other

Table 1. Comparison of head lengths of two species of *Alepocephalus*. Predicted values are calculated by solving the function (39.5−0.015SL) as given by Parr (1952: 258), where SL is the standard length, and the value obtained is the head length as a percentage of the standard length. Observed values for *A. blanfordii* should fall below the predicted values whereas in *A. productus* they should fall above predicted values.

	SL (in mm)	Head length as per cent SL	
		Predicted Value	Observed Value
A. blanfordii			
CAS 30095	540	<31.4	29.2
CAS 30095	575	<30.9	26.8
A. productus			
USNM (holotype)	432	>33.0	34.3
USNM 212186	304	>34.9	31.8
	275	>35.4	35.6
	290	>35.1	34.1
Koefoed, 1927	345	>34.3	34.0

Table 2. Comparison of selected meristic and morphometric features of two species of *Alepocephalus*.

	A. blanfordii		*A. productus*						
	CAS 30095	CAS 30095	USNM Holotype	USNM 212186	USNM 212186	USNM 212186	Koefoed, 1927	Parr, 1952	Goode & Bean, 1896
Total length	630	645	—	—	320	—	380	—	—
Standard length (SL)	540	575	432+	304	275	290	345	—	—
Head length (HL)	157	154	148+	97	98	99	117	—	—
HL: SL×100	29.2	26.8	34.3	31.8	35.6	34.1	34	—	35.5*
Orbit diam.: HL×100	21.0	21.4	27	27.9	23.5	26.3	23.9	—	25**
Snout len.: HL×100	31.2	29.2	28	25.8	24.5	24.2	29.9	—	—
No. of pyloric caeca	14	14	—	17	15	16	—	14～15	—
Long. scale rows	—	73	—	ca. 64	ca. 62	ca. 66	ca. 70	—	67
Scales above lat. line	—	ca. 16	—	—	ca. 8～9	ca. 11～12	—	—	9
Scales below lat. line	—	ca. 16	—	—	11	ca. 10	—	—	12
D. rays	16	17	18	ca. 16	16	16	17	16～18	17
A. rays	17	17	17～18	ca. 16	17	17～18	17	17～19	17
Gill rakers (1st arch)	—	8+1+16	7+1+16	8+1+16	9+1+16	9+1+16	—	—	—
Gill rakers (2nd arch)	—	10+1+19	9+1+16	10+1+18	10+1+18	10+1+18	—	—	—

* "More than one-third [35.5] of the total length."

** "Eye nearly one-fourth" of length of head.

meristic and morphometric characters are compared between the two species in Table 2. In addition to the larger head of *A. productus*, the scale and pyloric caeca counts of that species show some differences from those of *A. blanfordii*. With so few specimens (all in such poor condition), it is impossible to properly evaluate the significance of these differences. For the present, however, it seems justified to continue recognition of *A. blanfordii* as distinct from *A. productus*.

Alepocephalus umbriceps Jordan and Thompson, 1914, a species described from Japan, approaches *A. blanfordii* in number of longitudinal scale rows, number of dorsal and anal fin rays, and in certain proportional measurements, but it differs markedly in its pyloric caeca count (18～19 cf. 14), its longer upper jaw (38 percent head length compared with 32～36 per cent in *A. blanfordii*), its narrower interorbital space (15 percent head length compared with 24～25 percent in *A. blanfordii*), its fewer gill rakers (only 7+9 on outer arch in a 31-cm-SL specimen, SU 23777, compared with 8+17 in *A. blanfordii*), and its dentition (teeth in narrow band on mandible and palatine, compared with teeth in single series on the twobones in *A. blanfordii*; small teeth present on ventral margin of maxillary, no teeth on maxillary in *A. blanfordii*).

Alepocephalus bairdii Goode and Bean, 1879, is according to Parr (1952), the only other species of the genus with a longitudinal scale-row count in the same range (64～70) as those of *A. blanfordii*, *A. umbriceps*, and *A. productus*, The anal (21～25) and dorsal (20～23) fin-ray counts of *A. bairdii* are, however, much higher than those of the other three species.

Remarks

The presence of members of the family Alepocephalidae in Hawaiian waters is not surprising in view of the generally widespread distribution of the group in the world's oceans. What is surprising is that the family had not been previously reported, despite the extensive trawling work done by the U. S. Fish Commission steamer Albatross around the turn of the century and, more recently, by the National Marine Fisheries Service research vessel Townsend Cromwell. Dr. Thomas M. Clarke of the University of Hawaii has informed me (Feb., 1974, in litt.) of the capture of bathypelagic members of the Alepocephaloidei by the R/V Teritu. These will be reported on by other authors. The captures of the alepocephalid specimens serve to emphasize the fact that we have yet to explore the ocean's depths in a thorough fashion, even in areas like Hawaii, where substantial work has already been carried out. Gosline's report in 1954 of the brotulids collected among the fishes killed by the lava flows from the Mauna Loa eruption of 1950 is another prime example. Brotulids had not previously been reported from Hawaiian waters, but Gosline's collection contained five species, three of which represented species new to science.

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Literature cited

Alcock, A. 1892. Natural history notes from H. M. Indian Marine Survey Steamer "Investigator." Lieut. G. S. Gunn, R. N., commanding.—Ser. II. No. 5. On the bathybial fishes collected during the seasons of 1891～92. Ann. Mag. Nat. Hist., Ser. 6, 10 (59): 357～362.

Bean, T. H. 1890. Scientific results of explorations by the U. S. Fish Comm. steamer Albatross. No. XI–New fishes collected off the coast of Alaska and

the adjacent region southward. Proc. U. S. Nat. Mus., 13 (795): 37～45.

Gill, T. H. 1883. Diagnosis of new genera and species of deep-sea fish-like vertebrates. Proc. U. S. Nat. Mus., 6 (16～17): 253～260.

Goode, G. B. and T. H. Bean. 1879. Description of *Alepocephalus bairdii*, a new species of fish from the deep-sea fauna of the western Atlantic. Proc. U. S. Nat. Mus., 2: 55～57.

Goode, G. B. and T. H. Bean. 1896. "Oceanic ichthyology. . . ." Smithsonian Contrib. Knowledge, 30 (981) (also U. S. Nat. Mus., Spec. Bull. 3; and Mem. Mus. Comp. Zool. Harvard, 22), pt. 1: 1～553; pt. 2: 1～26, pls. 1～123.

Gosline, W. A. 1954. Fishes killed by the 1950 eruption of Mauna Loa. II. Brotulidae. Pacif. Sci., 8 (1): 68～83, figs. 1～3.

Günther, A. 1877. Preliminary notes on new fishes collected in Japan during the expedition of the H. M. S. 'Challenger.' Ann. Mag. Nat. Hist. Ser. **4**, 20: 433～446.

Günther, A. 1878. Preliminary notices of deep-sea fishes collected during the voyage of H.M.S. Challenger. Ann. Mag. Nat. Hist., Ser. 5, 2: 17～28.

Jordan, D. S. and W. F. Thompson. 1914. Record of fishes obtained in Japan in 1911. Mem. Carnegie Mus., 6, pt. 4: 205～213.

Koefoed, E. 1927. Fishes from the sea-bottom. Rept. Sci. Res. "Michael Sars" N. Atlan. Deep-sea Exped. 1910, 4 (1): 1～147, pls. 1～6.

Menon, A. G. K. and G. M. Yazdani. 1968. Catalogue of type-specimens in the Zoological Survey of India, Part 2. Fishes. Rec. Zool. Surv. India, 61 (parts 1 and 2): 91～190.

Parr, A. E. 1952. Revision of the species currently referred to *Alepocephalus, Halisauriceps, Bathytroctes* and *Bajacalifornia* with introduction of two new genera. Bull. Mus. Comp. Zool., 107 (4): 256～267.

Phleger, C. F. and A. Soutar. 1971. Free-vehicles and deep-sea biology. Amer. Zool., 11 (3): 409～418, figs. 1～6.

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セキトリイワシ科魚類のハワイからの初記録

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1973 年，調査船アルファフェリックス号による航海中，ハワイ島西方の水深約 2000 m の所で，free-vehicleset line によって，セキトリイワシ科の魚 2 尾を獲った．原記載と少し異なる所があるが，一応 *Alepocephalus blanfordi* Alcock と同定する．セキトリイワシ科の魚は，ハワイ水域から初めて報告されることになる．