

Ammolabrus dicrus, A New Genus and Species of Labrid Fish from the Hawaiian Islands¹

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ABSTRACT: *Ammolabrus dicrus* is described as a new genus and species of labrid fish from O'ahu, Hawaiian Islands. It is characterized by: dorsal rays IX,12; anal rays III,12; all fin spines flexible; caudal fin small and forked; upper jaw strongly protrusible; a pair of small, forward-projecting, outcurved canine teeth anteriorly in upper jaw, and a smaller pair of outward-projecting canines at front of lower jaw; a single row of very small conical teeth on about anterior half of side of jaws; no canine tooth at corner of mouth; pharyngeal teeth small, none as molars; body elongate, the depth 4.2–4.45 in standard length (SL); scales thin and rhomboidal, 27 in longitudinal series; lateral line interrupted (last one or two scales of dorsoanterior series without a pore); no median predorsal scales; median preopercle scales 3; anterior third of preopercle region naked; 2 small scales dorsally on opercle, and an oblique series of 5 partially embedded scales behind eye; adults pale with a dark blotch on side of body above outer third of pectoral fin. Occurs over open sand substrata, often in small, swift-swimming schools; specimens collected from 7 to 18 m, the largest 94 mm SL; feeds on zooplankton. The new genus appears to be most similar to *Novaculichthys*.

ON 22 JUNE 1986 the authors and Marjorie Awai made a dive over a broad expanse of sand bottom off Wai'anae, O'ahu, at a depth of 18 m. While lying motionless on the bottom to observe sand-dwelling animals, B.A.C. noticed a rapidly moving school of small, pale fish with a dark blotch on the side that he had not seen before. Back in the boat, he alerted the other two divers so that they could look for the fish on a second dive. Although none of us could get close to the school, it was concluded that the fish is a species of the wrasse family Labridae not previously known from Hawaiian waters. Several more dives were made during the summer of 1986 with the objective of collecting specimens, but the fish proved too elusive to be captured. We observed that they feed in an aggregation on zooplankton well above the substratum, but when approached, they quickly form a school near the bottom and move away. Finally on 17

August 1986, with the assistance of John L. Earle and Jane B. Culp, five divers herded the fish toward a broad monofilament barrier net. As we approached those that were trapped against the barrier net, most dived into the sand. We managed to hand-net 10 adult specimens. In later years John L. Earle and Therese Hayes collected smaller specimens for us. They observed that solitary individuals were much more apt to seek refuge by diving into sand than those in a school. John P. Hoover photographed a school of this species at Kahe Point, O'ahu, which is reproduced here as Figure 2.

Initially it was believed that the fish represented a new species of the genus *Leptojulis* Bleeker because of having the same dorsal and anal ray counts, the same general shape (except for the forked caudal fin), a dark blotch on the side just above the pectoral fin (the same mark on four of five species of *Leptojulis*), and because the species of *Leptojulis* are more inclined to move over sand away from the shelter of coral reefs than most wrasses; however, close examination of the specimens soon revealed that the species is not related to *Leptojulis*. The dentition is completely different, the lateral line is

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interrupted (continuous in species of *Leptojulius*), and there is an oblique row of scales on the head behind the eye (not present in *Leptojulius*). It was then realized that the fish is in the same lineage as the genera *Novaculichthys* Bleeker and *Xyrichtys* Cuvier, but clearly distinct at the generic level in having all of the fin spines flexible, reduced jaw and pharyngeal dentition, and a forked caudal fin.

MATERIALS AND METHODS

Type specimens of the new species have been deposited in the Australian Museum, Sydney (AMS); the Natural History Museum, London (BMNH); Bernice P. Bishop Museum, Honolulu (BPBM); California Academy of Sciences (CAS); National Science Museum of Tokyo (NSMT); and National Museum of Natural History, Washington, D.C. (USNM).

Lengths recorded for type 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; body width is the greatest width just posterior to the gill opening. Head length is taken from the front of the upper lip in the median plane to the posterior end of the opercular membrane; snout length from the same anterior point to the fleshy edge of the orbit. Orbit diameter is the greatest fleshy diameter. Interorbital width is the least bony width. Caudal-peduncle depth is the least depth, and caudal-peduncle length is the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base. The lengths of the fin spines and soft rays are taken to their extreme bases. 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 rays. Gill-raker counts include rudiments.

In the species description below, data in parentheses refer to paratypes. Twenty-six measurements were made on 10 type specimens and recorded as percentages of the standard length (Table 1); the paratypes in the table are arranged in ascending order left to right by size. Propor-

tional measurements in the text are rounded to the nearest 0.05.

Ammolabrus Randall & Carlson, n. genus

TYPE SPECIES: *Ammolabrus dicrus* Randall & Carlson, n. sp.

DIAGNOSIS: Dorsal rays IX,12; anal rays III,12; all fin spines flexible; pectoral rays 13; lateral line interrupted, pored scales 19 or 20 + 5 or 6; lateral-line scales with single horizontal tubule, ending in a pore; scales thin and rhomboidal, those of thorax and anterior abdomen smaller than those of side of body; head naked except for 2 small scales dorsally on opercle and diagonal row of 5 partially embedded scales behind eye; no median predorsal scales; 3 small median prepelvic scales; anterior third of prepelvic region (to free fold of branchiostegal membranes over isthmus) naked; gill rakers 20–24; branchiostegal rays 6; upper jaw strongly protrusible, median process of premaxilla extending to above anterior pupil edge; a pair of small, forward-projecting, outcurved canine teeth anteriorly in upper jaw, and a smaller pair of outward-projecting canines at front of lower jaw; no canine tooth posteriorly on upper jaw (at corner of mouth); very small conical teeth in a single row on about anterior half of side of jaws; pharyngeal teeth small and conical to slightly nodular (none enlarged or molariform); body moderately elongate, the depth 4.2–4.45 in SL; dorsal part of head from front of snout to origin of dorsal fin with a fleshy median ridge, the interorbital space high and triangular when viewed from the front; interorbital space narrowest anteriorly; caudal fin small, 1.45–1.65 in head length, and forked; pelvic fins small, 2.2–3.05 in head length.

ETYMOLOGY: This new genus is named *Ammolabrus* from the Greek word *amos*, meaning sand, in reference to the sand-dwelling habits of the single member species, *A. dicrus*. The common name Sand Wrasse is proposed.

REMARKS: The following characters are shared between *Ammolabrus* and the genus

TABLE 1

PROPORTIONAL MEASUREMENTS OF SPECIMENS OF *Ammolabrus dicrus* EXPRESSED AS PERCENTAGES OF THE STANDARD LENGTH

CHARACTER	HOLOTYPE			PARATYPES						
	BPBM 31027	BPBM 36860	AMS I.37120-001	BPBM 36858	USNM 338990	BPBM 36858	CAS 83577	NSMT 47483	USNM 338990	BPBM 36858
Sex	Male	Female	Male	Female	Male	Male	Male	Male	Male	Male
Standard length (mm)	89.9	51.8	70.6	74.6	75.3	78.7	79.2	82.2	89.9	94.1
Body depth	23.9	22.6	23.5	22.5	22.8	22.4	22.6	22.4	23.9	22.8
Body width	11.6	10.0	10.6	10.3	10.9	10.9	10.4	10.8	11.0	11.1
Head length	30.7	30.7	31.0	30.3	30.7	30.9	30.6	30.8	30.3	30.4
Snout length	7.9	7.8	8.2	7.9	8.1	8.0	8.1	8.3	8.3	8.3
Orbit diameter	5.1	5.2	5.1	4.4	4.8	4.8	4.8	5.2	5.1	5.1
Interorbital width	5.2	4.1	4.4	4.3	4.6	4.7	4.6	4.6	4.8	4.8
Upper jaw length	7.8	7.7	7.4	7.1	7.0	7.5	7.6	7.4	7.7	7.0
Caudal peduncle depth	10.3	11.9	10.6	10.3	10.2	10.0	10.7	10.2	10.1	10.7
Caudal peduncle length	12.2	12.8	12.3	11.8	12.7	12.4	12.6	12.3	12.1	12.0
Predorsal length	24.8	22.6	23.8	23.7	23.2	24.4	23.0	23.7	23.5	24.0
Preanal length	53.4	50.7	52.1	53.2	53.1	51.1	52.5	53.3	53.6	51.9
Prepelvic length	29.8	28.6	29.2	27.8	29.6	29.3	28.9	28.9	29.7	29.5
First dorsal spine	6.2	5.9	6.2	5.8	6.5	6.4	6.2	6.7	6.4	6.8
Second dorsal spine	7.3	7.0	7.5	7.2	7.4	7.6	7.3	7.9	7.5	8.0
Ninth dorsal spine	8.2	8.1	7.9	8.2	8.1	8.1	7.9	8.4	8.5	9.1
Longest dorsal ray	9.0	9.4	8.6	8.7	8.5	9.0	9.0	9.4	9.1	9.6
First anal spine	4.3	4.1	4.2	4.2	4.2	4.4	4.7	4.6	4.7	4.9
Second anal spine	5.6	5.8	6.5	5.6	5.6	5.6	6.2	6.1	7.0	6.3
Third anal spine	7.3	7.2	7.2	7.1	7.2	7.6	7.7	7.3	8.1	8.2
Longest anal ray	8.9	8.9	8.5	8.1	9.2	9.0	9.1	9.1	9.4	9.9
Caudal fin length	19.7	21.0	20.6	20.0	19.0	19.3	19.2	19.5	19.2	19.8
Caudal concavity	5.5	4.6	5.3	5.2	5.5	5.9	5.7	5.9	5.6	5.3
Pectoral fin length	20.5	18.9	19.1	19.3	20.1	20.6	19.3	20.9	19.5	19.8
Pelvic spine length	7.0	7.4	7.3	6.9	7.5	7.4	7.4	7.1	7.7	8.3
Pelvic fin length	10.7	10.0	10.7	10.6	11.3	12.0	11.9	11.1	13.1	13.8

Novaculichthys: a single pair of canine teeth anteriorly in jaws; no canine tooth at corner of mouth; IX dorsal spines; 13 pectoral rays; lateral line interrupted with 19 or 20 + 5 or 6 pored scales; scales of thorax and anterior abdomen smaller than those of side of body, no median predorsal scales; anterior or all of prepelvic space naked; and 2 small scales dorsally on otherwise naked opercle.

The genus *Novaculichthys* is represented by three described species: *N. taeniourus* (Lacepède), *N. woodi* Jenkins, and *N. macrolepidotus* (Bloch). *Ammolabrus dicrus* shares the count of 12 dorsal and anal soft rays and a middorsal ridge on the head with *N. taeniourus* and *N. woodi* (*N. macrolepidotus* has 13 dorsal and anal rays and lacks the ridge). It shares the oblique row of 5 small scales behind the eye with *N.*

taeniourus. The dentition comes closest to that of *N. woodi*.

Ammolabrus dicrus differs from all the species of *Novaculichthys* in its more elongate body; eye nearer level of corner of mouth than dorsal profile of head; interorbital space narrowest anteriorly; all fin spines flexible; origin of dorsal fin not anterior to upper end of gill opening; reduced dentition; tubule of lateral-line scales straight and unbranched; suborbital series of pores ending below posterior half of eye; and a forked caudal fin.

Ammolabrus is not unique among labrid genera in having flexible spines. This is true also of *Oxyjulis* Gill. In addition, de Beaufort (1939) described *Artisia festiva* as a new genus and species of labrid fish from one specimen 120 mm long from Amoy (now Hsia-men) Harbor,

China. The principal character for the new genus was its dorsal fin consisting of "nine weak, flexible, not-pungent spines." The illustration looks remarkably like *Halichoeres trimaculatus* in morphology and the two salient dark markings. Perhaps the fish was this species and was long in formalin, resulting in decalcification of the spines. The counts of the pectoral rays (14) and soft rays of the dorsal and anal fins (12) given by de Beaufort, however, are one off from those recorded for *H. trimaculatus*. The specimen was deposited in the Bureau of Science in Manila; unfortunately it is no longer extant.

Ammolabrus dicrus Randall & Carlson, n. sp.

Figures 1, 2; Table 1

DESCRIPTION: Dorsal rays IX,12; all dorsal and anal spines flexible; all dorsal and anal soft rays branched, the last to base; pectoral rays 13, the uppermost rudimentary, the second unbranched, the lowermost with a membranous ventral edge; pelvic rays I,5, the spine flexible; branched caudal rays 12; upper and lower segmented procurent caudal rays 2, the innermost

half length of longest caudal ray; upper unsegmented procurent caudal rays 5, the lower rays 4; longitudinal scale series 27; lateral line interrupted (last one or two scales of dorsoanterior series without a pore), the pored scales $20 + 6$ ($19-20 + 5-6$) (second count includes pored scales in the straight posterior section plus one pored scale at the front of this series in the scale row above); scales above lateral line to origin of dorsal fin $2\frac{1}{2}$; scales below lateral line to origin of anal fin $7\frac{1}{2}$; circumpeduncular scales 16; gill rakers 22 (20-24; only one of 10 paratypes with 20, one with 24, none with 23); branchiostegal rays 6; vertebrae $9 + 16$ (the first small); a single supraneural (predorsal) bone, ending in space between first two neural spines; first two dorsal pterygiophores in space between second and third neural spines; caudal skeleton typically labroid with a small fifth hypural just above fused third and fourth hypurals, and a slender parhypural just below fused first and second hypurals.

Body moderately elongate, the depth 4.2 (4.25-4.45) in SL, and compressed, the width

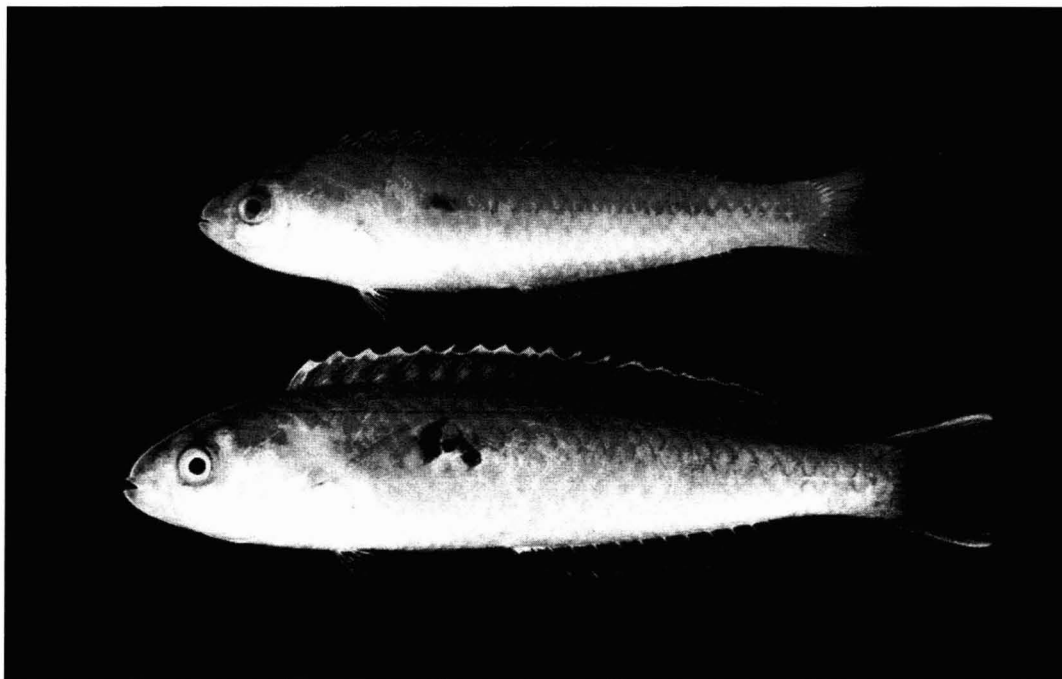


FIGURE 1. Holotype (below) of *Ammolabrus dicrus*, BPBM 31027, male 89.9 mm SL; paratype (above) of *A. dicrus*, BPBM 36858, female, 74.6 mm SL, Mākaha, O'ahu, Hawaiian Islands (J. Randall).

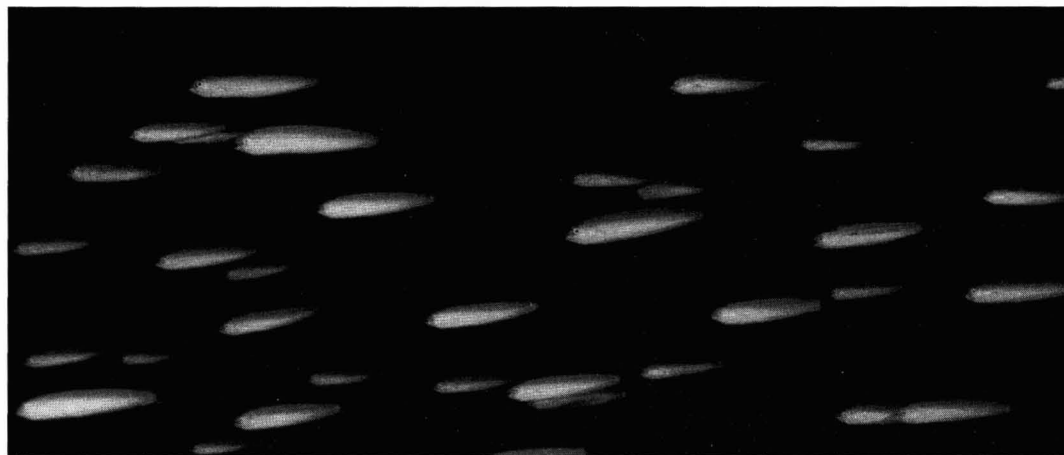


FIGURE 2. School of *Ammolabrus dicrus*, Kahe Point, O'ahu, Hawaiian Islands, 10 m (J. Hoover).

2.05 (1.85–2.25) in body depth; head length 3.25 (3.2–3.3) in SL; head pointed when viewed from above; anterior profile of snout convex, becoming nearly straight on posterior snout and interorbital region, and slightly convex on nape; a fleshy middorsal ridge on head; snout length 3.9 (3.65–3.9) in head; eye slightly above midlateral position of head; orbit diameter 6.0 (5.9–6.9) in head; interorbital space steeply triangular when viewed from front; interorbital width narrowest anteriorly, the least width 6.4 (6.3–7.5) in head; caudal-peduncle depth 3.0 (2.6–3.1) in head; caudal-peduncle length 2.5 (2.4–2.55) in head.

Mouth terminal or with lower jaw slightly projecting and oblique, forming an angle of about 20° to horizontal axis of body; mouth small, the maxilla reaching to between verticals at posterior nostril and anterior edge of orbit, the upper-jaw length 3.95 (3.95–4.4) in head; mouth strongly protrusible, the long median premaxillary process extending to above anterior edge of pupil; upper lip curled on itself anteriorly to form a thin cylinder, then expanding posteriorly into a broad, dorsally directed, thin flap; lower lip with a broad ventrally directed flap extending over side of lower jaw; a pair of small (less than half pupil diameter) canine teeth anteriorly in upper jaw that are slightly forward-projecting and strongly outcurved, followed by a series of about 8 very small canine teeth on anterior half of jaw, the tips barely emergent except for the first one or two; no canine tooth posteriorly on upper jaw; front of lower jaw with

a pair of outcurved canines about half as large as those of upper jaw, followed on anterior half of jaw by a row of about 10 very small conical teeth, only the tips emergent from dermal tissue (only the first few teeth apparent on both jaws of the smaller paratypes); no teeth on palate; pharyngeal dentition of 94.1-mm paratype: pair of upper pharyngeal bones closely joined to form a broad triangular plate with an indented posterior margin, the plate 3.0 mm wide and 1.3 mm long in median axis; four rows of small teeth anterior to posterior, the anterior teeth bluntly conical, the posterior teeth slightly nodular but not enlarged; about 15 teeth in posterior row of the combined two plates; posterior triangular part of the single lower pharyngeal bone 2.6 mm wide and 1 mm long (median axis), with eight or nine small nodular teeth on each side and about 11 conical teeth in an irregular indented row along posterior margin, these teeth about twice the size of those in previous row; narrow anterior median process of lower pharyngeal bone 2.5 mm long, with an irregular row of 12 teeth, the most anterior conical, those posteriorly progressively more blunt.

Tongue far back in mouth, its rounded anterior end posterior to cleft of mouth. Longest gill raker on first gill arch contained about 2.5 times in longest gill filament.

Opercular flap large, reaching to below a vertical through fourth lateral-line scale; preopercular margin thin and membranous with a broadly rounded corner, the upper margin extending to

level of upper edge of pupil, the lower margin anteriorly to below anterior edge of pupil.

Nostrils small, in front of upper edge of orbit, the anterior with a slight fleshy rim and a short triangular posterior flap that just covers nasal aperture when pressed forward; posterior nostril crescentic, nearly covered by an anterior flap.

Tubule of each lateral-line scale horizontal and straight, in middle of each scale, extending about three-fourths width of exposed part of scale and ending in a single pore. Last pored scale of lateral line on point of flexure of caudal fin (above end of hypural plate). A sensory canal with a series of pores extending forward onto head from lateral line, passing above eye and nostrils, and descending with branches onto side of snout; a series of 7 pores near free edge of preopercle and continuing with 3 more pores along side of mandible; a series of 3 postorbital pores ending below posterior part of eye, none extending as a suborbital series to below anterior half of eye.

Scales cycloid, thin, and rhomboid; head naked except for 2 small scales dorsally on opercle and a diagonal row of 5 partially embedded scales behind eye; no median predorsal scales; scales on side of nape extending to above upper end of preopercular margin; 3 small median pre-pelvic scales; anterior third of prepelvic region (from base of pelvic fins to where free fold of branchiostegal membrane crosses isthmus) naked; scales on side of thorax and anterior abdomen smaller than those on side of body, the smallest about half height of those of side of body (those ventroanteriorly on thorax still smaller); fins naked except for scales on about basal fourth of caudal fin (a vertical row of 3 of the outer scales in middle of fin largest, with smaller scales above and below), and a median scaly process at base of pelvic fins consisting of an elongate scale about half length of pelvic spine and a small basal scale.

Origin of dorsal fin above first lateral-line scale; dorsal spines progressively longer, the first 4.95 (4.45–5.2) in head, the ninth 3.75 (3.35–3.9) in head; fourth to eighth dorsal soft rays longest, 3.4 (3.15–3.6) in head; first anal spine 7.15 (6.2–7.5) in head; third anal spine 4.2 (3.7–4.3) in head; third anal soft ray usually longest, but second to eighth subequal, 3.45 (3.1–3.75) in head; caudal fin small, its length 5.1 (4.75–5.25) in SL, and forked, the caudal concavity 5.6 (5.2–6.7) in head; third and fourth pectoral rays longest, 4.9

(4.8–5.3) in SL; origin of pelvic fins below upper half of pectoral-fin base; pelvic fins short, the first soft ray longest, 2.85 (2.2–3.05) in head (these fins longest in large males).

Color of holotype in alcohol: light brown, paler ventrally, with a dark brown blotch on side of body above distal third of pectoral fins, this blotch a result of dark pigment on three or four scales of the second and third rows below lateral line (appearing on some large males as an incomplete W or M); fins pale. Adult females also have the dark blotch, but small and much less distinct.

Color of holotype when fresh: centers of scales gray-blue (brightest on midside of body), becoming whitish ventrally, the edges dull salmon pink dorsally and yellow on side of body; dark blotch on side of body purplish black, largely enclosed in light blue; an oblique yellow band beneath base of pectoral fins extending to upper end of gill opening; posterior part of lateral-line tubules in dorsoanterior series pink; head bluish gray-brown dorsally, shading to whitish ventrally, the snout with diffuse patches of light blue-green and yellow; iris yellow; dorsal fin dull yellow with a conspicuous white margin and a pale blue spot on base of each membrane (obscure on last few membranes); anal fin purple with a bright orange-red margin and a narrow light blue submarginal band anteriorly in fin; caudal fin with yellowish rays and blue membranes, the upper and lower edges pinkish white; pectoral fins pale; pelvic fins with transparent membranes, violet-blue rays, and an orange lateral edge.

Color of 74.6-mm female when fresh: bluish gray, the scale edges broadly orangish, shading to pinkish white ventrally; dark brown blotch on side of body small and horizontally elongate, the dark pigment on only two scales of second series below lateral line; a light yellow blotch beneath base of pectoral fin and extending slightly above; dorsal part of head, including snout, with patches of light red; front of chin light red; iris light red; dorsal fin translucent blue, the spines overlaid with pink, especially distally; margin of soft portion of fin dull orange-red with some dull yellow submarginally on anterior part; anal fin dull yellowish basally, shading to bluish distally, the ray tips faintly pink; caudal fin with blue membranes and orange-pink rays; paired fins pale, the pelvic rays streaked with light blue.

ETYMOLOGY: This species is named *A. dicrus* from the Greek *dikros* for forked, in reference to the forked caudal fin.

REMARKS: The stomach and gut contents of the three adult Bishop Museum paratypes were examined. As expected, they consisted of zooplankton, principally small copepods. A parasitic nematode was common in the intestine.

As discussed in the Remarks for the genus above, *Ammolabrus* seems most closely related to *Novaculichthys*. Its most divergent characteristics from *Novaculichthys* are the more elongate body, the forked caudal fin, reduced dentition, and flexible spines. These seem to be adaptations for its zooplankton food habits over open sand substrata. To avoid predation, this fish must swim rapidly, for which the more elongate body and forked caudal fin are assets. The flexible spines may be a specialization for swifter swimming (fast-swimming fishes may have spines, but they fold into a deep middorsal groove; *A. dicrus* lacks a deep groove on the back); or they may be an advantage over spines for diving into sand; or perhaps both. The smaller mouth, highly protractile premaxilla, and reduced dentition are characteristics that are apparent in species of other genera that have evolved from species feeding on benthic prey to those feeding on zooplankton. An example is *Pseudocoris* Bleeker, which appears to be derived from a benthic-feeding lineage of the genus *Coris* Lacepède. The species of *Pseudocoris* generally form feeding aggregations over coral reefs; thus they are able to seek refuge in the reef if needed. Away from the shelter of coral reefs, *Ammolabrus dicrus* relies on its speed and ability to form schools to escape predators, but it has retained the ability of its more benthic ancestors to dive into sand as a last resort.

One of our specimens of *A. dicrus*, BPBM 36859, 21 mm SL, was taken by John L. Earle from the stomach of a lizardfish (synodontid fishes are able to bury themselves in sand and ambush prey that venture near). This specimen is not designated as a paratype.

The niche of feeding on zooplankton over open sand in Hawai'i is shared with *Ammodytoides pylei* Randall, Ida & Earle (1994). Like *Ammolabrus dicrus*, it is pale, elongate with a forked tail, and forms swift-swimming evasive schools.

Currently *Ammolabrus dicrus* is known only from the island of O'ahu; specimens were collected in the depth range of 7–18 m. It will undoubtedly be found at other Hawaiian Islands.

In 1991 J.E.R. and John L. Earle observed a small school of a slender, pale wrasse over sand in 15 m at Chichi-jima, Ogasawara Islands, that behaved like *A. dicrus* and may be this species or a close relative. We were unable to collect specimens. *Ammodytoides kimura* Ida & Randall was common in the same habitat.

HOLOTYPE: BPBM 31027, male, 89.9 mm, Hawaiian Islands, O'ahu, Mākaha, over sand, 18 m, barrier net and hand nets, B. A. Carlson, J. E. Randall, M. Awai, J. L. Earle, and J. B. Culp, 17 August 1986.

PARATYPES: AMS I.37120-001, 70.6 mm; BMNH 1986.9.4.129, 84.0 mm; BPBM 36858, 3: 74.6–94.1 mm; CAS 83577, 79.2 mm; NSMT-P 47483, 82.2 mm; USNM 338990, 2: 75.3–89.9 mm, all with same data as holotype; BPBM 36860, 51.8 mm, O'ahu, Mākua, over sand, 15 m, hand net, J. L. Earle, 16 April 1989; BPBM 36861, 52.0 mm, O'ahu, Kahe Point, over sand, 7 m, hand net, T. Hayes, 16 May 1989; BPBM 36862, 2: 21–21.5 mm, O'ahu, Mākua, midbay, over sand, 15 m, hand net, J. L. Earle and T. Hayes, 1 April 1991.

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