Batfishes of the Galápagos Islands with descriptions of two new species of *Dibranchus* (Teleostei: Ogcocephalidae)

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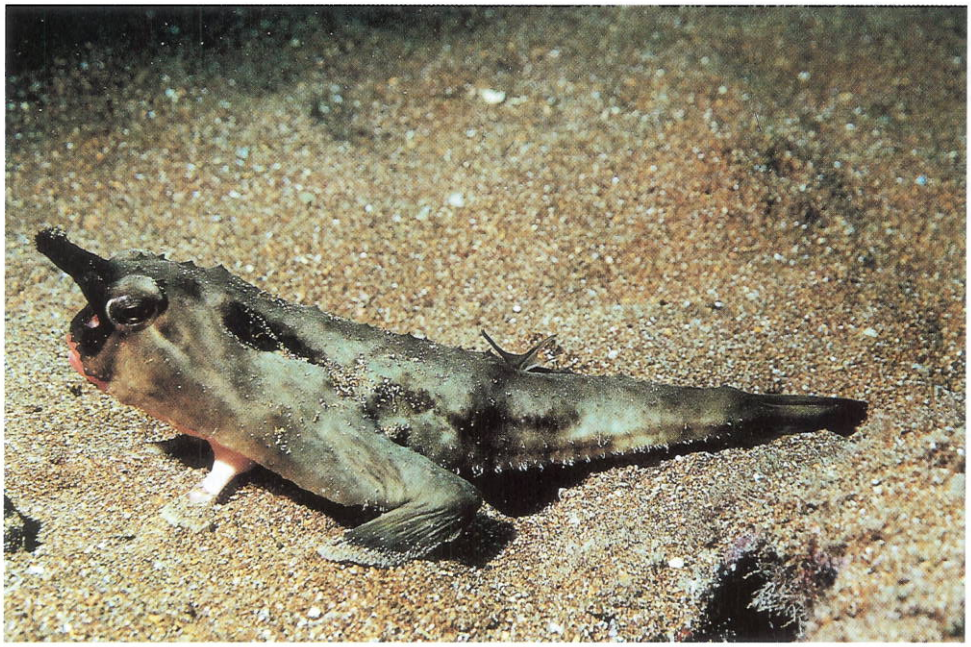

Carl Roessler

Fig. 1. - *Ogcocephalus darwini* at 10 m, Isla Bartolomé, Galapagos Islands.
Ogcocephalus darwini par 10 m, Ile Bartolomé, Iles Galapagos.

Abstract

The batfishes of the Galápagos Islands are reviewed and illustrated along with a key to the identification of adults. They are: *Ogcocephalus darwini* Hubbs, *Dibranchus erinaceus* (Garman), *D. hystrix* Garman, *D. cracens* n. sp., and *D. discors*, n. sp. The new species were observed and photographed *in situ* and were collected using a deep submersible. The specimen of *D. hystrix* represents the first record from the Galápagos, but its poor condition makes identification uncertain.

Introduction

From ogcocephalids taken by the *Albatross* expedition in the eastern Pacific in 1891, **Garman** (1899) described *Dibranchus erinaceus* (originally described as *Malthopsis erinacea*, **Bradbury** 1967), a species whose range included the Galápagos archipelago. **Garman** also described *Dibranchus hystrix*, whose range along the coast of Central and South America extended westward towards the Galápagos. **Hubbs** (1958) described a third ogcocephalid from the Galápagos, *Ogcocephalus darwini*. This paper reports the discovery of two new ogcocephalids from the Galápagos Islands.

The genus *Dibranchus* is characterized by having gills on only the second and third arches, hence the name. The scales are in the form of conical tubercles, the skull has a deep dorsal median groove for the illicium, the illicial bone lacks a dorsal median process and has each lateral process pierced by a large foramen, and the lateral line is interrupted at the rear of the disk so that the lateral line of the tail is separate and commences posterior to the anus (**Bradbury** 1967).

Dibranchus is known from the western Pacific, Indian and Atlantic oceans, as well as from the eastern Pacific where it is relatively speciose (a forthcoming review by **Bradbury** will show that 13 species of *Dibranchus* are known, 9 of these from the eastern Pacific). One Atlantic species is commonly taken on the outer continental shelf but reaches 800 m and beyond; all other species have been taken between 310-2300 m.

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In that species of *Dibranchus* inhabit depths well below the safe limits of scuba diving, most specimens have been collected by trawl or by dredge. The recent California Academy of Sciences/Harbor Branch Oceanographic Institute Expedition to the Galápagos Archipelago aboard the *R/V Seward Johnson* allowed the observation, filming and capture of numerous specimens of deep reef fishes using the submersible *Johnson Sea-Link* to a depth of 1000 m (**McCosker** 1996). The expedition results included numerous new records and new species, including many of the specimens reported herein, as well as an opportunity to observe *Dibranchus* in their normal habitat.

Although **McCosker** was unable during the expedition to recognize the species of *Dibranchus* while observing them from the submersible, we were later able to reconstruct something about their depth distribution and habitat preference by examination of the *in situ* videos. On that basis (see Table 1), it appears that there is appreciable separation by depth and habitat, the two new species, *D. cracens* and *D. discors*, occupying the steeper slopes between 310-549 m, and *D. erinaceus* and *D. hystrix* living above flatter sand bottoms at 715-2323 m.

Table 1
Depth distribution of Galapagos Batfishes. 3, Sources: 1, this study; 2, **Bradbury** (1980); **Garman** (1899)
Répartition en profondeur des Poissons Chauve-Souris des Galapagos. Sources : 1, ce travail; 2, **Bradbury** (1980) ; 3, **Garman** (1899)

Species	Depth m	Source
Ogcocephalus darwini	3.5-120	1,2
Dibranchus cracens	350-480	1
Dibranchus discors	340-549	1
Dibranchus erinaceus	715-1143	1,3
Dibranchus hystrix	914-2323	1,3

Materials and Methods

Methods are those developed for a study of *Ogcocephalus* (**Bradbury** 1980) and modified for a study of *Halieutopsis* (**Bradbury** 1988). Standard measurements include distance from jaw to anus, distance from jaw to anal fin, distance from snout to dorsal fin, interorbital width, jaw length, mouth width, depth of caudal peduncle, and length of pectoral. Length of disk margin is the dis-tance taken on the right side from the front of the posterior swelling of the mandible just at the corner of the mouth to the distal end of the subopercle excluding the subopercular spine. Skull length is the distance from the upper lip to the slight pit that can be felt with the point of the calipers between the cranium and the first vertebra. Width of cranium is the distance between the points of greatest concavity just behind the orbits. Eye width is the greatest width of the orbit.

Meristic characters include numbers of rays in dorsal and pectoral fins and counts of neuromasts. Counts from both sides were used for pectorals and neuromasts. In ogcocephalids, neuromasts are free, *i.e.*, lie on the surface of the skin, where they are cupped in modified tubercles. In *Dibranchus*, the lateral line is interrupted at its transition from the dorsal side of the disk to the lateral side of the tail, resulting in two separate series, a disk lateral line and a tail lateral line. The lateral-line counts that have been useful in *Dibranchus* are the subopercular, preopercular, dorsolateral branch of the subopercular, and the tail lateral line.

Otoliths (right sagitta only) were removed either from fresh frozen or from specimens preserved in formalin and transferred to 70% ethanol for approximately one year. Otolith terminology follows that of **Nolf** (1985).

Specimens examined in this study are cataloged using the institutional abbreviations and standardized symbolic codes proposed by **Leviton** *et al.* (1985). Additional specimens of batfishes including the new species (non-types) were given to the Instituto Nacional de Pesca, Guayaquil, Ecuador. Dives made aboard the submersible *Johnson Sea-Link* are recorded as "JSL"; additional data concerning those dives is available from the Harbor Branch Oceanographic Institute, Ft. Pierce, Florida.

Ogcocephalus darwini Hubbs
Fig.1; Table 1

Ogcocephalus darwini **Hubbs** 1958: 161 (Isla Isabella, Galápagos Islands, holotype SIO H51-214).

Material Examined

The holotype and paratypes of *O. darwini* were examined as well as the specimens listed in **Bradbury** (1980: 282). Additional material examined includes: **Galápagos:** CAS 86413, 107 mm SL, N of Isla Española, JSL 3939, 122 m. CAS 86758, 122 mm SL, Isla Isabella, Puerto Ayora, 18 m. SIO 81-197, 115 mm SL, S Plaza Island and Champion Island, 00°30.0'S, 09°30.0'W, "vomited up by sea lions." **Peru:** SIO 80-48, 170 mm SL, Gulf of Guayaquil, 03°30'S, 81°03.5'W, 11 m (locality and depth questionable).

Key to the Adult Ogcocephalidae of the Galápagos Islands

1a. Fine tubercles smoothly covering dorsal and ventral surfaces of body so skin resembles shagreen. A prominent horn-like rostrum protruding forward above the esca and mouth. A dark stripe extending backwards from the eye on either side of the trunk ..... ***Ogcocephalus darwini***
1b. Skin rough with prominent spined tubercles. Rostrum forming a brief shelf over illicium, not produced into a horn. No striped color pattern 2
2a. Teeth present in broad plates on palate 3
2b. No teeth on palate 4
3a. Tubercles present in skin of eyeballs. Mouth relatively large, its width 15% of standard length or more. No white patch on chin ..... ***Dibranchus erinaceus***
3b. No tubercles in skin of eyeballs. Mouth very narrow, its width 12% or less of standard length. Chin with a prominent white patch in midline ..... ***Dibranchus discors*** n. sp.
4a. Large tubercles decorated with spinules radiating in lines from the central spine. Small tubercles thickly cover ventral surface of disk. Subopercular lateral-line count 6 ..... ***Dibranchus cracens*** n. sp.
4b. Large tubercles with lines radiating from central spine, but no spinules. Ventral surface of disk with few or no tubercles Subopercular lateral-line count usually 5. ..... ***Dibranchus hystrix***

Diagnosis

Ogcocephalus darwini differs from the Galápagos species of *Dibranchus* in having an elongate horn-like rostrum above the illicium (*Dibranchus* has a short shelf-like structure above the illicium) and in having the entire ventral surface of the body thickly covered by uniformly tiny tubercles (*Dibranchus* has various sized tubercles on the ventral surface of the body, especially the tail, and often has bare patches of skin). The lateral line in *Ogcocephalus* extends in an unbroken series from the head to the base of the caudal fin (in *Dibranchus* the lateral line is interrupted at the transition from the disk to tail). Gill rakers in *Ogcocephalus* are flat oval plates attached to the gill bars and bearing small teeth (gill rakers in *Dibranchus* are pedicles placed perpendicular to the gill bar, each capped with a small plate of teeth). See **Bradbury** (1980) for a detailed description of the genus and species.

Color in Preservative. Dorsal surface of body tan to brown, the conspicuous markings a dark stripe on each side originating behind eyes, extending posteriorly over disk and onto lateral walls of tail where they are sometimes interrupted to form linear series of blotches. Top of head dark, from whence extends posteriorly a median dusky stripe. Face also dark, a narrow light stripe on each side extending obliquely from eye to lip. Rostrum the same dark shade as face and head. Dorsal surfaces of pectorals pale basally, grading to black distally. Ventral surface of body uniformly pale, except chin sometimes dusky. Pelvics, anal, and ventral sides of pectorals also pale, the anal sometimes dusky or black on distal third.

Color in Life. **Hubbs** (1958) states for one specimen that had retained some color, "upper parts purplish gray; rather blue-gray on tubercles and in an irregular blotch near each side of the disk; the two dark streaks, reddish brown; underparts bright rose-red, becoming white or whitish on the lower (but not the upper) surface of the pelvics, on the outer tip of the anal, and, weakly, on the lower border of the caudal, also on the esca (but not the red stem) of the illicium; pectoral rays pink-gray, encroached by the widening, blackish interradial streaks; the fin becoming almost solidly blackish inside the narrow red outer border."

One of us (**M.G.B.**) in August 1968 observed two live specimens freshly taken from coral rubble in 25 m off Isla Isabela by pipe dredge. In these the dorsal surfaces of disk and tail medium brown, the two longitudinal stripes dark cocoa brown. Ventral surfaces of body creamy white, as were esca and tops of eyeballs, all contrasting sharply with brown head and brown rostrum. Lips cherry-red. Striking white blotches along sides of disk posterior to mouth. Pelvics creamy white, tipped with brown on dorsal surfaces. Pectorals brown on dorsal surfaces, grading distally to rich dark brown, creamy white on ventral surfaces.

Remarks

Ogcocephalus darwini was thought to be a Galápagos endemic (**Hubbs** 1958; **Bradbury** 1980) until **Chirichigno** (1978) reported upon a 166 mm SL specimen from Puerto Pizarro, Peru (03°30'S, 80°23'W), and mentioned an additional record (but without a specimen) from Banco de Máncora (03°35.3'S, 81°05.6'W). An additional specimen, now in the collection of the Scripps Institution of Oceanography (SIO 80-48), is also from Peru (03°30'S, 81°03.5'W) and is clearly conspecific; however, the accuracy of the collection data and location were questionable according to the late **C. L. Hubbs**.

While scuba-diving and aboard the submersible *Johnson Sea-Link*, one of us (**JMc**) had the opportunity to observe *O. darwini* on several occasions between shallow depths (a few meters) and 120 m at Isla Española. This depth exceeds the previous range of 3.5-73.5 m (**Bradbury** 1980: 282).

Although partially digested specimens of *O. darwini* have been discovered in the stomachs of Galápagos horn sharks (*Heterodontus quoyi*) (**Bradbury** 1980), **McCosker** and **Rosenblatt** (1984) pondered as to the defense that this sedentary, non-cryptic species might possess. During a submersible dive at Isla Española, **McCosker** observed a large school of ocean whitefish (*Caulolatilus princeps*) in water 110 m deep attracted to the lights of the submersible. Several of the whitefish noticed an individual *O. darwini* and picked it up, then dropped it, several times. Another specimen, from South Plaza Island (SIO 81-197), was reported to have been "vomited up by sea lions" (presumably *Zalophus californianus wollebaeki*). Something about *O. darwini* might be highly distasteful, in that *Caulolatilus* and *Zalophus* are extremely catholic in their diets. **McCosker** licked the skin surface of a live shallow water specimen (but did not eat a living specimen) and did not find it distasteful.

Dibranchus erinaceus (Garman)

Figs 2, 3A; Table 1

Malthopsis erinacea **Garman** 1899: 103, plate XIX (8 specimens from eastern tropical Pacific). **Bradbury** 1962: 3 (lectotype selected, MCZ 28712, from the Galápagos Islands)

Dibranchus erinaceus, **Bradbury** 1967: 414 (diagnosis of *Dibranchus*).

Material

Cocos Island: CAS 60476 (8, 37.0-97.0 mm SL), *Arcturus* 74 OT-4, 60 mi. S of Cocos Id, 4°50'N, 87°00'W, 1143 m. **Galápagos Islands:** CAS 86503 (3, 83.8-105.2 mm SL), JSL 3977, James Bay, Isla San Salvadore, 914 m, **J. E. McCosker** and party. CAS 86529 (2, 98.0-105.8 mm SL), JSL 3949, off Cabo Rosa, Isla Isabella, 744 m, **J. E. McCosker** and party. CAS 86533 (1, 105.5 mm SL), JSL 3976, James Bay, Isla San Salvadore, 914 m, **J. E. McCosker** and party. MCZ 28712 (114.0 mm SL, lectotype), and MCZ 41598 (81.0 mm SL), *Albatross* sta. 3402, 0°57'30"S, 89°03'30'W, 770 m. SIO 90-71 (110.0 mm SL), 1°37.73'S, 90°10.7'W, between 310 and 965 m. USNM 135579 (90.0 mm SL), *Albatross*, 0°29'S, 89°54'30"W, 715 m. **Off Península de Azuero, Panamá:** MCZ 28711 (102.0 mm SL), *Albatross* sta. 3358, 6°30'N, 81°44'W, 1015 m.

Diagnosis

Teeth on vomer and palatines. Tubercles distributed over entire body, consisting of moderate size tubercles interspersed with tiny tubercles. Subopercular lateral-line count usually 6, preopercular lateral-line count usually 3.

Description

Proportions given as the mean and range of the percentage of standard length. Disk margin length 45.0 (41.6-48.5); skull length 28.0 (26.4-29.5); jaw to anal fin 76.2 (73.4-77.6); jaw to anus 54.0 (52.2-56.8); snout to dorsal fin 63.4 (60.9-

66.1); interorbital 8.2 (7.2-9.4); width of cranium 19.9 (16.9-21.6); jaw length 10.9 (9.6-11.7); mouth width 17.2 (15.3-18.4); eye width 11.8 (9.6-13.6).

Counts: dorsal 5-6, pectorals 12-14, subopercular lateral-line usually 6 (range 5-7); preopercular lateral-line usually 3 (range 2-4); dorsolateral branch of subopercular series usually 3 (range 2-4), tail lateral-line 10-14, vertebral count 18-20.

Skeleton relatively rigid, skin firm. Rostrum triangular in shape when viewed from above, overhanging mouth in small specimens but becoming just a narrow shelf in larger specimens. When viewed from above, a notch is conspicuous on either side at the base of the rostrum where the supraoccipital lateralis channel passes from the face to the top of the cranium. Esca broader than high, consisting of a median dorsal lobe continuous with two ventral lobes which frontally are smoothly connected with one another across the midline but which are spheroid and swollen behind, sometimes flared out laterally, and subtended by a bordering ridge of tissue. Olfactory organs sexually dimorphic: in females, olfactory capsule relatively small with few small lamellae within, the nostrils small and round; in males, the capsule large, swollen by enormous lamellae within, the posterior nostril a long, gaping slit.

Sagitta (Fig. 3A) slightly longer than broad; inner face flat, outer face moderately convex. Sulcus as a deep incision in the center of the inner face, bordered by a short, acute crista superior and a weakly developed crista inferior; anterior colliculum absent, posterior colliculum shallow, radiating from sulcus and becoming wide posteriorly. Dorsal rim smooth; ventral rim edged with large scallops, two deep grooves from either side of central lobe to near sulcus. Weakly developed ridge partly encircles sulcus.

Teeth in oral and gill cavities simple, small, recurved, in bands on jaws, visible when mouth closed. Present also on palatines and vomer, and on each ceratobranchial V, these latter two tooth plates contiguous along the midline. Gill rakers in the form of pedicels capped by small tooth plates, 6 on each side of lower limb of second arch.

Tubercles on dorsal surface of disk moderate size with relatively short stout spines, fairly uniform in size except as noted below. Larger tubercles occur in longitudinal series on either side of the trunk and both dorsal and ventral sides of the tail. Larger tubercles also along edges of disk and sides of tail, these usually with extra spinules that are much smaller than terminal spines. Subopercular spines relatively long, 6-8 spinelets. Tiny tubercles evenly distributed in skin of eyeballs. Tubercles of ventral surface of disk much smaller than those of dorsal surface, closely spaced, evenly distributed. Paired fins and caudal with sparse tubercles running out on fin rays a short distance. Dermal cirri usually present along disk margins and sides of tail; not abundant. Large cirri in form of fringed flaps associated with neuromasts. Fins moderate, pectorals slender, pelvic rays with thickened skin.

Color in preservative. Pale, tan or grey; in some specimens, fins, esca, and nasal capsules blotched with black. Cirri associated with lateralis channels on face and ventral surface of disk also blackish; lining of gill cavities dark brown, epithelium of gill bars also brown, contrasting with white gill rakers; peritoneum blotched with black. **Garman** (1899: 104) stated "young individuals blackish."

Color in life. Head and body uniform gray, tail slightly darker. All fins gray, median fins paler at posterior margins. Lips and lower jaw pale. Esca orange.

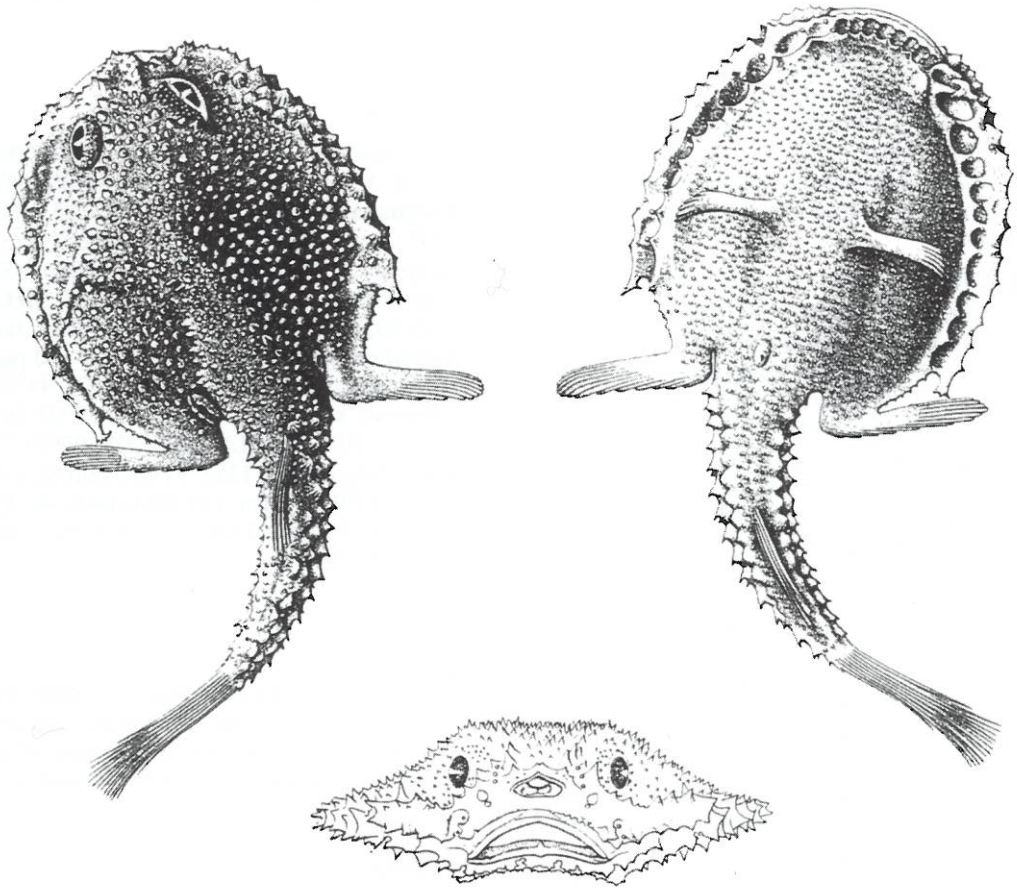

Fig. 2. - *Dibranchus erinaceus,* from **Garman** (1899: plate XIX). Upper left, dorsal view. Upper right, ventral view. Bottom, anterior view.
Dibranchus erinaceus, d'après **Garman** (1899 : planche XIX). En haut à gauche, face dorsale. En haut à droite, face ventrale. En bas, face antérieure.

Dibranchus discors new species
Figs 3B, 4; Table 1

Holotype. CAS 86502 (107.9 mm SL, female), JSL 3957, 00°17.5'S, 91°38.9'W, Isla Fernandina, off Cabo Douglas, 340 m, 16 Nov. 1995, **J. E. McCosker** and party.

Paratypes. CAS-SU 47195 (87.2 mm SL, female), *Albatross* sta. 4642, 1°30'30»S, 89°35'W, 549 m, 7 Nov 1904; CAS 86542 (88.2 mm SL, male), JSL 3974, N shore of Tower Island, 00°21.6'S, 89°58.3'W, 373 m, **J. E. McCosker** and party; SIO 90-71 (80.2 mm SL, female), Galápagos Islands, 1°37.73'S, 90°10.7'W, between 310-965 m, rock dredge, 1 Feb 1990. USNM 344535 (84.1 m SL, male), JSL 3957, 00°17.5'S, 91°38.9'W, Isla Fernandina, off Cabo Douglas, 415 m, **J. E. McCosker** and party.

Diagnosis

Teeth present on palatines and vomer. Interorbital and mouth exceptionally narrow. No tubercles in skin on eyeballs; no tubercles on ventral surface of disk except a few near bases of pelvics. Conspicuous oval chalk-white marking in midline of chin.

Description

Proportions given as the mean and range of the percentage of standard length; values are about average for the genus except where noted. Disk margin relatively long, 47.1 (44.1-49.6); skull length 27.6 (27.2-28.1); distance from jaw to anal fin 78.5 (76.6-79.9); distance from jaw to anus 53.3 (50.5-55.6); distance from snout to dorsal fin 62.0 (59.2-65.1); interorbital very narrow, 4.6 (3.5-5.1); width of cranium 22.3 (20.1-24.3); jaw very short, 6.9 (5.2-8.3); mouth very narrow, its width 10.8(10.2-11.5); eye large, prominent, its width 12.9 (12.0-13.8); depth of caudal peduncle 2.3 (2.0-2.8); length of pectoral fin 24.3 (22.3-27.0).

Counts from 5 specimens: dorsal 6-7, pectorals 12-14, subopercular lateral line 6, preopercular lateral line 2, dorsolateral branch of subopercular series 2, tail lateral line 10-13, vertebrae 18-20.

Body, including skin, relatively firm. Rostrum short, narrow, upturned, about even with jaws. Esca higher than wide, ventral margin with a membranous fringe. Illicium of one specimen (CAS 47195) cleared and stained; somewhat compressed from side to side, nevertheless agrees with *Dibranchus* in lacking a medial dorsal process and in having the two lateral processes each perforated by a large foramen. Olfactory organs in males somewhat larger than in females, the posterior nostril slit-shaped, but this sexual dimorphism less pronounced than in other *Dibranchus*; females show no swelling or enlargement and have both anterior and posterior nostrils small and round. A unique chalk-white oval patch in midline of chin, which encompasses the chin lateral-line scales, so the sculptured appearance is really due to the presence of normal lateral-line scales and cirri. The skin in this patch is tough; it does not appear glandular.

Sagitta (Fig. 3B) longer than wide. Inner and outer faces both moderately convex and smooth. Sulcus short but deeply incised medially on inner face. Crista superior short and moderately developed, crista inferior poorly developed. Anterior and posterior colliculi short and poorly developed. Dorsal rim smooth. Ventral rim with weak crenulations.

Teeth in oral and gill cavities simple, small, recurved, in bands on jaws and on palatines and vomer; each ceratobranchial V with a tooth plate. Gill rakers formed as pedicles capped by tooth plates, 5 on each side of lower limb of second arch.

Tubercles relatively large, widely spaced, each with a short, stout spine, the largest with minute spinules (requiring magnification to see) radiating from central spine, sprinkled over dorsal surface of disk and pectoral pedicles with intervening skin bare. Relatively prominent tubercles present in longitudinal rows on dorsal surface of trunk and all surfaces of tail. Along edge of disk, tubercles multifid. No tubercles in skin covering eyeballs. Few tubercles on ventral surface of disk except small tubercles along midline, especially between pelvics. Small cirri thinly scattered; large fringed cirri associated with lateral-line scales. Paired fins slender, moderately strong, fin membranes transparent; tips of pectoral rays fleshy. No tubercles on fins.

Color in preservative. Albatross specimen (CAS-SU 47195) faded white. Other specimens medium brown dorsally with tubercles pale, appearing as pale spots all over dorsal surface of body. A dark saddle on tail beneath dorsal fin, the dark color continuing onto dorsal fin. Ventral surface pale; pectorals, anal, and pelvics pale. A conspicuous oval chalk-white patch on chin, its effect intensified by black edging consisting of black cirri. A black circle around each anterior nostril, giving the effect of a mustache.

Color in life. Dorsal surface light brown with pale tubercles making whitish spots. Ventral surface pale, esca brown, fins pink except dorsal which is brown. Brownish saddle over tail under dorsal fin. Dark margin around anterior nostrils gives effect of a moustache. Oval chalk white marking at midline of chin, surrounded by border of blackish cirri.

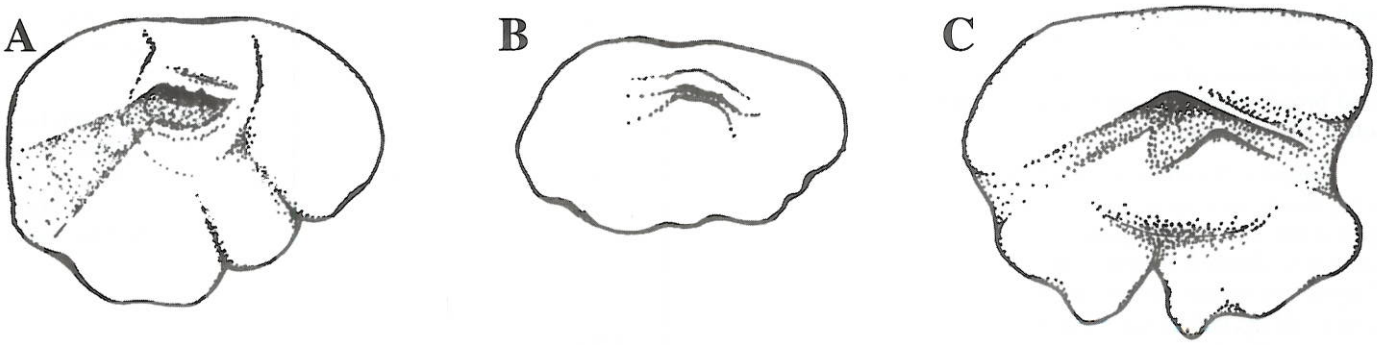

Fig. 3. - *Dibranchus* otoliths, inner face of right sagitta, anterior end directed to the right. A. *Dibranchus erinaceus,* CAS 86529, 105.8 mm SL; B. *D. discors,* CAS 86542, 88.2 mm SL; C. *D. cracens,* CAS 88034, 128 mm SL.
Dibranchus, otolithes, face interne de la sagitta droite, extrémité antérieure dirigée vers la droite. A. *Dibranchus erinaceus,* CAS 86529, 105,8 mm LS ; B. *D. discors,* n.sp., CAS 86542, 88,2 mm LS ; C. *D. cracens,* CAS 88034, 128 mm LS.

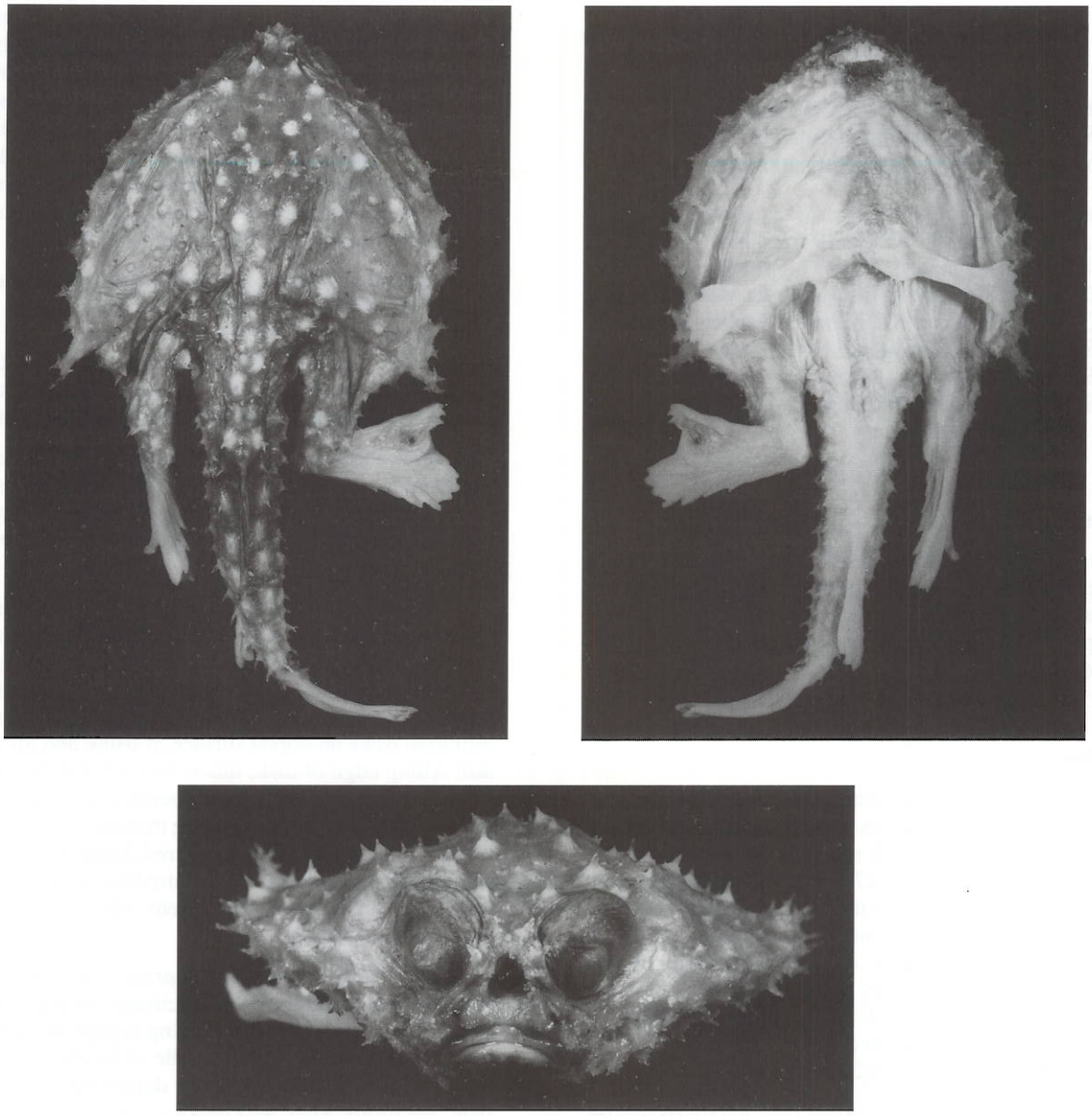

Fig. 4. - Holotype of *Dibranchus discors,* new species, CAS 86502, 107.9 mm SL, Isla Fernandina, Galápagos Islands. Upper left, dorsal view. Upper right, ventral view. Bottom, anterior view.
Holotype de *Dibranchus discors* n. sp., CAS 86502, 107,9 mm LS, Ile Fernandina, Iles Galapagos. En haut à gauche, face dorsale. En hauit à droite, face ventrale. En bas, face antérieure.

Name. The name *discors* means unlike, or different, in reference to the aberrant shape of the head in this *Dibranchus*, manifested chiefly by the extremely narrow interorbital space and narrow mouth with enlarged eyes. Also, although the characteristics of the illicial bone are those of *Dibranchus*, the proportions of the bone (high and narrow instead of low and broad when viewed frontally) differ from those of all other *Dibranchus*.

Remarks. No other ogcocephalid features the chalk white chin patch seen in *D. discors*. The tissue does not appear glandular, but at first glance the surface appears irregular, almost sculptured; the effect proves to be due to pits between lateral-line organs (which are normally present in this position in all ogcocephalids). The shape of its sagitta also differentiates *D. discors* from those congenors examined. Its sagitta is proportionately smaller, its ventral face is sculptured, it has a short, deep sulcus with a barely developed colliculum, and it is thinner laterally.

Dibranchus cracens new species
Figs 3C, 5-6; Table 1

Holotype. CAS 86516 (119.1 mm SL, male), JSL 3947, off Cabo San Rosa, Isla Isabella, 01°04.7'S, 91°11.9'W, 480 m, 10 Nov. 1995, **J.E. McCosker** and party.

Paratypes. CAS 82222 (102.0 mm SL, male), between Islas Santa Cruz and Floreana, 350 m, dredge, collected by **A. deRoy** and **J. deRoy**, 1978; CAS 88034 (128.3 mm SL, male), JSL 3957, off Cabo Douglas, Isla Fernandina, 00°17.5'S, 91°38.9'W, 354 m, 16 Nov. 1995, **J.E. McCosker** and party.

Diagnosis

No palatal teeth. Preopercular lateral-line count 2. Large tubercles decorated with rows of boss-like spinules radiating out from central spine.

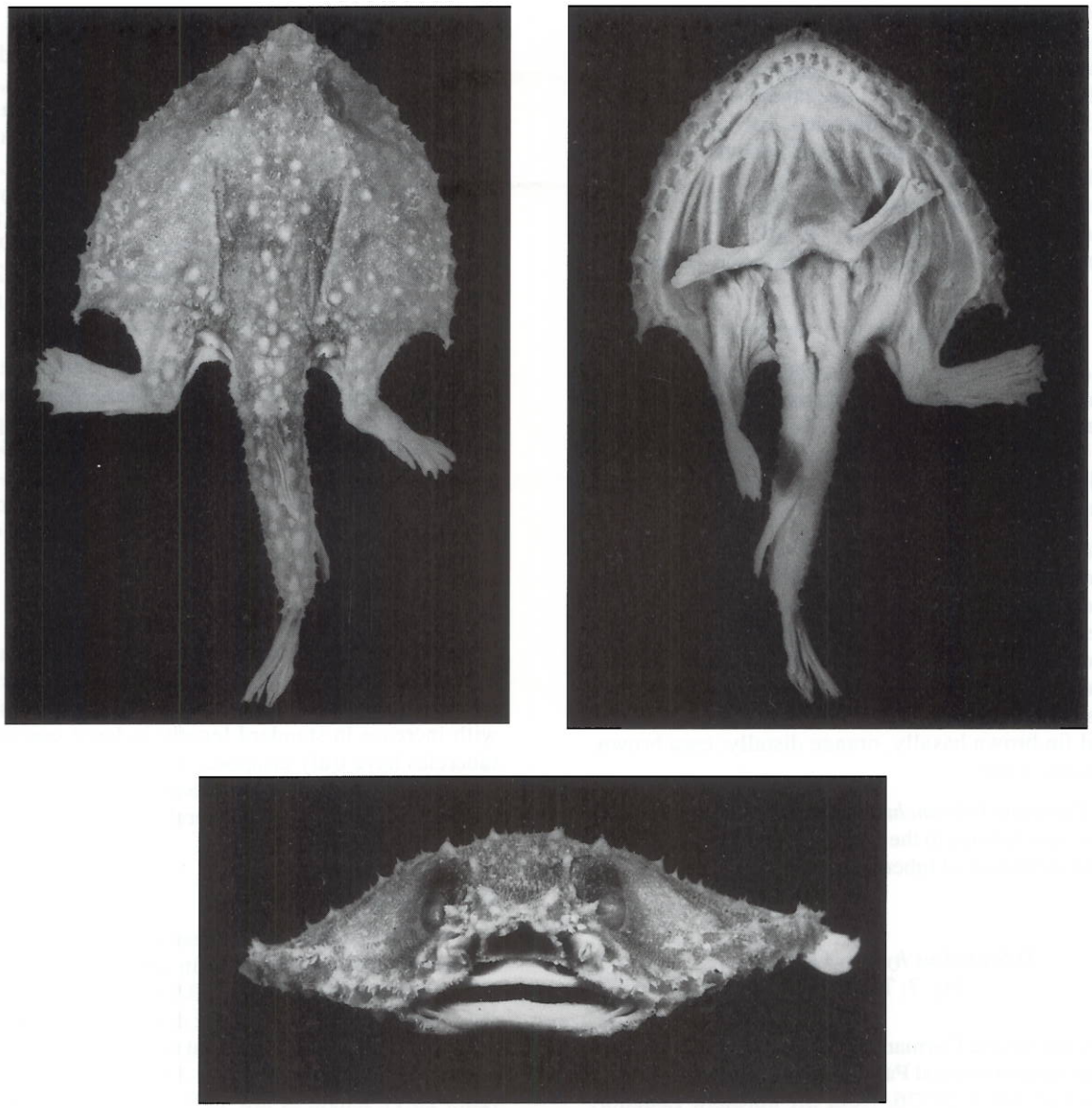

Fig. 5. - Holotype of *Dibranchus cracens,* new species, CAS 86516, 119.1 mm SL, Isla Isabella, Galápagos Islands. Upper left, dorsal view. Upper right, ventral view. Bottom, anterior view.
Holotype de *Dibranchus cracens* n. sp., CAS 86516, 119,1 mm LS, Ile Isabella, Iles Galapagos. En haut à gauche, face dorsale. En haut à droite, face ventrale. En bas, face antérieure.

Description

Proportions given as the mean and range of the percentage of standard length; values are about average except where indicated. Length of disk margin 45.0 (43.2-45.9); skull length 30.0 (29.4-30.4); distance from jaw to anal fin 77.2 (73.4-80.9); distance from jaw to anus 55.3 (53.2-57.8); distance from snout to dorsal fin 65.0 (62.4-66.4); interorbital relatively wide, 11.3 (10.0-12.6); width of cranium 23.5 (21.2-26.1); jaw length 13.1 (10.6-14.6); mouth relatively wide, 22.1 (21.2-23.2); width of eye 11.6 (10.6-12.4); depth of caudal peduncle 2.9 (2.3-3.3); length of pectoral 24.3 (22.4-27.8).

Counts for the three specimens: dorsal fin 6, pectorals 12-13, subopercular lateral line 6, preopercular lateral line 2, dorsolateral branch of subopercular series 3, tail lateral line 12-14, vertebrae 18-19.

Body relatively firm, skin tough. Rostrum short, bluntly triangular, scarcely overhanging mouth; when viewed from above, rostrum appears notched on either side owing to excavations of supraorbital lateral line. Illicium of CAS 88034 was stained and cleared, revealing that illicial bone morphology is typical for *Dibranchus*. Esca broader than high, consisting of a median dorsal lobe and two ventral lobes, these ventral lobes relatively well-separated. All three specimens are males; these have olfactory organs typical for males in *Dibranchus*, that is, swollen by enlarged lamellae within, the posterior nostril a long vertical, gaping slit.

Teeth in oral and gill cavities simple, small, recurved, in bands of jaws, visible when mouth closed. No palatal teeth. Each ceratobranchial V with a broad tooth plate, the two contiguous along the midline. Gill rakers formed as pedicels capped by small tooth plates, about 6 of these structures on each side of lower limb of second gill arch.

Sagitta (Fig. 3C) nearly as broad as long. Sulcus an obtuse chevron, deeply incised medially, becoming shallow anteriorly and posteriorly. Anterior and posterior colliculi with smoothly rounded distal margins Dorsal rim smooth, ventral rim scalloped with a deep incision on the median side. A shallow depression between the sulcus and the incision of the ventral rim.

Large tubercles on body have rows of boss-like spinules radiating out from short, stout center spines, these tubercles sprinkled in an orderly pattern on dorsal surface of disk and in longitudinal rows on the tail. Spaces between large tubercles

packed with tiny tubercles. Subopercular spines moderate in size. Ventral surface of disk and pectoral pedicles thickly covered with tiny tubercles. Ventral surface of tail covered by four orderly longitudinal rows of large tubercles. Skin of eyeballs thickly covered with tiny tubercles. Tiny tubercles also present on fin rays of dorsal and caudal fins and dorsal side of pectoral fins, running out about half the length of the fin. Ventral surfaces of pelvics with tubercles near base. Dermal cirri very numerous around mouth but otherwise not abundant. Enlarged, flap-like cirri associated with lateral-line scales.

Paired fins relatively slender; fin membranes transparent.

Color in Preservative. One specimen faded white, but others light brown with tubercles pale so they seem like pale spots. Olfactory capsule dark or pale. Dark saddle across tail at base of dorsal fin. Ventral surface of body pale. Caudal dusky on dorsal half, otherwise pale. Dorsal dark basally, pale distally. Paired fins and anal fin pale.

Color in life. Holotype with dorsal surface of body salmon colored, tubercles white; dorsal, caudal and pectoral fins salmon to orange. Faint dark saddle across tail at base of dorsal fin. Ventral surface of body white, pelvic and anal fins pink. Lower jaw and tip of snout white, esca red-orange, eyes blue. Paratype, CAS 88034, with dorsal surface brown, tubercles white; orange around ventral body margin, tail, and fins; dorsal fin brown basally, orange distally; esca brown, mouth and anus white.

Name. The name *Dibranchus cracens* means a neat or tidy *Dibranchus*, in reference to the firm, trim body and regularity of size and distribution of tubercles.

Dibranchus hystrix Garman
Fig. 7; Table 1

Dibranchus hystrix Garman 1899: 92, plate XXIII (3 specimens from eastern tropical Pacific). **Bradbury** 1962:2 (lectotype selected, MCZ 28776, from off northern Ecuador, 2196 m.)

Material

CAS-SU 46287 (5, 41.0-75.0 mm SL) and CAS-SU 46657 (125.0 mm SL), *Arcturus* 74-D-1, 4°50'N, 87°00'W, 1543 m. CAS 82242 (4, 41.1-83.1 mm SL), *Anton Bruun* Cr. 18B, sta. 776, 4° 10'S, 81°27'W, 1815-1860 m. LACM 33588-5 (64.0 mm SL), *Velero* 18932. Costa Rica, 14 mi. off Punta Guiones. MCZ 28726 (83.0 mm SL, lectotype), *Albatross* sta. 3375, 2° 34'N, 82°29'W, 2196 m. MCZ 28727 (63.5 mm SL), *Albatross* sta. 3392, 7°05'30»N, 79°40'W, 2323 m. MCZ 28728 (56.0 mm SL), *Albatross* sta. 3362, 5°56'N, 85°10'30»W, 2149 m. USNM 135364 (2, 53.2-80.0 mm SL), 0°24'S, 89°06'W, 1485 m.

Three specimens in 2 lots, which apparently were allowed to dry out and are therefore difficult to identify, are provisionally identified as *D. hystrix* even though their depth of capture is relatively shallow. They are CAS-SU 46656 (1), *Arcturus* 61-T-4, 4°56'N, 84°35'W, 914 m, and CAS-SU 57662 (2), *Arcturus* 84-T-20, 2.6 km N of Isla Fernandina, 0°17'S, 91°34'W, 914 m (only known specimens from the Galápagos Islands).

Diagnosis

No palatal teeth. Skin between large tubercles largely bare of small tubercles. On ventral surface of disk, tubercles small, widely spaced so skin seems naked, this effect intensifying with increase in standard length; in large specimens these tubercles have truly disappeared. Spines of tubercles on tail extremely long and recurved. Subopercular spines very long and curved. Subopercular lateral-line count usually 5 (most *Dibranchus* have 6).

Description

Proportions given as the mean and range of the percentage of standard length. Disk margin relatively short, 42.8 (39.9-47.3); skull relatively long, 30.9 (28.7-32.9); distance from jaw to anal fin 76.8 (73.2-80.5); distance from jaw to anus 56.2 (52.0-59.8); distance from snout to dorsal fin 64.0 (60.7-66.9); width of interorbital 10.2 (9.1-11.3); width of cranium 22.6 (20.3-25.1); length of jaw 14.9 (13.4-16.4); width of mouth 22.2 (18.8-25.3); width of eye 12.4 (11.5-14.8).

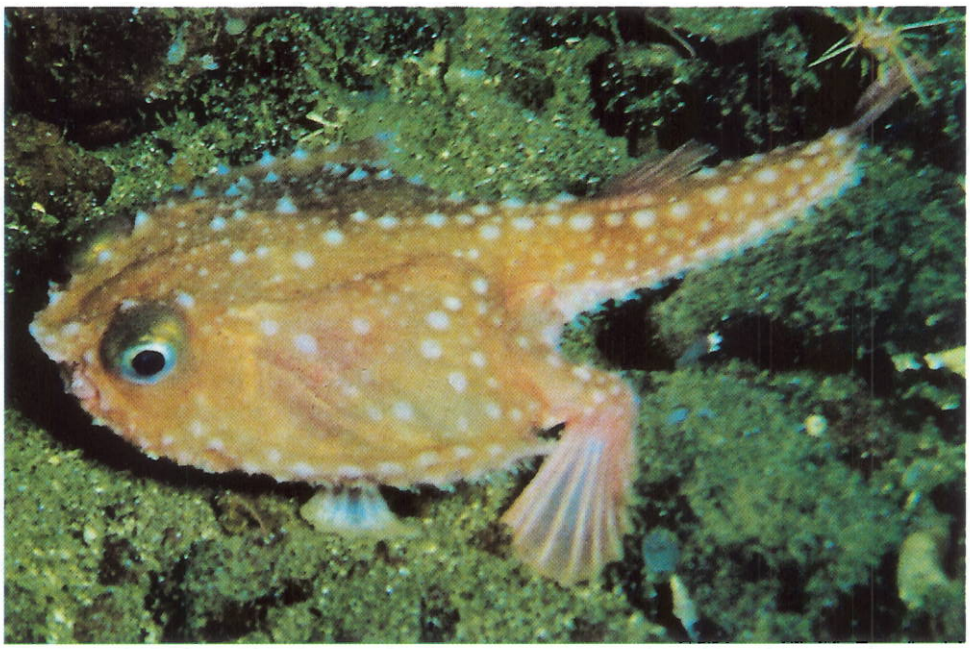

Fig. 6. - Holotype of *Dibranchus cracens,* new species, photographed from submersible before capture, 480 m, Isla Isabella, Galápagos Islands.
Holotype de *Dibranchus cracens* n. sp., photographié depuis le submersible avant sa capture, 480 m, Ile Isabella, Iles Galapagos.

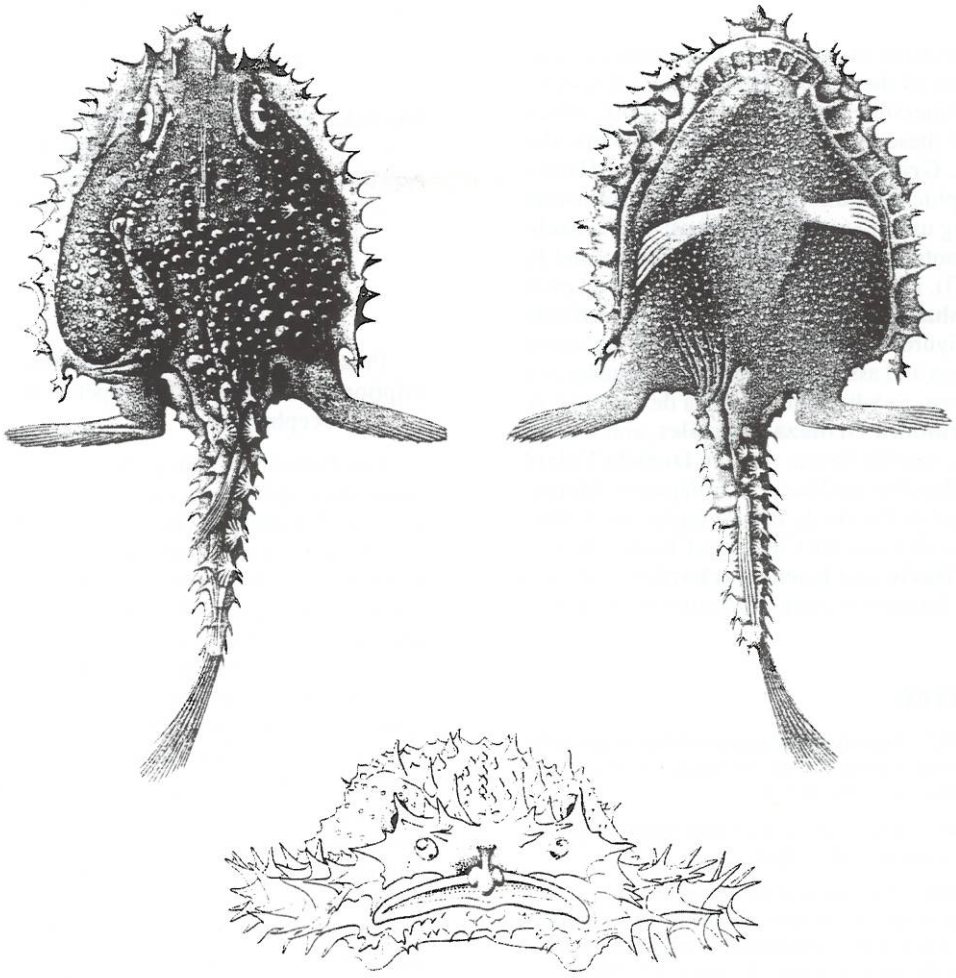

Fig. 7. - *Dibranchus hystrix,* from **Garman** (1899: plate XXIII). Upper left, dorsal view. Upper right, ventral view. Bottom, anterior view.
Dibranchus hystrix, d'après **Garman** (1899 : planche XXIII). En haut à gauche, face dorsale. En haut à droite, face ventrale. En bas, face antérieure.

Counts: dorsal 4-6, pectorals 12-14, subopercular lateral line 5-6, preopercular lateral line 2, dorsolateral branch of subopercular series 3, tail lateral line 8-13, vertebrae 18-20.

Skeleton pliant, body may be flabby, depending upon preservation. Subopercles weakly calcified so lateral sides of disk tend to roll up in preservative. Skin thin, flabby, especially soft on ventral surface of disk. Rostrum triangular, slightly overhanging mouth, a deep notch on either side is the channel for supraorbital lateral-line series. Esca broader than high, consisting of a dorsal lobe and two ventral lobes, although frontal view shows little division between the three. Olfactory organs in males swollen by enlarged lamellae within, the posterior nostril a long vertical, gaping slit. In females, olfactory organs small with two small round nostrils.

Teeth in oral and gill cavities small, simple, recurved, present in bands on jaws. No palatal teeth. A pad of teeth on each ceratobranchial V, the two abutting in midline. Gill rakers formed as pedicles capped by small tooth plates.

Tubercles widely spaced over dorsal surface of disk and pectoral pedicels, skin bare in the intervals, tubercles varied in size but spines always relatively stout and long. Largest tubercles occur on edges of disk, where they are bifid, on face, and on dorsal and lateral sides of tail, where they are close together with extremely long, recurved spines. Subopercular spines extremely long with 4-5 spinelets. Skin covering eyeballs with small, widely-spaced tubercles. Ventral surface of disk with small, widely-spaced tubercles in small specimens, becoming inconspicuous with increase in body size, virtually absent in large individuals; skin thin and flaccid. Fins devoid of tubercles except a few sometimes present at base of pectorals. Dermal cirri relatively sparse, present around margins of disk and lateral sides of tail. Cirri associated with neuromasts formed as fringed flaps. Pectoral fins slender. Pelvic fins with thickened skin on rays.

Color. **Garman** (1899, p.91) states: "Color a rich dark chestnut to chocolate brown; fins black." Preserved specimens become pale, but sometimes have gill and buccal cavities and peritoneum covered with melanophores, giving a brown effect.

Remarks

Dibranchus hystrix Garman was not taken by the *JSL* Expedition. There is only one possible record from the Galápagos known to us; a small specimen from a former expedition to the Galapágos, CAS-SU 57662, was apparently allowed to dry out and is now impossible to identify with certainty, but is most probably *D. hystrix*. Certainly the known range, mouth of the Gulf of California to the Gulf of Guayaquil and west nearly to the Galápagos, argues for its occurrence in the Archipelago. We conclude that it is likely that *D. hystrix* will be found to occur there. *Dibranchus hystrix* is a relatively deep water species, known from 914 to 2323 m. Of the Galápagos forms, only *D. erinaceus* approaches those depths, occurring from 715-1143 m.

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RÉSUMÉ

Poissons Chauves-souris des Iles Galapagos avec description de deux nouvelles espèces de *Dibranchus* (Teleostei : Ogcocephalidae).

Les Poissons Chauves-Souris, sont rassemblés dans le sous-Ordre des Ogcocephalioidei de l'Ordre des Lophiiformes (Poissons-Pêcheurs), au voisinage des Baudroies (Lophiidae) et des Antennaires (Antennariidae, Poissons Grenouilles). Tous possèdent un "filament pêcheur" (illicium) terminé par un leurre (esca) qui imite plus ou moins une proie - petit Poisson ou Crustacé - quand le Poisson agite cet organite qui correspond en fait au premier rayon de la dorsale ; au repos, il peut être dissimulé dans un sillon médiodorsal plus ou moins profond (voir ci-dessus : Introduction). Le nom anglais vernaculaire de "Batfishes" a longtemps prêté à confusion, car il désignait aussi un Platacidé, à cause des longues nageoires sombres de ce dernier. Soucieux d'éviter ces confusions, les auteurs anglo-saxons réservent à présent le nom de Batfishes aux seuls Ogcocephalioides. Ils seraient utiles en aquarium si l'on désire se débarasser des Polychètes (certains urticants, comme *Eurythoe* ou *Staurocephalus*) qui envahissent le sol de certains bassins. En réalité, ces Vers assurent une certaine hygiène du bac en dévorant les restes de nourriture qui tombent sur le fond et finissent parfois par polluer le substrat. Certains Poissons (Labridés, par exemple) consomment ces Polychètes. Introduire un *Platax,* comme cela fut conseillé dans un Périodique "semi-populaire", destiné aux aquariophiles, est un exemple des conséquences fâcheuses de l'attribution d'un même nom à deux groupes radicalement différents.

Tois espèces d'Ogcocéphalidés étaient connues des Galapagos : *Dibranchus erinaceus* (Garman, 1899), *D. hystrix* (Garman, 1899) et *Ogcocephalus darwini* Hubbs 1958.

Dibranchus est caractérisé par la présence de branchies sur les arc 2 et 3 seulement. Un profond sillon médio-dorsal, sur le crâne, abrite l'illicium au repos. Les deux espèces mentionnées plus haut fréquentent des fonds sableux entre 715 et 2323 m ; les deux espèces nouvelles décrites ici (*D. cracens* et *D. discors*) occupent des pentes plus raides entre 310 et 549 m, selon les observations réalisées à bord d'un submersible de recherche (*Johnson Sea-Link*) et l'examen des bandes vidéo prises au cours des plongées.