

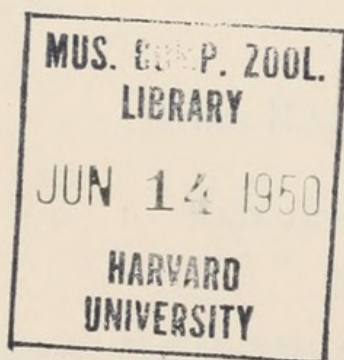
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NEW AND LITTLE KNOWN CARTILAGINOUS
FISHES FROM THE ATLANTIC

By HENRY B. ^{ryant}BIGELOW and WILLIAM C. ^{Charles}SCHROEDER

WITH SEVEN PLATES



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No. 7 — *New and little known Cartilaginous Fishes from the Atlantic*¹

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WITH SEVEN PLATES

Batoidei

Family RAJIDAE

Skates

The rajid fauna of shoal water off eastern North America may be regarded as fairly well known so far as the identity of its constituent species is concerned. But the recent discovery along the 200–500 fathom zone off Cuba and in the Gulf of Mexico of an abundant population of small skates, the existence of which had not been suspected previously, shows that we have much to learn of the skates that exist in depths greater than 200 fathoms or so in the western North Atlantic. Descriptions of three of these species, representing two new genera *Breviraja* and *Cruriraja*, have already appeared (Bigelow and Schroeder, 1948). Here we describe and picture five more new species of *Breviraja* and two new deep water species of the old genus *Raja*.

Genus *RAJA* Linnaeus, 1758

RAJA JENSENI spec. nov.

Plate 1

Type Specimen. Female 541 mm. long, continental slope off southern New England, Lat. 39°35'N., Long. 71°21'W., 1043 fathoms, U. S. National Museum, No. 35592.

Additional Material. Male 223 mm. long, Lat. 41°09'N., Long. 66°02'W., 1255 fathoms, U. S. National Museum, No. 33457; and female about 850 mm. long, in very fragmentary condition, upper part of continental slope off Halifax, Nova Scotia, about 200 fathoms, U. S. National Museum, No. 23483. This last specimen, caught from the fishing schooner AUGUSTA H. JOHNSTON, Captain G. A. Johnston, is catalogued as from Lat. 42°37'N., Long. 62°55'W. But

¹ Contribution No. 511 from the Woods Hole Oceanographic Institution.

the depth at which it was taken locates it as from closer in shore and a few miles farther north.

Diagnostic Characters. This skate resembles *R. hyperborea* Collett, 1878, so closely that it might easily be mistaken for the latter. It is set apart from *hyperborea* sharply by having 56–66 series of teeth (only 38–44 in *hyperborea*) and by lacking thorns on the anterior margins and mid-posterior parts of the pectorals and either side of the mid-dorsal line on the disc rearward from the nuchal region.

Description. Disc about 1.35 times as wide as long, maximum anterior angle to level of spiracles 90° ; tip of snout rounded, not noticeably projecting; anterior margins nearly straight except slightly convex opposite orbits, general contour thus broadly wedge-shaped; outer and posterior corners both rather abruptly rounded; posterior margins nearly straight; axis of greatest breadth about 73 per cent of distance rearward from tip of snout toward level of axils of pectorals. Tail from center of cloaca about 63 per cent as long to first dorsal and about 90 per cent as long to tip as from center of cloaca to tip of snout.

A few small thorns along rostral ridge, one larger close in front of each orbit; one close behind orbit and one inward-rearward from each spiracle; three large on each scapular region arranged thus \therefore ; also a median row of 24 or 25 conspicuous thorns on radiate bases, from nuchal region to first dorsal fin, 7 of them anterior to level of axils of pectorals, largest on disc, successively smaller along rear part of tail. Skin of disc also prickly (in addition to the larger thorns) on snout, between orbits, above eyes, in advance of scapular regions, over greater part of pectorals, and along posterior part of mid-dorsal belt; but naked along either side of latter and around posterior margins of pectorals. Pelvics with a few prickles on inner parts but without thorns (more or less thorny on *R. hyperborea*). First and second dorsals with a few minute prickles. Each side of tail with a densely prickly band from base to tip. Lower surface smooth on disc and tail.

Evidently the thorns on the disc decrease somewhat in number and in relative size with growth, for the juvenile male, 223 mm. long, is more thorny along the rostral ridge; it has several smaller thorns around the anterior and inner margins of each orbit, in addition to the two larger ones that persist there on the type specimen, also 4 thorns on each scapular region (only 3 on the type) and 31 in the mid-dorsal row, nuchal region to first dorsal. The disc also is more uniformly prickly on small specimens than on larger, with only a narrow naked band around the posterior margins of the pectorals; and the pelvics are more prickly on their inner parts.

Snout in front of orbits about 2.3 times as long as distance between orbits; its length in front of mouth about 1.3 times as great as distance

between exposed nostrils. Orbit about 72 per cent as long as distance between orbits and about 1.8 times as long as spiracle. Nasal curtain fringed; expanded outer posterior margin of nostril smooth. Mouth very little arched. Teeth in about 66 series above, with sharp cusp, loosely spaced in transverse rows. Distance between inner ends of fifth gill openings about 1.1 times as great as between exposed nostrils. First and second dorsal fins about alike in size and shape and separated by a very short interspace without thorns. Pelvics deeply concave; anterior margin only about 47 per cent as long as from pelvic origin to rear tips; anterior lobe narrowly rounded; posterior lobe moderately convex outwardly, the rear tip abrupt, extending back about 40 per cent of distance from level of axils of pectorals toward first dorsal.

Upper surface (after many years in alcohol) plain light grayish brown, a little darker along margins of fins; lower surface brownish gray, dusky around cloaca and on inner parts of pelvics.

The largest specimen so far seen (a female) is about 850 mm. long, suggesting that the maximum size is about the same as for *R. hyperborea*.

Remarks. Accounts of the largest of the three specimens listed above have already appeared, by Jensen (1914, p. 31), and by us (1927, p. 246; 1934, p. 29), under the name *R. granulata* Goode and Bean, 1879. But it seems practically certain, from the original account (Goode and Bean, 1879, p. 28) and from the subsequent illustration (Goode and Bean, 1895, pl. 9, fig. 30) of the type specimen of *granulata* that the latter is a synonym of *R. laevis* Mitchill, 1817. A new name is therefore needed for the skate described here. We propose *jenseni* in recognition of Dr. A. S. Jensen's contributions to the ichthyology of the North Atlantic.

The largest of the three specimens listed above (Study Material, p. 385) was earlier characterized by us (Bigelow and Schroeder, 1927, p. 246; 1934, p. 29) as with minute rounded tubercles on the lower surface. Renewed examination, however, has shown that Jensen's (1914, p. 32, footnote 2) account of it as smooth below was correct. The supposed tubercles (no longer to be seen or felt) doubtless were nothing more than grains of sand embedded in the coagulated mucous with which the skin of the lower surface is coated.

Habits. The localities and depths of capture indicate that this is a deep water species, finding its upper limit at about 200 fathoms, else fishermen would almost certainly pick it up along the upper slopes of the banks. The nature of its teeth suggests that it feeds on small fishes and free swimming crustacea, just as its relative *R. hyperborea* is known to do.

RAJA MOLLIS spec. nov.

Plate 2

Type Specimen. Juvenile male 262 mm. long, continental slope south of southern Nova Scotia, Lat. $41^{\circ}53'N.$, Long. $65^{\circ}35'W.$, 858 fathoms, ALBATROSS Station 2072, September 2, 1883; U. S. National Museum, No. 33385.

Diagnostic Characters. *R. mollis* resembles *R. spinicauda* Jensen, 1914 and females and juvenile males of *R. senta* Garman 1885, most nearly among skates of the North Atlantic in its general form, and in the fact that the upper surface of its disc and its entire tail are uniformly prickly. But it differs noticeably from *R. senta* in lacking any large thorns on its disc posterior to its scapular region. The lack of large thorns on its tail, with the greater length and uniformly prickly lower surface of the latter set it apart from *R. spinicauda*. And it appears to be unique among skates of the genera *Raja* and *Breviraja* so far known from the Atlantic in the softness of the rostral projection from its cranium. In this respect it appears to parallel *Raja abyssicola* Gilbert, 1895, from deep water off the coast of British Columbia, and *R. stellulata* Jordan and Gilbert, 1880, southern California to Alaska. But each of these has a mid-dorsal row of thorns on the tail and disc which *R. mollis* lacks.

Description of Type. Proportional dimensions in per cent of total length.

Disc: extreme breadth 61.0; length 49.7.

Snout length of: in front of orbits 14.9; in front of mouth 15.7.

Orbits: horizontal diameter 3.8; distance between 3.8.

Spiracles: length 2.1; distance between 7.1.

Mouth: breadth 8.0.

Exposed nostrils: distance between inner ends 8.6.

Gill openings: lengths 1st 1.5; 3rd 1.5; 5th 1.0; distance between inner ends 1st 13.2; 5th 8.8.

First dorsal fin: vertical height 2.3; length of base 4.4.

Second dorsal fin: vertical height 2.3; length of base 5.0.

Pelvics: anterior margin 10.3.

Distance: from tip of snout to center of cloaca 42.8; from center of cloaca to 1st dorsal 44.4; to tip of tail 57.2; from rear end of 2nd dorsal to tip of tail 3.4.

Interspace between: 1st dorsal and 2nd dorsal 0.0.

Disc about 1.2 times as broad as long, subangular in front; tip of snout slightly blunted, projecting a little; maximum anterior angle in front of spiracles about 115° ; anterior margins from close behind tip

of snout either nearly straight or very weakly concave abreast of eye and spiracle;¹ outer corners broadly rounded; posterior margins strongly convex; posterior corners well rounded with curvature continuous to axils of pectorals. Tail with very narrow lateral folds confined to posterior $\frac{1}{3}$; distance from center of cloaca about as great to 1st dorsal fin and about 1.3 times as great to tip of tail as from center of cloaca to tip of snout. Distance from axils of pelvics to 1st dorsal a little greater (1.1) than from axils of pelvics to front of orbits.

Upper surface of disc (including skin above eyes) rugose except close along posterior margins, with prickles or minute thornlets, some low conical, others higher but straight, others still higher, their tips very fine, curved rearward in varying degree. One or two somewhat larger thorns close in front of eye on juveniles,² perhaps a larger number on adults; 1 blunt thorn a little larger still, inward from each spiracle, 1 in mid-line on nuchal region; 1 on mid-dorsal line over pectoral girdle; 1 smaller on each shoulder (perhaps more there on adults); no other sizeable thorns on disc. Upper surface of tail rough with thornlets a little larger than those on disc, its median line also with an irregular row of somewhat larger thorns scattered from opposite tips of pelvics about $\frac{1}{3}$ the distance toward 1st dorsal. Upper surface of pelvics prickly on inner parts of posterior lobe, otherwise smooth. Dorsal fins prickly; caudal membrane with a few prickles; lower surface smooth on disc, pelvics, and root of tail, but remainder of tail close set with small thornlets rearward to level of posterior end of 2nd dorsal, similar to upper surface.

Snout in front of orbits about 3.9 times as long as distance between orbits, its length in front of mouth about 1.8 times as great as between exposed nostrils. Orbit about as long as distance between orbits and about 1.8 times as long as spiracle. Nasal curtain fringed, but edge of expanded posterior (outer) margin of nostril smooth or nearly so. Mouth nearly straight on juvenile male, probably also on females, perhaps more arched on mature males. Teeth about $\frac{56}{54}$; close crowded in quincunx, with low conical cusp, bases about as long antero-posteriorly as broad transversely, those of mature males not yet seen. Distance between inner ends of 1st gill openings about 1.6 times as long as between exposed nostrils, distance between 5th gills about $\frac{2}{3}$ (67 per cent) as long as between 1st gills; 1st gills about 1.5 times as long as 5th gills, about 19 per cent as long as breadth of mouth. First and second dorsal fins about equal in size, confluent at base without definite interspace, their shape as shown in Pl. 2. Caudal membrane

¹The two sides of our specimen differ slightly in this respect.

²One such thorn on one side of our specimen, two on the other.

posterior to 2nd dorsal about $\frac{3}{4}$ (77 per cent) as long as base of 1st dorsal. Pelvics deeply concave outwardly, strongly scalloped around concavity; anterior margin nearly as long (90 per cent) as from pelvic origin to rear tip; anterior lobe rounded at tip; posterior lobe moderately rounded outwardly, its inner margin straight; tip well rounded, extending rearward about $\frac{1}{4}$ (27 per cent) of distance from axil of pectoral toward 1st dorsal. Rostral cartilage extending nearly to tip of snout; so soft and flexible as hardly to be felt, but visible against a strong light; tips of anterior rays of pectorals falling a little short of level of tip of rostral cartilage.

Upper surface of disc, tail and pelvics light grayish brown (after many years in alcohol), except pale yellowish either side of rostral ridge, perhaps translucent there in life; no dark markings. Lower surface pale yellowish without markings.

It is not known how large this skate may grow; the only specimen yet seen (a male) is juvenile, its claspers reaching only $\frac{2}{3}$ the distance rearward along the inner margins of the pelvics.

Habits. The great depth at which the one known specimen was trawled (858 fathoms), added to its absence from the catches of skates that are made along the upper slopes of the fishing banks off Nova Scotia and the Gulf of Maine, mark this as a deep sea species, probably confined to depths greater than 200-300 fathoms.

Range. So far known only from the lower part of the continental slope off southern Nova Scotia.

Genus *BREVIRAJA* Bigelow and Schroeder, 1948

BREVIRAJA ATRIPINNA spec. nov.

Plate 3

Type Specimen. Female, 278 mm. long, Atlantis Station 3443, Lat. 23°22'N., Long. 79°53'W., 325 fathoms, Museum of Comparative Zoölogy, No. 36370.

Additional Material. One male 225 mm. long and one female, 187 mm. long, trawled off Santa Clara Province, north coast of Cuba, 250 and 500 fathoms, by the research vessel ATLANTIS Stations 2985, 3459; in Museum of Comparative Zoölogy.

Diagnostic Characters. Among Atlantic skates *B. atripinna* falls with *B. plutonia* (Garman), 1881, with *B. cubensis* and with *B. sinus-mexicanus* (these last two described as new in the present paper) in the great length of its tail, but it is separable from all three of them by its relatively longer rostral cartilage. The larger specimens also

differ conspicuously from *B. sinus-mexicanus* in relatively longer interspace between their first and second dorsal fins. And while very young *atripinna* more nearly agrees with *sinus-mexicanus* in this respect, its tail is so much less thorny that there is little danger of confusing the two. The plain coloration of its disc and tail without dark markings, combined with its sooty black dorsals, is a convenient field mark to distinguish *atripinna* from the *cubensis-plutonia* group, from which it differs further in the greater length of its snout relative to the distance between its eyes and nostrils, in various other proportional dimensions and in its less obtuse anterior angle.

The great length of its tail marks *atripinna* off from all rajids so far known from the Pacific coast of America, except perhaps for *Raja equatorialis* Jordan and Bollman, 1890, from shoal water off Pacific Panama, for which the tail is described as very long and slender and the two dorsal fins as separated by an interspace longer than either fin. But the back of the disc of *atripinna* is closely and uniformly prickly throughout, and the edge of its nasal curtain even, while the back of *equatorialis* is mostly smooth apart from the larger thorns, and the edge of its nasal curtain deeply fringed. For first-hand descriptions of the type and only known specimen of *equatorialis* see Jordan and Bollman, Proc. U. S. Nat. Mus., 12, 1890: p. 150; Gilbert, Proc. U. S. Nat. Mus., 48, 1915: p. 308.

Description of Type. Proportional dimensions in per cent of total length.

Disc: extreme breadth 45.3; length 38.5.

Snout length of: in front of orbits 9.7; in front of mouth 12.6.

Orbits: horizontal diameter 5.0; distance between 2.7.

Spiracles: length 1.9; distance between 6.1.

Mouth: breadth 5.0.

Exposed nostrils: distance between inner ends 5.9.

Gill openings: lengths 1st 1.3; 3rd 1.3; 5th 1.2; distance between inner ends 1st 10.0; 5th 6.1.

First dorsal fin: vertical height 1.3; length of base 4.7.

Second dorsal fin: vertical height 1.4; length of base 3.6.

Pelvics: anterior margin 11.8.

Distance: from tip of snout to center of cloaca 35.7; from center of cloaca to 1st dorsal 47.0; to tip of tail 64.3; from rear end of 2nd dorsal to tip of tail 4.0.

Interspace between: 1st dorsal and second dorsal 5.0.

Disc about 1.2 times as broad as long; tip of snout pointed; maximum anterior angle to level of spiracles 120° ; anterior margins of disc slightly convex in advance of orbits, thence nearly straight to broadly

rounded outer corners; posterior margins and corners broadly rounded; inner margin weakly convex. Tail slender, its lateral folds confined to posterior $\frac{2}{3}$, very narrow, widening somewhat rearward. Distance from center of cloaca about 1.3 times as long to first dorsal, about 1.6 times to second dorsal, and about 1.8 times to tip as from cloaca to snout.

Upper surface of disc roughened with small, sharp, closely set prickles except along extreme posterior margins and on tip of snout; skin over eyes densely prickly; bases of many of the prickles colored with pigmented skin. Also inner margin of each orbit rimmed with a row of about 12-13 small thorns from in front of eye to opposite spiracle; 1-2 small thorns inward from spiracle and another in line with them toward mid-line of disc; 3-4 thorns on each scapular region; a median row of 6 from nuchal region to pectoral girdle, followed after a short gap by about 62 more to first dorsal fin, decreasing in size rearward along tail and in regularity of spacing; also a lateral row along either side of mid-dorsal ridge on posterior part of disc, losing identity rearward among prickles of tail and another row low down along either side of tail from level of axils of pelvics to first dorsal fin. Anterior $\frac{2}{3}$ of first and second dorsals prickly; space between dorsals prickly but without larger thorns, caudal membrane naked. Anterior lobe of pelvics naked; posterior lobe densely prickly except at margin. Lower surface smooth on disc and pelvics, but rough with small, close set prickles throughout entire length of tail, except for naked area in median zone along anterior part.

Snout in front of orbits about 2 times as long as orbit; its length in front of mouth about 2 times as long as distance between exposed nostrils. Orbit twice as long as distance between orbits and 2.7 times as long as spiracle. Nasal curtain smooth edged, expanded outer posterior margin of nostril with a few lobelets or irregularities. Mouth arched forward a little centrally. Teeth about $\frac{40}{40}$, close set in transverse series, with low conical cusp.

Distance between 5th gills about as great as between exposed nostrils; base of first dorsal about 1.3 times as long as base of second dorsal; interspace between first and second dorsals about 1.1 times as long as base of first dorsal; caudal posterior to second dorsal about as long as base of second dorsal. Pelvics deeply concave; anterior margin about 90 per cent as long as from pelvic origin to rear tips; anterior lobe slender, bent rearward at outer joint with 2 slender radials in addition to the first stout one of 3 segments; posterior lobe with slightly wavy outer margin; the rear corner rather broadly rounded, extending about $\frac{1}{4}$ the distance from level of axils of pectorals toward first dorsal; inner margin straight.

Firm rostral process narrow, extending about 75 per cent the distance from front of cranium toward tip of snout. Anterior radials of pectorals extending forward beyond rostral process almost to level of tip of snout.

Upper surface of disc pale pinkish without distinctive markings; dorsal fins and caudal brownish black, a very conspicuous feature; lateral folds on tail transparent anteriorly, becoming brownish black between second dorsal and tip of tail. Lower surface chocolate, except a whitish translucent area between first gill openings and tip of snout; anterior lobes of pectorals and region over body cavity darkest. Posterior lobe of pelvics whitish; tail pale whitish except for a chocolate blotch on its anterior part.

On an immature male 225 mm. long the distance from center of cloaca is about 1.45 times as great to first dorsal, 1.73 times to second dorsal, and 1.9 times to tip of tail as from cloaca to tip of snout; snout in front of orbits 2.3 times as long as orbit; orbit 1.6 times as long as distance between orbits and 1.9 times as long as spiracle; interspace between first and second dorsals 80 per cent as long as base of first dorsal; anterior margins of pelvics about as long as distance from pelvic origin to rear tips. Only 2 small thorns on each scapular region; prickles sparse on anterior $\frac{1}{3}$ of lower side of tail; posterior part of second dorsal smooth. Chocolate color of lower surface is confined to outer parts of pectorals and of anterior lobes of pelvics. On very small specimens (female 187 mm. long) the anterior angle (115°) is a little less obtuse than on larger; the snout relatively longer; its length in front of orbits about 3 times as great as length of orbit, and length in front of mouth 2.7 times as great as between exposed nostrils, but rostral cartilage a little shorter proportionately. Interspace between first and second dorsal fins is shorter (about 0.4 as long as base of first dorsal), but caudal membrane relatively longer (about 1.6 times base of second dorsal); dermal armature is similar to that of larger specimens except fewer (7-8 thorns) around orbit, with only 1 on each scapular region and lower surface of tail naked; also the dorsal fins are whitish, not black as on large specimens, and the lower surface of disc and tail plain whitish without darker markings.

A male 225 mm. long is immature, the tips of the claspers still fall a little short of the rear limits of the pelvics.

The several specimens thus far taken were trawled in 250-500 fathoms and none were taken in the many hauls made at lesser depths. Evidently this is a deep water species. It is known only off the north central coast of Cuba.

BREVIRAJA CUBENSIS spec. nov.

Plate 4

Type Specimen. Male, 210 mm. long, from Lat. 23°20'N., Long. 79°59'W., Atlantis Station 3451; Museum of Comparative Zoölogy, No. 36443.

Additional Material. 69 specimens, male and female, 68–221 mm. long trawled off north central Cuba at 235–405 fathoms by the research vessel ATLANTIS Stations 2961, 2983, 2984, 2986, 2987, 2988, 2999, 3432, 3438, 3449, 3451, 3457, 3483, 3485. For precise localities, see Chace, 1940.

Diagnostic Characters. This little skate closely resembles *B. plutonia* (Garman) 1881, in general form, and some specimens show much the same color pattern. But the anterior lobes of its pelvic fins are shorter than from pelvic origin to rear tip (as long or longer on *plutonia*); the thorns on its disc are smaller and less conspicuous with (usually) only 1 or 2 on each scapular region (3–4 on *plutonia*); its first and second dorsal fins usually are separated by a definite interspace (confluent on *plutonia*); and its rostral cartilage is longer than in *plutonia*, though intermediates may occur in this respect.

Description of Type. Proportional dimensions in per cent of total length.

Disc: extreme breadth 49.7; length 39.0.

Snout length of: in front of orbits 10.0; in front of mouth 11.0.

Orbits: horizontal diameter 4.8; distance between 2.9.

Spiracles: length 2.4; distance between 7.1.

Mouth: breadth 6.2.

Exposed nostrils: distance between inner ends 5.0.

Gill openings: lengths 1st 1.2; 3rd 1.2; 5th 1.0; distance between inner ends 1st 11.0; 5th 6.7.

First dorsal fin: vertical height 1.2; length of base 5.2.

Second dorsal fin: vertical height 1.7; length of base 3.8.

Pelvics: anterior margin 11.2.

Distance: from tip of snout to center of cloaca 38.1; from center of cloaca to 1st dorsal 50.0; to tip of tail 61.9; from rear end of 2nd dorsal to tip of tail 1.4.

Interspace between: 1st dorsal and 2nd dorsal 1.4.

Disc 1.2 times as broad as long, tip of snout forming a low projection; maximum anterior angle to level of spiracles 120°; anterior margins convex before orbit and approaching outer corner, weakly concave between; outer corner and posterior margin broadly rounded; inner margin weakly convex. Tail with narrow lateral folds along posterior $\frac{1}{3}$ to tip, widening rearward; distance from center of cloaca

1.3 times as great to first dorsal, 1.5 times to second dorsal and 1.6 times to tip of tail as from cloaca to tip of snout.

Upper surface of disc, including skin above eyes mostly covered with very small close set prickles; anterior and posterior margins only sparsely prickly or smooth; tip of snout smooth, also areas outward-rearward from scapular regions. Upper surface of tail, including interspace between first and second dorsals roughened with scattered prickles besides thorns described below. Ten small thorns around inner margin of orbit on one side, 11 on the other; 1 inward rearward from each spiracle; 2 on each scapular region; a median row of 72 from nuchal region along disc and tail to first dorsal fin, 19 of these anterior to level of axils of pectorals; those on tail sharper than those on disc. Each side of tail from a little posterior to axils of pectorals with 1 additional row (2 such rows locally) to level of first dorsal, the linear arrangement less regular rearward. Anterior parts of first and second dorsals prickly. Pelvics smooth except for a few prickles on inner parts. Lower surface smooth. Sexual armature a patch of thorns on each side of head outward-forward from orbit, near outer margin; also 1-2 irregular rows of alar spines, 4-5 spines per row.

Snout in front of orbit about 2.1 times as long as orbit, its length in front of mouth about 2.2 times as long as between exposed nostrils; orbit about 1.7 times as long as distance between orbits and about 2 times as long as spiracle. Nasal curtain smooth edged, expanded outer posterior margin of nostril also smooth. Mouth weakly bowed centrally. Teeth in about 42 series in upper jaw, with long, sharp recurved cusp, in quincunx. Distance between inner ends of 5th gills about 1.4 times as long as between exposed nostrils. First dorsal fin a little longer than second dorsal; interspace between first and second dorsals about 27 per cent as long as base of first dorsal; caudal membrane posterior to second dorsal about 40 per cent as long as base of second dorsal. Pelvics deeply notched, scalloped around the concavity; anterior margin about 70 per cent as long as from pelvic origin to rear tip. Anterior lobe slender, tapering to narrow tip, of 2 slender radials besides first stout one of 3 segments; posterior lobe moderately convex outwardly, the rear tip narrowly rounded, extending nearly $\frac{1}{4}$ the distance from level of axils of pectorals toward first dorsal; inner margin straight. Claspers slender, reaching back about $\frac{1}{4}$ way from tips of pelvics toward first dorsal; without projecting terminal armature when not in function.

Rostral process narrowly triangular, extending about 60 per cent of distance from front of cranium toward tip of snout; pectoral rays reaching nearly to level of tip of snout.

Upper surface of disc pale brownish with a few small roundish

darker brown spots and larger irregular blotches, one, largest, about central on each pectoral. Anterior lobe of pelvics whitish, posterior lobes of same brownish tint as disc, with a few darker markings. Tail with 5 blackish brown cross bars, the fourth and fifth noticeably darker than the others, covering anterior $\frac{2}{3}$ of first and second dorsal fins; also a fainter bar opposite tips of pelvics. Lower surface pale yellowish without dark markings.

Among other specimens, half grown to mature, the anterior margins vary from nearly straight to rather strongly sinuous (Fig. 4); the anterior angle ranges up to 138° ; snout in front of orbit is 1.6–2.1 times as long as orbit; snout in front of mouth 2.1–2.6 times as long as distance between exposed nostrils; distance between fifth gills 1.1–1.6 times as long as between nostrils; and distance from center of cloaca is up to 1.4 times as great to first dorsal and up to 1.8 times to tip of tail as from cloaca to tip of snout. Some specimens have a detached thorn inward from each spiracle, but others lack this. The maximum number of thorns along the inner margin of orbit among specimens examined is 15, the row spaced regularly on some, but interrupted opposite middle of eyes on others. There may be either 1 or 2 small thorns on each scapular region and from 50 to 100 or more in the mid series which is interrupted on some specimens between pectoral and pelvic girdles. The interspace between the dorsal fins ranges from none up to nearly as long as base of first dorsal. The teeth are in 34–48 series; those of females with low conical cusp, more or less worn down.

The number of cross bars on the tail varies from 4 to 6, and the color pattern is more strongly contrasting on some small specimens (68–100 mm. long) than on larger, usually with a curved bar extending from close behind each orbit to the corresponding scapular region.

Evidently this is a small species, probably not growing to a greater length than 250–300 mm. for the claspers are well developed on a male 221 mm. long.

Nothing is known of its habits other than that it is a deep water species, all so far taken in 235–405 fathoms (325–740 meters). It is so far known only from off the north central coast of Cuba, at the stations listed above.

BREVIRAJA SINUS-MEXICANUS spec. nov.

Plate 5

Type Specimen. Female, 228 mm. long, Lat. $28^\circ 34'N.$, Long. $86^\circ 48'W.$, Albatross Station 2396, U. S. Nat. Mus., No. 103376.

Additional Material. Three females and 6 males, 171–325 mm. long from the northeastern part of the Gulf of Mexico between the offings of Pensacola, Florida and of the Mississippi River delta, in U. S. National Museum.

Diagnostic Characters. The shortness of its rostral cartilage separates *B. sinus-mexicanus* from all hard nosed skates of the genus *Raja*. Within its own genus it falls with *B. plutonia* Garman, 1881, in the great length of its tail; also in this same respect with *B. atripinna* and *B. cubensis* which are described here as new. But its tail is so much more thorny than that of the *cubensis-plutonia* group that there is no danger of confusing it with either of these, while its anterior angle is less obtuse. It is distinguishable from young *atripinna* by the thorniness of its tail; from older *atripinna* by the shortness of the interspace between its two dorsal fins. Rajids from other oceans that rival or surpass it in length of tail are, *Cruriraja parcomaculata* (Bonde and Swart), 1924, South Africa; *Raja andamanica* Lloyd, 1909, Indian Ocean; *Raja caudispinosa* Bonde and Swart, 1924, (including *R. alba-linea* Bonde and Swart, 1924) South Africa; *Raja tobae* Tanaka, 1916, 1927, Japan; and perhaps *Raja equatorialis* Jordan and Bollman, 1890, Panama Bay. But the nature of the pelvics, with separate limb-like anterior subdivision clearly locates *parcomaculata* in the newly described genus *Cruriraja* Bigelow and Schroeder, 1948. This may also prove to be true of *andamanica*, and in any case *sinus-mexicanus* is separable from it by the considerably more broadly rounded outer corners of the disc, by more numerous thorns, and by coloration, *andamanica* being plain slaty below as well as above. *Sinus-mexicanus* more nearly resembles *caudispinosa* in shape of disc and in distribution of thorns, but differs from it in uniformly prickly disc (largely smooth apart from the thorns in *caudispinosa*) and in relatively longer tail. It differs from *tobae* in the facts that its orbit is rimmed with thorns anteriorly as well as posteriorly; that its eyes are much larger than its spiracles (spiracles larger than eyes in *tobae*) and that there are several rows of thorns along its tail (1 row only mentioned for *tobae*). A prickly and thornier disc with the fact that it has only a short interspace between its first and second dorsal fins, if any, sets it apart from *equatorialis*.¹

Description of Type. Proportional dimensions in per cent of total length.

¹For redescription of the type (and only known) specimen of *equatorialis*, see Gilbert, 1915:309.

Disc: extreme breadth 44.7; length 39.4.

Snout length of: in front of orbits 9.4; in front of mouth 11.4.

Orbits: horizontal diameter 3.5; distance between 2.6.

Spiracles: length 2.2; distance between 5.9.

Mouth: breadth 4.6.

Exposed nostrils: distance between inner ends 4.6.

Gill openings: lengths 1st 0.9; 3rd 0.9; 5th 0.8; distance between inner ends 1st 11.0; 5th 6.2.

First dorsal fin: vertical height 1.3; length of base 3.5.

Second dorsal fin: vertical height 1.3; length of base 2.6.

Pelvics: anterior margin 10.5.

Distance: from tip of snout to center of cloaca 32.9; from center of cloaca to 1st dorsal 54.8; to tip of tail 67.1; from rear end of 2nd dorsal to tip of tail 4.6 (estimated).

Interspace between: 1st and 2nd dorsal 0.9.

Disc 1.14 times as broad as long; snout narrow, not noticeably projecting; maximum anterior angle to level of spiracle 110° ; anterior margins very slightly concave close posterior to tip of snout, thence nearly straight to broadly rounded outer corners; posterior margins rather strongly convex, rear corners evenly rounded, inner margins nearly straight. Tail with very narrow folds originating close behind tips of pelvics, extending to tip, widening rearward. Distance from center of cloaca 1.66 times as great to origin of first dorsal as from cloaca to tip of snout; tip of tail lost.

Upper surface of disc with 1 small thorn and 1 larger over anterior end of rostral cartilage about $\frac{1}{3}$ the way from tip of snout toward orbits; 4 around anterior margin of orbit, 3 or 4 along inner posterior margin to level of spiracle, 1 (larger) inward from spiracle toward median line and several scattered outward from orbits; 4 thorns on each scapular region arranged thus . : .; midline of back with a row of 14 from nuchal region to level of axils of pectorals, irregularly alternating larger and smaller, and about 50 (counting is difficult) along midline of tail to first dorsal, less regularly arranged rearward; also an additional row each side of median row from about midway between pectoral girdle and pelvic girdle to first dorsal, and 1-2 such lateral rows along posterior part of tail, the lowest row continuing to below base of second dorsal. Interspace between first and second dorsals with 1 thorn. In addition to larger and smaller thorns, the upper surface of the disc, out to extreme margins (including skin above eyes and areas either side of rostral cartilage) is sprinkled with very slender prickles entirely enclosed in skin (except if worn off as seems to happen easily) freely movable at base, not rigid as in many species. Posterior lobes of pelvics with a few similar prickles, also

anterior $\frac{1}{4}$ of upper surface of tail; first and second dorsals with a few slender, sharp spinelets along outer edge.

Lower surface smooth except with a few small rigid prickles on anterior part of tail back to a little beyond tips of pelvics.

Snout in front of orbits about 2.7 times as long as orbit, its length in front of mouth about 2.5 times as great as between exposed nostrils; orbit 1.3 times as long as distance between orbits, about 1.6 times as long as spiracle. Nasal curtain coarsely fringed, expanded margin of nostrils somewhat more finely so. Mouth very weakly arched centrally. Distance between fifth gill openings about 1.3 times as long as between exposed nostrils. Teeth $\frac{46}{46}$, in quincunx, most of those near center with a low, blunt conical cusp. Base of first dorsal about 1.33 times as long as base of second dorsal; interspace between first and second dorsals about $\frac{1}{4}$ as long as base of first dorsal; caudal membrane lost. Pelvics deeply concave; anterior margin a little more than $\frac{4}{5}$ as long as distance from pelvic origin to rear tip; anterior lobe pointed, scalloped along posterior margin, including 4 radials besides the first stout one; posterior lobes strongly convex, inner margins nearly straight, rear tips abrupt, reaching back about $\frac{1}{5}$ the distance from level of axils of pectorals toward first dorsal.

Rostral cartilage narrowly triangular, extending about $\frac{2}{3}$ the distance from front of cranium toward tip of snout.

Upper surface of disc and tail light purplish brown, palest along margins of pectorals, either side of rostral cartilage and on pelvics; irregularly marked with small darker vaguely outlined spots or blotches, most conspicuous being one either side close to base of tail. Skin covering many of the movable prickles much more deeply pigmented, producing a dark-speckled effect over disc generally. Lower surface plain yellowish white, but with darker hue of upper surface showing through along outer edges of pectorals.

On a small female, nasal curtain and margin of nostril are only partly fringed; teeth are only $\frac{42}{42}$; only 2 thorns on each scapular region, 9 in median row from nuchal region to level of axils of pectorals, with about 36 along tail to first dorsal, and very few prickles have yet appeared on tail and on dorsals, though roughening the disc much as on larger specimens.

On males at maturity the anterior margins of the disc are rather noticeably concave at level of spiracles; the thorns of the lateral rows on the disc are smaller than on the females, the malar regions are more thorny, and the outer corners of the pectorals are strewn with small thorns (lacking on the females), but the pelvics are entirely smooth. The alar spines are in 2 rows, 4-7 spines per row; the claspers slender, widening a little at tip, reaching rearward about $\frac{3}{10}$ the distance

from level of axils of pelvics toward tip of tail; no terminal spines or hooks exposed when not in function. Mature males are similar to females in general hue but without conspicuous markings, and only occasional prickles are densely pigmented, here and there.

The state of development of the claspers shows that males mature at a length of 310–330 mm., probably the females also.

So far only known from 170–347 fathoms, off the north and north-eastern coast of the Gulf of Mexico, Lat. $28^{\circ}34'N.$, Long. $86^{\circ}48'W.$, ALBATROSS Station 2396; Lat. $28^{\circ}36'N.$, Long. $86^{\circ}50'W.$, ALBATROSS Station 2395; Lat. $28^{\circ}45'N.$, Long. $86^{\circ}26'W.$, ALBATROSS Station 2398; Lat. $29^{\circ}08'N.$, Long. $88^{\circ}08'W.$, ALBATROSS Station 2377; and a recent record from Lat. $29^{\circ}02'N.$, Long. $88^{\circ}40'W.$

BREVIRAJA SPINOSA spec. nov.

Plate 6

Type Specimen. Female 288 mm. long from Lat. $30^{\circ}58'N.$, Long. $79^{\circ}34'W.$, 250–290 fathoms, collected by research vessel ATLANTIS, Museum of Comparative Zoölogy, No. 36373.

Additional Material. Female, 280 mm. long, off middle Florida, Lat. $29^{\circ}41'N.$, Long. $79^{\circ}55'W.$, 373 fathoms, ALBATROSS Station 2664, in U. S. National Museum; also a female 187 mm. long, off north Florida, Lat. $30^{\circ}21'N.$, Long. $79^{\circ}55'W.$

Diagnostic Characters. This new skate resembles *Raja fyllae* Lutkin, 1887, in general appearance, including the arrangement of its thorns, but the shortness of its rostral cartilage marks it off sharply from *fyllae*. The presence of 3 or 4 irregular rows of large and conspicuous thorns along the mid belt of its disc separates it from all other western Atlantic members of its own genus. And it differs in the combination of a broadly rounded anterior contour with a conspicuously thorny mid belt (including shoulder region) from any rajid with a short rostral cartilage yet described from Pacific-American waters.

Description of Type. Proportional dimensions in per cent of total length.

Disc: extreme breadth 50.8; length 42.8.

Snout length of: in front of orbits 8.0; in front of mouth 10.2.

Orbits: horizontal diameter 4.8; distance between 3.6.

Spiracles: length 3.4; distance between 7.0.

Mouth: breadth 7.8.

Exposed nostrils: distance between inner ends 6.0.

Gill openings: lengths 1st 1.4; 3rd 1.4; 5th 1.2; distance between inner ends 1st 15.9; 5th 7.9.

First dorsal fin: vertical height 1.4; length of base 5.8.

Second dorsal fin: vertical height 1.5; length of base 5.5.

Pelvics: anterior margin 11.6.

Distance: from tip of snout to center of cloaca 42.3; from center of cloaca to 1st dorsal 45.8; to tip of tail 57.7; from rear end of 2nd dorsal to tip of tail 2.0.

Interspace between: 1st dorsal and 2nd dorsal 0.0.

Disc obtusely rounded in front; tip of snout marked by a low papilla; maximum anterior angle to level of spiracles 142° ; anterior margins convex anterior to level of orbits, thence nearly straight to very broadly rounded outer corners, the contour a continuing arc around convex posterior margin and rounded rear corners to axils. Tail moderately robust with narrow lateral folds along posterior $\frac{1}{3}$ nearly to tip; distance from center of cloaca about 1.1 times as great to first dorsal fin and about 1.35 times as great to tip of tail as from cloaca to tip of snout.

Upper surface of disc conspicuously rough; medium sized thorns scattered along rostral ridge, about 10 around anterior-inner margin of orbits, and 1 larger inward from each spiracle; malar regions outward from eyes and spiracles with 12-15 large thorns; 2-3 on each scapular region; a band of various sizes (some very large) along mid belt of back from nuchal region rearward, irregularly distributed on disc but partially in serial arrangement (4-5 rows) on tail to first dorsal fin followed by 1-2 rows of smaller thorns along either side of tail to tip; those on disc and some of those on tail with conspicuously radiate bases. Disc, including skin above eyes further roughened by prickles of various sizes except naked above body cavity, around posterior margins of pectorals, and between orbits. Anterior $\frac{1}{3}$ of tail also with a band of close set prickles along either side in addition to the thorns; upper anterior parts of dorsals prickly; pelvics smooth. Lower surface smooth except for a few prickles on anterior part of tail along outer edge on one side (none on the other side).

Snout in front of orbits about 1.7 times as long as orbit, its length in front of mouth about 1.6 times as great as distance between exposed nostrils; orbit about 1.3 times as long as distance between orbits, about 1.4 times as long as spiracle. Nasal curtain fringed; expanded outer posterior margin of nostril somewhat irregular. Mouth weakly arched. Teeth $\frac{46}{44}$, close set in quincunx; older rows worn nearly smooth, younger rows with low conical cusp. Distance between fifth gill openings about 1.3 times as long as between exposed nostrils. First and second dorsals confluent, base of first about as long as base of second. Extreme tip of tip of tail missing. Pelvics deeply concave,

weakly scalloped around the indentation; anterior margin about $\frac{2}{3}$ as long as from pelvic origin to rear tip; anterior lobe small, with well rounded tip, of 3 radials besides the first stout one. Posterior lobe rather strongly convex outwardly, rear corners abruptly rounded, reaching back a little more than $\frac{1}{3}$ the way from level of axils of pectorals toward first dorsal fin.

Rostral cartilage broadly triangular, extending about $\frac{1}{2}$ the distance from front of cranium toward tip of snout.

Upper surface plain light brown, without evident markings. Lower surface whitish, central part of disc, anterior parts of pelvics, and anterior $\frac{1}{4}$ of tail irregularly blotched with chocolate.

The chief differences between the smallest specimen and the type are such as may be attributed to an early stage in growth. There are only 36 series of teeth; the tail is relatively longer (distance from center of cloaca 1.3 times as great to first dorsal and 1.6 times as great to tip as from center of cloaca to tip of snout); there are only 7 or 8 thorns around each orbit, but the thorns along mid belt of disc are more numerous and more regularly arranged serially in 5-6 rows. The thorns along tail include a definite median row of 25; and the thorns on the malar regions (conspicuous on the type) are foreshadowed by coarse sharp prickles only. The prickles on the disc as a whole are finer and closer set than on the type and involve the area between the orbits, which is not the case on the type; the prickly band on either side of the tail extends along anterior $\frac{2}{3}$, and the dorsal fins are more generally prickly. The upper surface (plain colored on the type) is marked on the posterior part of the disc with 2 pairs of whitish spots indistinctly outlined; the outer parts of the dorsals and tip of tail are brownish, the lower surface plain white.

The presence of large thorns on the malar region of a female only 288 mm. long, but not on the youngest specimen, makes it likely that this species matures at a length of perhaps 300 mm.

Nothing is known of its habits except that it is evidently a deep water species. It is known only from the localities listed above, p. 400.

BREVIRAJA YUCATANENSIS spec. nov.

Plate 7

Type Specimen. Juvenile male (the type), 215 mm. long, from northeastern slope of Yucatan, 231 fathoms, U. S. National Museum No. 148273.

Diagnostic Characters. This newly discovered species is marked off from all other known members of its genus in the western Atlantic,

excepting for *B. spinosa*, by the presence of 2 or more irregular rows of thorns along the median belt of its disc rearward from the scapular region. And it differs from *B. spinosa* in its less conspicuous thorns; also in the facts that its snout anterior to the orbits is about 3.5 times as long as the distance between the orbits (not more than 2.5 times in *B. spinosa*), that its first and second dorsal fins are separated by a definite (though short) interspace with 1 or 2 thorns, and that the upper surface of its disc is closely freckled with small dark brown dots (not freckled, on *B. spinosa*).

Description of Type. Proportional dimensions in per cent of total length.

Disc: extreme breadth 55.0; length 45.2.

Snout length of: in front of orbits 9.8; in front of mouth 11.6.

Orbits: horizontal diameter 4.9; distance between 2.8.

Spiracles: length 2.6; distance between 6.5.

Mouth: breadth 6.7.

Exposed nostrils: distance between inner ends 7.0.

Gill openings: lengths 1st 1.4; 3rd 1.9; 5th 1.3; distance between inner ends 1st 13.2; 5th 8.1.

First dorsal fin: vertical height 2.3; length of base 5.8.

Second dorsal fin: vertical height 2.1; length of base 4.9.

Pelvics: anterior margin 12.6.

Distance: from tip of snout to center of cloaca 39.5; from center of cloaca to 1st dorsal 44.7; to tip of tail 60.5; from rear end of 2nd dorsal base to tip of tail 3.7.

Interspace between: 1st dorsal and 2nd dorsal 1.4.

Disc about 1.2 times as broad as long, moderately obtuse in front, with tip of snout hardly protruding; maximum anterior angle in front of spiracles about 128° ; anterior margins weakly convex from tip of snout to level of eyes, very slightly concave at level of spiracles and straight thence outwardly; outer corners broadly rounded; posterior margins weakly and evenly convex; posterior corners broadly rounded, the curvature continuous to axils of pectorals. Lateral folds on tail extremely narrow, extending along posterior $4/5$ nearly to tip. Tail from center of cloaca about 1.1 times as long to 1st dorsal and about 1.5 times as long to tip as from center of cloaca to tip of snout. Distance from axils of pelvics to 1st dorsal about as long (1.1) as from axils of pelvics to fronts of orbits, about 90 per cent as long as from center of cloaca to tip of snout.

A few small thorns on anterior part of rostral ridge; 5-7 along inner anterior margin of orbit;¹ 1-2 on inner margin and a group of about 4

¹Five on one side, seven on the other on specimen examined.

between inner posterior edge of orbit and inner end of spiracle; about 3 on nuchal region; 2-3 on each shoulder; also 2 rows along mid-dorsal belt on disc from a little behind pectoral girdle rearward, with an occasional thorn between them in the midline. Outer anterior parts of pectorals sparsely strewn with small thorns grading down to prickles; inner parts of pectorals roughened generally with minute prickles, also nuchal region; a few prickles here and there on anterior part of head, also between thorns on shoulders and along mid-dorsal belt; skin over eyes prickly; posterior parts of pectorals smooth. Upper surface of tail with 3-4 irregular rows of thorns along anterior part, about as large as on disc; 2-3 rows rearward to 1st dorsal fin; 1 thorn in interspace between 1st and 2nd dorsals. Each side of tail (from axil of pelvic) with a band of close set prickles along anterior $\frac{1}{2}$, decreasing posteriorly to 1-2 rows interspaced with very small thornlets past 2nd dorsal fin. Dorsal fins and upper surface of pelvics smooth; lower surface smooth everywhere.

Snout in front of orbits about 3.5 times as long as distance between orbits, its length in front of mouth about 1.6 times as great as distance between exposed nostrils; orbit about 1.7 times as long as distance between orbits and about twice as long as spiracle. Nasal curtain fringed, also expanded posterior (outer) margin of nostril. Mouth only a little arched forward in juvenile, probably also in females, perhaps more strongly so in adult males. Teeth in 46 series in upper jaw, those of juvenile males (probably also of females) oval, rounded, without cusp, close set in quincunx; those of mature males not yet seen. Distance between 1st pair of gill openings about 1.9 times as great as between exposed nostrils; between 5th gills about 1.2 times; 1st gills about as long as 5th gills and a little more than $\frac{1}{5}$ (21 per cent) as long as breadth of mouth. First and second dorsals about alike in size and shape, anterior margins sloping, weakly convex, posterior margins slightly recurved. Dorsal fins separated by a short but definite interspace with 1 thorn. Caudal membrane posterior to 2nd dorsal about 30 per cent as long as base of 1st dorsal. Pelvics deeply concave outwardly, with 3 conspicuous scallops at base of concavity; anterior margin about 60 per cent as long as from pelvic origin to rear tip; anterior lobe fleshy with rounded tip; posterior lobe weakly and evenly convex outwardly, rear tip narrowly blunted, reaching about $\frac{1}{4}$ of distance from axils of pectorals toward 1st dorsal fin. Claspers of mature males not yet seen.

Rostral cartilage extends a little more than $\frac{2}{3}$ (69-70 per cent) the distance from front of cranium toward tip of snout; anterior radials of pectorals extend nearly to level of tip of snout.

Upper surface (after many years in alcohol) brownish gray; disc

and anterior part of tail thickly freckled with darker brown dots; posterior part of tail with similar dots aggregated in 2 indistinct cross bars, also an additional, more definite dark bar crossing tail and anterior part of each dorsal fin. Caudal membrane sooty; lower surface uniformly pale yellowish.

A male (only specimen yet seen) 118 mm. broad, is juvenile, its claspers reaching only about $\frac{1}{2}$ way on inner margins of pelvics. Size at maturity not known.

The depth of capture (231 fathoms) of the only recorded specimen suggests that this is a deep water species, but nothing definite is known of its habits.

So far known only from northeastern slope off Yucatan, at 231 fathoms.¹

Holocephali

Family RHINOCHIMAERIDAE

The few known members of this curious family of long nosed chimaeroids have commonly been distributed between two genera, *Harriotta* Goode and Bean, 1886, 1895, and *Rhinochimaera* Garman, 1901, the first with ridges and knobs on the dental plates but without denticles along the upper margin of the caudal fin, the second with smooth dental plates but with the upper margin of the caudal fin armed with a conspicuous series of large denticles. Schnakenbeck (1931) on the other hand has united these two genera under the older name *Harriotta* and has referred to it a new species, *pinnata*, with denticulate upper caudal, ridged dental plates, and also with a separate anal fin, which is lacking on all other known Rhinochimaeroids.

The species in the family so far described fall into three categories: *Harriotta raleighana* Goode and Bean, 1895, ridged dental plates, without caudal denticles or anal fin; *Harriotta pacifica* Mitzukuri, 1895, and *Rhinochimaera atlantica* Holt and Byrne, 1909, smooth dental plates, denticulate caudal, no anal fin; and *Harriotta pinnata* Schnakenbeck, 1931, ridged dental plates, denticulate caudal, a separate anal fin. The detailed sculpture of the dental plates may not stand the test of time as a generic character since it not only alters with growth but is known to vary from specimen to specimen in other Chimaeroids. But the presence of large and highly specialized denticles along the upper margin of the caudal fin seems of greater taxonomic importance, since it marks off the two species concerned from all other known chi-

¹ALBATROSS Station 2359, Lat. 29°19'N., Long. 87°03'W., January 29, 1885.

maeroids. And the presence or absence of an anal fin, separate from the lower lobe of the caudal fin, seems to us well worthy of generic recognition in this family, as it is commonly so considered in the family Chimaeridae. We, therefore, recognize three genera in the family defined as follows:

(1) *Harriotta* Goode and Bean, 1886, 1895; no denticles along upper margin of caudal fin, no separate anal fin, dental plates with ridges and knobs; one known species *H. raleighana* Goode and Bean, 1895, northwestern Atlantic.

(2) *Rhinochimaera* Garman, 1901; upper margin of caudal fin with a series of large denticles, no anal fin, dental plates smooth so far as known; two known species *Rh. pacifica* (Mitsukuri), 1895, Japan, and *Rh. atlantica* Holt and Byrne, 1909, 1910, Irish Atlantic slope.

(3) *Neoharriotta*, new genus; upper margin of caudal fin with denticles, a separate anal fin, dental plates with ridges and knobs; type and only known species, *N. pinnata* (Schnakenbeck), 1931, p. 39, figs. 6-9, Walvish Bay, southwest Africa (type locality); also off Equatorial West Africa, Lat. 2°09'N., Long. 9°27'E., whence we have seen a newly hatched specimen and empty egg case collected by the ATLANTIDE Expedition and loaned us by Dr. Anton F. Bruun.

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