the University of Helsinki, for help in assembling and purifying some of the materials; and M. R. Vollmer, instrument maker, for his careful construction of the various parts of the calorimetric apparatus.

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ICHTHYOLOGY.—*Three new skates and a new chimaerid fish from the Gulf of Mexico.*[1] HENRY B. BIGELOW and WILLIAM C. SCHROEDER. (Communicated by Leonard P. Schultz.)

The U. S. Fish and Wildlife Service vessel *Oregon*, while engaged in a shrimp investigation in the Gulf of Mexico during the winter of 1950–51, caught a number of fishes that prove to be new to science. Stewart Springer, knowing of our interest in elasmobranchs and holocephalids, kindly sent us the specimens which we here describe. The holotypes and some of the paratypes are in the collection of the U. S. National Museum, while a representative of each species is in the collection of the Harvard Museum of Comparative Zoology.

Raja lentiginosa, n. sp.

Study material.—Male, 402 mm in total length, holotype, U. S. N. M. no. 153552, from the Campeche Bank, lat. 22° 32′ N., long. 88° 47′ W., in 29 fathoms, *Oregon* station 222; also four males and three females from the latter region and from the northern part of the Gulf of Mexico, lat. 28° 10′ to lat. 29° 11′ N. and long. 85° 00′ to 86° 52′ W. in recorded depths of 85, 112, 165, and 305 fathoms, including *Oregon* stations 256, 257, 278, and 279.

Distinctive characters.—*Raja lentiginosa* closely resembles *R. garmani* but may be distinguished by the color pattern of its upper surface, which is densely freckled with very small dark, light-brown, and whitish spots (sparse in *garmani* and mostly grouped in a distinct rosette pattern).

Description of holotype.—Proportional dimensions in percent of total length:

Disc.—Extreme breadth 60.0; length 46.5.

Snout length.—In front of orbits 9.2; in front of mouth 11.2.

Orbits.—Horizontal diameter 4.2; distance between 2.9.

Spiracles.—Length 2.1; distance between 6.2.

Mouth.—Breadth 6.5.

[1] Contribution no. 555 from the Woods Hole Oceanographic Institution.

Exposed nostrils.—Distance between inner ends 6.0.

Gill openings.—Lengths, first 2.0; third 1.9; fifth 1.2; distance between inner ends, first 13.9; fifth 7.0.

First dorsal fin.—Vertical height 3.0; length of base 5.6.

Second dorsal fin.—Vertical height 3.0; length of base 5.5.

Pelvics.—Anterior margin 12.2.

Distance from tip of snout to center of cloaca 39.2; from center of cloaca to first dorsal 45.3; to tip of tail 60.8; from rear end of second dorsal base to tip of caudal 2.9.

Interspace between first and second dorsals 1.2.

Disc about 1.3 times as broad as long, maximum angle in front of spiracles about 120°; anterior margins weakly convex from just posterior to tip of snout to opposite orbits, thence gently concave between spiracles and outer corners which are broadly rounded; posterior margins and corners and inner margins all rounded. Axis of greatest breadth about 68 percent of distance back from tip of snout to axils of pectorals. Tail with a lateral fold, low down on each side, beginning abruptly posterior to axils of pelvics a distance about equal to space between spiracles and continuing almost to extreme tip, width of fold about the same throughout its length; length of tail from center of cloaca to origin of first dorsal fin 1.15 times as great and to its tip 1.54 times as great as distance from center of cloaca to tip of snout.

Five prominent thorns along anterior edge of orbit, one opposite inner central margin and three along posterior margin, the last opposite spiracle, with an additional thorn inward from this one; a row of thorns over margins of rostral process; prickles and very small thorns are present over anterior third of disc in advance of nuchal region and extend along outer margin rearward to about axils of pectorals; a triangular patch of about 17 thorns on shoulder region, five of which extend along median line from nuchal to scapular region; a naked area behind these for a distance about equal to distance between spiracles. A band of three to five rather regular rows of thorns along median zone of back and on tail beginning in advance of axils of pectorals a distance about equal to that from eye to snout and ending at origin of first dorsal, the lowermost row reaching nearly to tip of tail; the median row, counting from nuchal region, consisting of 33 thorns, in most cases alternating large and small; most all the thorns on tail with sharp points, directed backward; one prominent thorn in space between dorsals; prickles on dorsal fins and caudal; skin over eye naked; a band of alar spines on outer part of each pectoral, in one to three rows, with 19 spines in longest row. Lower surface naked except for a small median patch of spines at extreme snout tip.

Snout in front of orbits 2.2 times as long as orbit, its length in front of mouth about 1.8 times as great as distance between exposed nostrils. Distance between orbits about 0.7 as great as length of orbit. Orbit twice as long as spiracle. Nasal curtain fringed; expanded posterior (outer) margins of nostrils fringed. Upper and lower jaws rather strongly arched centrally. Teeth $\frac{53}{53}$ close set, mostly in straight rows rather than in quincunx, with small base, circular or oval, those in median sector of mouth with slender sharp cusp pointing toward symphysis or inward toward throat, those in outer sector with triangular cusp pointing toward corner of mouth, one row of teeth at symphysis in upper jaw, pointing straight downward. Distance between first gill openings 2.3 times as great as distance between exposed nostrils; between fifth openings 1.2 times; first gill openings 1.6 times as long as fifth and 0.3 as long as breadth of mouth. First and second dorsals similar in size and shape. Interspace between dorsals 0.22 as long as base of first dorsal. Caudal membrane from rear end of base of second dorsal about half as long as base of first dorsal. Pelvics deeply concave, strongly scalloped along anterior side of excavation but only weakly so rearward; anterior margin only 0.55 as long as distance from its own origin to rear tip of pelvic; anterior lobe slender, including four radial cartilages besides the first stout one; posterior lobe moderately convex along its forward half, thence nearly straight to its narrowly rounded tip, extending a little more than one-fifth the distance from axil of pelvics toward first dorsal; inner margin straight. Claspers reaching beyond tips of pelvics by a distance about equal to diameter of orbit.

Rostral cartilage firm, extending nearly to tip of snout. Anterior pectoral rays reaching about seven-tenths the distance from front of orbits toward tip of snout.

Color.—Upper surface everywhere sprinkled with very small light to dark brownish and whitish spots, including the tail, pelvics and claspers; many groups of about 30–50 dark spots scattered everywhere, the most prominent marking being the group of spots at axil of pectoral, some of the spots on tail grouped in form of bars, there being

about five prominent bars; light and dark spots present on anterior part of each dorsal fin and on caudal. Below whitish with a group of grayish blotches, mostly fused, on each pectoral, and an elongate blotch along the inner part of the claspers anteriorly.

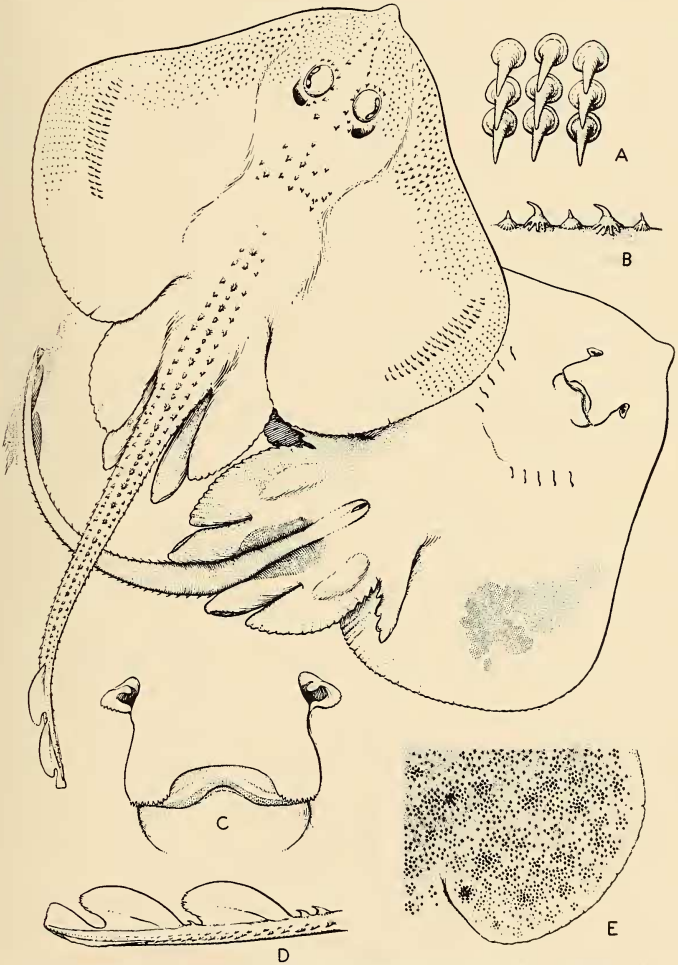

FIG. 1.—*Raja lentiginosa*, n.sp., male, 402 mm long, holotype (U.S.N.M. no. 153552): A, Upper teeth, about × 10; B, thorns on midrow of tail, about × 2; C, mouth and nostrils, about × 1.5; D, posterior part of tail, about × 1; E, section of upper surface to show color pattern.

A female 302 mm long differs slightly from the type by having no naked area on the midzone of back immediately behind shoulder region, but the thorns begin on the nape and extend without a break to the first dorsal, the rows being somewhat more irregular and the median row having about 45 thorns mostly of uniform size instead of alternating large and small. There is a patch of small thorns on the posterior part of the pectorals and a few on the pelvics and three thorns in the space between the dorsals. There are $\frac{50}{46}$ teeth, in quincunx, with low triangular cusp, none of which point toward symphysis or corners of mouth.

On a male of 232 mm the claspers extend a little beyond the tips of the pelvics, while on a *R. garmani* of 285 mm they fail to reach the tips of the pelvics by a distance as great as diameter of orbit. This male has 46 teeth in upper jaw and lacks the small patch of thorns on the extreme tip of snout below.

The few specimens of this species thus far captured have been taken over a wide depth range, from 29 to 305 fathoms. It is known from the northern part of the Gulf of Mexico in the offings of Pensacola and Cape San Blas and in the southern part on Campeche Bank.

Raja olseni,[2] n. sp.

Study material.—Immature male, 280 mm in total length, holotype, U. S. N. M. no. 153556, from lat. 27° 25′ N., long. 96° 13′ W., 76 fathoms, *Oregon* station 157 and an immature male, 282 mm, paratype, M. C. Z. no. 37176, from lat. 27° 27′ N., long. 96° 17′ W., 65 fathoms, *Oregon* station 158.

Distinctive characters.—*Raja olseni* closely resembles *R. laevis* in general appearance and in lacking thorns along the midbelt of the disc from the level of the axils of the pectorals to the vicinity of the spiracles. But it differs from *laevis* in having an interspace between the dorsal fins nearly or quite as long as the base of the first dorsal (only 0.1 to 0.3 that long in *laevis*); by having a fringe on the expanded outer margin of the nostril (smooth in *laevis*); also the lateral folds along its tail reach to only opposite the anterior third of the caudal fin, but in *laevis* extend almost or quite to the extreme tip of the tail; the lower sides of the disc are prickly along the anterior edges and over the rostral cartilage in *olseni* but smooth on *laevis* of equal size and its mucous pores are not marked with black as they are in *laevis*. It differs from *R. spinicauda* in its fringed nostril lobe, in its shorter tail folds, in the interspace between its dorsals, and in having three rows of thorns on the tail (only one row on *spinicauda*).

Description of holotype.—Proportional dimensions in percent of total length:

Disc.—Extreme breadth 69.0; length 54.0.

Snout length.—In front of orbits 15.6; in front of mouth 17.7.

Orbits.—Horizontal diameter 4.4; distance between 3.6.

Spiracles.—Length 2.0; distance between 6.3.

Mouth.—Breadth 7.9.

Exposed nostrils.—Distance between inner ends 7.9.

Gill openings.—Length, first 2.0; third 2.1; fifth 1.6; distance between inner ends, first 13.6; fifth 7.3.

First dorsal fin.—Vertical height 2.5; length of base 4.3.

Second dorsal fin.—Vertical height 2.4; length of base 4.6.

Pelvics.—Anterior margin 13.2.

Distance from tip of snout to center of cloaca 47.5; from center of cloaca to first dorsal 30.4; to tip of tail 52.5; from rear end of second dorsal base to tip of tail 3.2.

Interspace between first dorsal and second dorsal 4.3.

Disc about 1.3 times as broad as long, the maximum anterior angle in front of spiracles about 90°; anterior margins concave just posterior to tip of snout, weakly convex opposite eyes and spiracles, thence about straight rearward; outer corners narrowly rounded; posterior corners more broadly so; posterior margins gently convex. Axis of greatest breadth about 67 percent of distance back from tip of snout to axils of pectorals. Tail with a lateral fold, low down on each side, beginning posterior to axils of pelvics by a distance about four-fifths as long as eye and ending opposite anterior third of caudal fin, its length from center of cloaca to origin of first dorsal fin about 0.67 as great and to its tip about 1.1 times as great as distance from center of cloaca to tip of snout.

Two small thorns immediately in front of orbit, of which one is on the inner and one on the outer margin, also one on the inner rear margin; these are the only thorns or prickles on the disc. Sixteen thorns along midline of tail from a little in advance of axils of pelvics to first dorsal fin, and three in interspace between first and second dor-

[2] Named for Yngve H. Olsen in recognition of his excellent editorial work on Fishes of the Western North Atlantic.

sals. An additional row of thorns, widely and unevenly spaced, on each side of median row, beginning about opposite tips of pelvics and extending to opposite beginning of caudal fin; dorsals and caudal fin smooth. Lower surface with a narrow band of small prickles along anterior margin of disc from level of nostrils to tip of snout and also along rostral cartilage.

Snout in front of orbits 3.5 times as long as orbit, its length in front of mouth 2.2 times as great as distance between exposed nostrils. Distance between orbits 1.2 as great as length of orbit. Orbit 2.2 times as long as spiracle. Nasal curtain fringed; expanded posterior (outer) margins of nostrils fringed. Upper and lower jaws moderately arched centrally. Teeth $\frac{34}{34}$, close set in quincunx, ovate, with a triangular cusp. Distance between first gill openings 1.7 times as great as distance between exposed nostrils; between fifth gill openings 1.1 times; first gill openings 1.25 times as long as fifth and 0.25 as long as breadth of mouth. First and second dorsals similar in size and shape. Interspace between dorsals as long as base of first dorsal. Caudal

Fig. 2.—*Raja olseni*, n.sp., male, 280 mm long, holotype (U.S.N.M. no. 153556): A, Posterior part of tail, about × 1.5; B, mouth and nostrils, about × 2; C, upper teeth, about × 12.

membrane from rear end of base of second dorsal about twice as long as base of first dorsal. Pelvics deeply concave, strongly scalloped along anterior side of excavation but only weakly so rearward; anterior margin about as long as distance from its own origin to rear tip of pelvic; anterior lobe moderately slender, including five radial cartilages besides the first stout one; posterior lobe moderately convex outwardly; rear tips abruptly rounded, extending about two-sevenths the distance from axil of pelvics toward first dorsal; inner margin straight. Claspers falling well short of tips of pelvics.

Rostral cartilage firm, extending to tip of snout. Anterior pectoral rays reaching about half way from level of front of orbits toward snout tip.

Color.—Upper surface, in life, olive-brown with many small roundish obscure spots of darker brown on disc; a small dark spot, smaller than pupil, on each side of disc near its inward center; series of small whitish pores extend in three or four rows along midzone of back from region of pectoral girdle to axils of pelvics and extend on to tail in one or two rows; two rows extend rearward and outward on each side of disc posterior to the scapular region; whitish pores also are present opposite and in front of orbits, some extending toward outer margin of disc in sinuous rows. Below jet black everywhere, but this pigment tends to diminish in intensity in preservative.

The other known specimen of this species, 282 mm long, has a somewhat longer snout, the distance in front of orbits being four times the diameter of orbit; the interorbital space is as long as the orbit; the interspace between dorsals is nine-tenths as long as base of first dorsal and there are more teeth $\frac{41}{40}$.

As both specimens have very small claspers it is probable that the species attains at least a moderately large size, possibly 2 feet or more in total length.

Nothing is known of the habits of this skate except that it is apparently a moderately deep water species. It is known only from the northwestern part of the Gulf of Mexico as listed above.

Raja teevani[3], n. sp.

Study material. Immature male, 558 mm in total length, holotype, U. S. N. M. no. 153557, and an immature male 302 mm in total length, paratype, M. C. Z. no. 37189, both from lat. 29° 11′ N.; long. 86° 52′ W., in 305 fathoms, *Oregon* station 279.

Distinctive characters.—*Raja teevani* differs from all other rajids in the western North Atlantic in its broad tail, which widens rearward approaching the dorsal fins (in all other rajids it narrows rearward). It resembles *R. olseni* and *R. laevis* in general appearance and in lacking thorns along the midbelt of the disc from the level of the axils of the pectorals to the vicinity of the spiracles. But it differs from *olseni* by having no interspace between the bases of the dorsal fins; from *laevis* of comparable size it may be separated by its longer snout (the distance from tip of snout to eye being about one-fourth to one-third the width of the disc in *teevani* but only about one-fifth in *laevis*) and by the fact that the anterior margin of the pelvic fins is longer than the distance from its own origin to the rear tip of pelvic (shorter in *laevis*).

Description of holotype.—Proportional dimensions in percent of total length:

Disc.—Extreme breadth 72.7; length 58.2.

Snout length.—In front of orbits 22.2; in front of mouth 24.2.

Orbits.—Horizontal diameter 3.2; distance between 4.1.

Spiracles.—Length 2.0; distance between 6.1.

Mouth.—Breadth 7.7.

Exposed nostrils.—Distance between inner ends 8.7.

Gill openings.—Length, first 1.7; third 1.8; fifth 1.2; distance between inner ends, first 13.8; fifth 8.4.

First dorsal fin.—Vertical height 2.7; length of base 4.3.

Second dorsal fin.—Vertical height 2.7; length of base 4.0.

Pelvics.—Anterior margin 14.7.

Distance from tip of snout to center of cloaca 51.7; from center of cloaca to first dorsal 34.3; to tip of tail 48.3; from rear end of second dorsal base to tip of tail 5.4.

Interspace between first and second dorsals 0.0.

Disc about 1.25 times as broad as long, the maximum anterior angle in front of spiracles about 70°; anterior margins sinuous from snout to outer corners, being slightly convex a little in front of orbits; outer corners very sharply rounded; posterior margins gently convex; posterior corners broadly rounded. Axis of greatest breadth about 77 percent of distance back from tip of snout to axils of pectorals. Tail with a lateral fold low down on each side beginning al-

[3] Named for John Tee Van in appreciation of his helpful assistance to us as editor-in-chief of Fishes of the Western North Atlantic.

most imperceptibly about opposite tips of pelvics, widening rearward and ending opposite middle of caudal fin, its length from center of cloaca to origin of first dorsal fin 0.66 as great and to its tip 0.93 times as great as distance from center of cloaca to tip of snout.

Three small thorns along inner margin of left orbit, two of them anterior and one posterior; one anterior and one posterior thorn along inner margin of right orbit; minute prickles scattered over interorbital area and over entire disc anterior to the orbits. Tail with a median row of 15 backward pointing thorns, beginning about an eye's diameter posterior to the axils of pelvics and ending a little in front of first dorsal, the thorns somewhat more closely spaced and larger rearward than near their origin; minute prickles on tail from about tips of pelvics nearly to tip; dorsals and caudal with a few minute prickles. Lower surface with a band of prickles along anterior

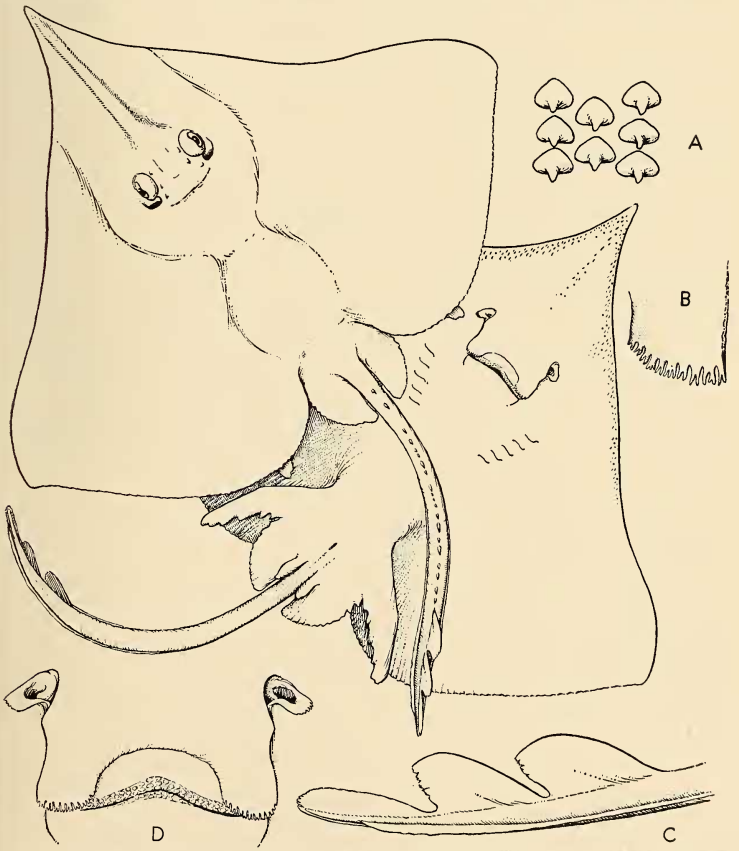

Fig. 3.—*Raja teevani*, n.sp., male, 558 mm long, holotype (U.S.N.M. no. 153557): A, Upper teeth, about × 6; B, margin of left nasal curtain about × 2.5; C, posterior part of tail, about × 1; D, mouth and nostrils, about × 1.

margin of disc from a little posterior to level of mouth to tip of snout and also along anterior half of rostral cartilage.

Snout in front of orbits 6.9 times as long as orbit; its length in front of mouth 3.6 times as great as distance between exposed nostrils. Distance between orbits 1.3 times as great as orbit. Orbit 1.6 times as long as spiracle. Nasal curtain fringed; expanded posterior (outer) margins of nostrils smooth except for a few fringes on extreme outer angle. Upper and lower jaws moderately arched centrally. Teeth $\frac{36}{36}$, rather widely spaced, in quincunx, triangular or ovate, with smooth rounded apex on outward margin and a low triangular cusp, pointing inward, on inner margin. Distance between first gill openings 1.6 times as great as distance between exposed nostrils; between fifth gill openings about 1.0 times; first gill openings 1.4 times as long as fifth and 0.22 as long as breadth of mouth. First and second dorsals similar in size and shape. No interspace between dorsals. Caudal membrane from rear end of base of second dorsal 1.25 times as long as base of first dorsal. Pelvics deeply concave, strongly scalloped along anterior side of excavation but only weakly so rearward; anterior margin 1.1 times as long as distance from its own origin to rear tip of pelvics; anterior lobe moderately slender, including five radial cartilages besides the first stout one; posterior lobe convex outwardly; rear tips abruptly rounded, extending about one-fifth the distance from axil of pelvics toward first dorsal; inner margin straight. Claspers falling well short of tips of pelvics.

Rostal cartilage firm, narrow, extending to tip of snout. Anterior pectoral rays reaching only about two-fifths the distance from level of front of orbits toward tip of snout. Translucent area in front of orbits and on either side of rostral cartilage very thin and membranous.

Color.—Upper surface pale brown, somewhat darker along posterior margins of disc, on pelvics and on tail. Dorsal fins and caudal black. Below creamy on disc except somewhat dusky along outer margins from outer angle rearward and on pelvics. Probably blackish everywhere in life. Tail blackish.

The other known specimen of this species, 302 mm long, has a somewhat shorter snout, the distance in front of orbits being 5.5 times as long as orbit and a relatively longer tail the distance from center of cloaca to tip of tail being 1.1 times as great as distance from center of cloaca to tip of snout. There is one sharp backward pointing spine on the anterior inner margin of each orbit and another on the posterior inner margin. The color of the upper surface is similar to that of the type except that there is a narrow black margin along the posterior edge of the disc and the lower surface is distinctly margined with black rearward from the level of the mouth; the rear parts of the pelvics also are blackish.

The very small claspers on the larger specimen indicate that this species attains at least a moderately large size.

Nothing is known of its habits beyond the fact that our two specimens were taken at a depth of 305 fathoms. It is known only from the offing of Pensacola, Fla.

Hydrolagus alberti[4], n. sp.

Study material.—Immature male, 275 mm long to origin of upper caudal fin, holotype (U. S. N. M. no. 153558); male, 280 mm and female 275 mm, paratypes, all from lat. 29° 11′ N., long. 86° 52′ W., 305 fathoms, *Oregon* station 279.

Distinctive characters.—This newly discovered chimaerid is marked off from its genus mate *affinis* by its very long caudal filament, its relatively much longer pectorals, and its very much larger eyes. It resembles the Japanese *H. himitsukurii* very closely but differs from it by having a shorter dorsal spine, longer pectorals and more conspicuously waved lateral line anteriorly.

Description of holotype.—Proportional dimensions in percent of distance between snout and origin of upper caudal fin:

Trunk.—Breadth 10.9; height 15.6.

Snout length.—In front of eye 9.5; in front of mouth 10.5.

Eye.—Horizontal diameter 7.6; vertical diameter 5.8.

Mouth.—Breadth 5.5.

Nostrils.—Distance between 0.4.

Dorsal spine.—Length 15.3.

First dorsal fin.—Length of base to lowest point between dorsals 13.8.

Second dorsal fin.—Length of base 64.7.

Upper caudal fin[5].—Length of base to last horny ray 19.3.

Pectoral fin.—Length 31.6; breadth 16.3.

Distance from snout to origin of dorsal spine 24.4; second dorsal 38.2; pectorals 23.2; pelvics 45.5.

Distance from origin to origin of pectorals and pelvics 26.6.

[4] Named for Albert E. Parr in recognition of his many contributions to ichthyology.

[5] The point of origin of the lower caudal fin is not evident.

Trunk opposite dorsal spine about as high as distance from snout to posterior margin of eye; about one-half as high close behind pelvics, tapering evenly thence rearward and terminating in a long filament which, when complete, is about two-thirds the length of body from snout to termination of caudal fin; strongly compressed laterally posterior to head, increasingly so rearward, its thickness about three-quarters as great as its height opposite bases of pectoral fins and one-half as great opposite bases of pelvic fins.

Skin perfectly smooth on immature specimen.

Head about 21 percent of length of trunk to upper origin of caudal fin. Snout conical with blunt tip. Eye oval, sloping a little rearward, its horizontal diameter about 1.3 times its vertical diameter; distance from tip of snout to front of eye about two-fifths length of head to origin of pectorals; pupil one-half vertical diameter of eye; height of eye about two-fifths of height of head, its length about one-third length of head to origin of pectorals. Exposed subdivision of nostrils crescentic on inner edge, about $1\frac{1}{2}$ times as long as broad, its length about 15 percent as great as length of eye; distance from its own rear edge to free edge of upper lip about as long as its own length. Width of mouth, when closed, a little less than length of eye.

Lateral mucous canal with a short and abrupt wave opposite the anterior part of first dorsal fin, after which there is a long low dip opposite origin of second dorsal fin, thence continuing nearly straight along the upper part of the caudal axis, descending at origin of caudal fin to follow out along lower edge of caudal axis. Junction of cranial canal with aural canal somewhat more acute than a right angle; anterior course of cranial canal nearly straight, looping down in front of eye;

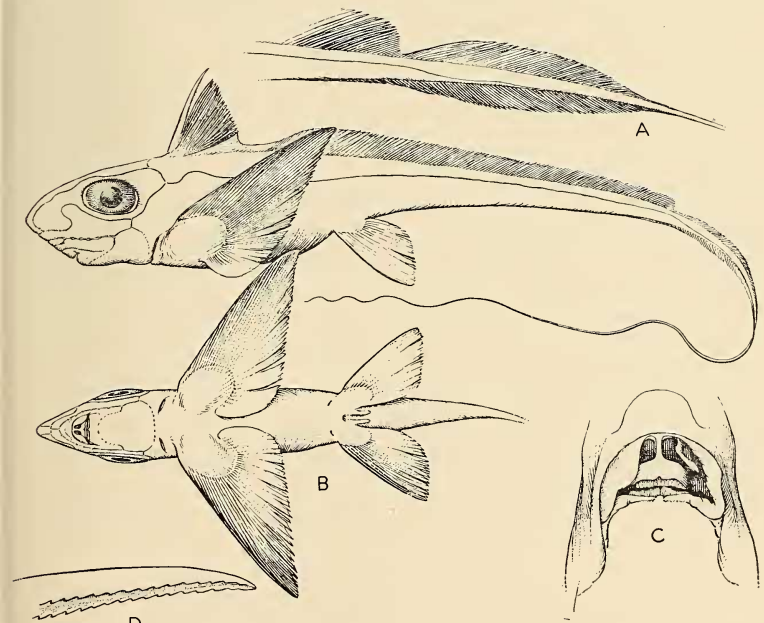

Fig. 4.—*Hydrolagus alberti*, n.sp., male, 275 mm long to origin of upper caudal fin, holotype (U.S.N.M. no. 153558): A, Posterior part of second dorsal fin and upper and lower caudal fins, about × 1; B, ventral view of head and body; C, mouth, with left lip folded aside to show nostrils and dental plates, about × 2; D, tip of dorsal spine, about × 2.5.

jugular and oral canals running downward from suborbital as a joint canal for a short distance before separating. About 10–12 medium size pores close in front of occipital canal; about 12 pores in area bounded by suborbital and joint oral-jugular canals; about 10 large openings along angular canal to front of snout; a single row of about 15 small pores parallel to descending oval branch and continuing in front of it; about 8 or 9 large openings along anterior part of suborbital canal from its descending wave to front of snout; jugular canal continued downward onto throat as a series of short slits. Skin closely pock-marked on top and on upper sides of head abreast of mouth and nostrils and toward tip of snout, with many rounded depressions of different sizes.

Anterior upper (vomerine) dental plates quadrate, their outer anterior outlines convex, with six radial ridges. Posterior upper (palatine) plates about 2.75 times as long as anterior plates, triangular, the posterior margin about two-thirds as long as outer margin, surface lumpy, with four prominent ridges running longitudinally. Lower (mandibular) plates nearly as long as posterior upper plates, each plate with a double concavity and central ridge on inner surface, the cutting edge uneven, highest at center of mouth.

Gill openings nearly one-half as long as distance from tip to snout to front of eye, distance across throat between their lower ends about one-half as long as eye, fold across throat strongly marked.

Dorsal spine about as long as distance from tip of snout to rear edge of pupil, reaching slightly beyond apex of first dorsal fin; outer part free from first dorsal fin, the rear face with two rows of low sharp thorns pointing toward base. First dorsal fin with sharp angle at apex and straight posterior margin; its base (from origin of spine to bottom of inter-dorsal notch) nearly as long as height along anterior margin of fin. Distance between first dorsal (when slightly depressed) and first noticeable elevation of second dorsal about two-fifths as long as anterior margin of first dorsal.

Second dorsal with horny rays easily distinguishable, upper margin nearly straight; height at midlength about one-fifth as great as length of anterior margin of first dorsal; about equally great at rear end and slightly greater toward anterior end; posterior outline of second dorsal curving abruptly downward. No definite interspace between second dorsal and upper origin of caudal. Caudal lanceolate, prolonged into a long filament about four-fifths as long as distance from snout to rear end of second dorsal; maximum height of caudal above axis about two-thirds height of second dorsal at posterior end; its extreme length to most posterior ray about 9 times as great as its height; caudal below axis about four-fifths as wide as above; the most posterior rays of both upper and lower sides of caudal terminate almost imperceptibly and about opposite each other; origin of lower side of caudal indefinite in position, preceded by a low fleshy ridge distinguishable forward to a point above and opposite beginning of last third of second dorsal fin. Pelvic fins with weakly convex anterior and distal margins, subangular outer corners and gradually rounded posterior (inner) corners; length of pelvics along anterior margin about as great as distance from tip of snout to middle of eye; origin posterior to axils of pectorals by a distance about equal to that from tip of snout to origin of pectorals. Pectoral fins about three-tenths as long as distance from tip of snout to opposite rear part of second dorsal fin; tips, when laid back, extending just beyond the base of pelvic; anterior margin weakly convex; distal margin straight or slightly concave; apex sharp pointed; inner corner broadly rounded.

Prepelvic openings present. Frontal tenaculum embedded in skin in this immature male. Claspers bifid but may develop as trifid with age.

Color.—Dark brownish everywhere on head and body above and below; fins somewhat darker.

The female closely resembles the male but lacks the prepelvic openings and, of course, the frontal tenaculum.

This species is known only from the offing of Pensacola, Fla., in a depth of 305 fathoms.