

Mr. Belding. He sends two specimens, an adult male and female, which agree closely with Mazatlan examples. These western specimens all differ appreciably from eastern ones (from Yucatan and Honduras) in the darker shade of chestnut on the head and in some other less important characters, but until I have seen more specimens I do not venture to separate them.

The group to which this species belongs is an exceedingly difficult one on account of the great amount of variation with locality. A recent examination of a large series of specimens from various localities strongly suggests the probability of the existence in Middle America and the West Indies of but a single species of "Golden Warbler" besides *D. astiva*, but this broken up into numerous local races more or less distinct from one another. According to this view, *D. petechia*, *D. capitalis*, and other West Indian races, *D. aureola*, of the Galapagos, *D. vieilloti*, and the present bird would all represent merely local variations of a single species, the difference being appreciable chiefly, if not only, in fully adult males, and consisting in the varying amount of rufous on the head and under parts. So far as the material in the National Museum collection is concerned, the distinctions between the present bird and the true *D. vieilloti*, pointed out in the descriptions above cited, hold good, and I must therefore, for the present at least, beg to dissent from the opinion of Messrs. Salvin and Godman (in Biol. Centr.-Am. Aves, i, p. 125) that *D. bryanti* cannot be separated from *D. vieilloti*.

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THE TAXONOMIC RELATIONS AND GEOGRAPHICAL DISTRIBUTION OF THE MEMBERS OF THE SWORD-FISH FAMILY, XIPHIIDÆ.

By G. BROWN GOODE.

The following essay toward a reformulation of the characters by which the members of the sword-fish family are classified is the outcome of a systematic study of this group of fishes, a detailed statement of which, together with an account of the sword-fisheries of the world, are given in full in a forthcoming report of the United States Fish Commission. The views of the writer having been somewhat modified since reading the proof-sheets of the report just referred to, the portion relating to the classification of the group has been rearranged and is here presented. The views of Dr. Lütken, of the Zoological Museum, Copenhagen, as expressed in his recent work entitled "Spolia Atlantica", have received a careful consideration in the preparation of these notes, and have, to a considerable extent, been adopted.

As Dr. Lütken has pointed out, the genus *Xiphias*, to which the common sword-fish belongs, cannot, as has hitherto been customary, be regarded as the central type of the family, but must be considered an

aberrant or divergent type; the round-billed species, provided with ventral fins, especially those of the genus *Histiophorus*, being the most typical and representative of the group.*

Representatives of all the genera of the sword-fish family occurring in the waters of the United States the writer has had opportunities of studying and formulating by means comparison, certain structural characters never before expressed.

DESCRIPTION OF THE FAMILY XIPHIIDÆ.

Family XIPHIIDÆ, Agassiz.

Xiphioides, AGASSIZ, Recherches sur les Poissons Fossiles, v, 1843, p. 89.—BLEEKER, Enum. Sp. Pisc. 1839, p. 62.

Xiphiida, GÜNTHER, Catalogue of the Fishes in the British Museum, ii, 1860, p. 511; Fische des Südsee, i, 1873-5, p. 105; Study of Fishes, 1880, p. 431.—GILL, Arrangement of the Families of Fishes, 1872, p. 8 (name only).—DAY, Fishes of India, i, 1876, p. 198.

Diagnosis of family.

Scombroid fishes, with elongate, compressed bodies, covered with elongate scale-like scutes (*Tetrapturinae*) or naked (*Xiphiinae*). Pre-maxillaries with nasal and vomerine bones produced in a long spear-like snout, immovably articulated with the prenasal and maxillary. Teeth rudimentary (*Tetrapturinae*) or absent (*Xiphiinae*). Nasal bone cellular at its base. Ventrals rudimentary (*Tetrapturinae*), or absent (*Xiphiinae*). A single dorsal, extending nearly the whole length of the body in young, persistent (*Histiophorus*) or subpersistent, divided in middle with age (*Tetrapturus*), or becoming with age subdivided into two short dorsals (*Xiphiinae*). A similar rudimentation of anal fin in both subfamilies. Preopercular spine present in young (*Xiphiinae*), or parietal and preopercular spines (*Tetrapturinae*), disappearing with age. Seven branchiostegals. Pseudo-branchiæ present. Branchiæ cancelled or reticulated. Air-bladder present, cellulated (*Tetrapturus* and *Histiophorus* (?)), or simple (*Xiphiinae*). Intestine short, not sinuous (*Tetrapturinae*), or long, sinuous (*Xiphiinae*). Gall-bladder free, hanging at some distance from the liver. Articular processes developed from the parapophyses.

Synopsis of subfamilies.

Ventrals present: skin with scutes: snout rounded: caudal keels double.

TETRAPTURINÆ, Gill.

Ventrals absent: skin scaleless: snout flat: caudal keel single. . . XIPHIINÆ, Swainson.

* 1875, LÜTKEN, CHR.

Om rundnæbides Svaerdfiske, særligt om *Histiophorus orientalis*, Schl. < Vidensk. Meddel. Naturhist. Foren. Kjöbenhavn, 1875, pp. 1-21 + 1-5.

DESCRIPTIONS OF THE SUBFAMILY TETRAPTURINÆ AND THE GENERA
TETRAPTURUS AND HISTIOPHORUS.

Subfamily TETRAPTURINÆ, Gill.

Tetrapturinae, Gill, in Rep. U. S. F. C. i, 1873, p. 787; Cat. Fish. E. Coast N. A. 1873, p. 9 (name only; no description).

Diagnosis of subfamily.

Xiphiid fishes, with bodies much compressed, covered with elongate, scale-like scutes. Sword somewhat flattened, but rounded at edges, spear-like. Tooth-like granulations upon the jaws. Pelvic arch present. Ventrals reduced to a single ray. Dorsal fin single (*Histiophorus*) or in two portions, but little remote, separated by aborted section (*Tetrapturus*). Preopercular spine absent (but probably present in young). Two keels upon each side of caudal peduncle. Ultimate dorsal and anal rays suctorial. Air-bladder very large, sacculated, consisting of numerous separate divisions. Intestine short, straight. Two genera, *Histiophorus* and *Tetrapturus*.

Synopsis of genera.

Dorsal fin single, high, sail-like: ventral rays two or three.... *Histiophorus*, Lacépède.
Dorsal fin double, *Xiphias*-like: ventral rays one *Tetrapturus*, Rafinesque.

Genus *Tetrapturus* Rafinesque.

Tetrapturus, RAFINESQUE, Caratteri, etc., 1810, p. 54, pl. 1, fig. 1.

Tetrapterus, AGASSIZ, Poiss. Foss. v, 1843.

Diagnosis of genus.

Xiphiid, tetrapturine fishes, with body much compressed. Two dorsal and two anal fins in adult state; single dorsal and anal in immature ages. Tooth-like asperities on palatines and lower jaw. Body covered with cultriform scale-like scutes, under epidermis. Dorsal rays much more numerous than in *Xiphias*, less so than in *Histiophorus*. Ventrals rudimentary, consisting of one pair of very elongate, flattened rays. Vertebrae 25 (*T. belone*). Pyloric caeca very numerous. Intestine short, nearly straight.

Habitat.—Mediterranean, tropical and subtropical Atlantic.

1. *Tetrapturus imperator* (Schneider), Goode.

Xiphias imperator, SCHNEIDER, Bloch's Syst. Ichth. 1801, p. 93, pl. xxi (poor figure), founded on Duhamel, iii, p. 333, pl. xxvi, fig. 2.

Tetrapturus belone, RAFINESQUE, Caratteri Animali e piante della Sicilia, 1810, p. 54, pl. i, fig. 1.—CUVIER, Règne Animal, 2d ed. 1829, ii, p. 201.—CUVIER & VALENCIENNES, Hist. Nat. Poiss. viii, 1831, p. 280, pls. cexxvii (skeleton), cexxviii (adult fish).—BONAPARTE, Catalogo Metodico, 1846, p. 80.

Tetrapterus belone, AGASSIZ, Poissons Fossiles, 1843, v, p. 89, tab. E. (fine figure of skeleton).

Tetrapterurus belone, BONAPARTE.

Histiophorus belone, GÜNTHER, Cat. Fish Brit. Mus. ii, 1860, p. 513.

Skeponopodus typus, NARDO, Isis, 1833, Heft iv, p. 417 (Adriatic).

This species appears to be limited to the waters of the Mediterranean. It was not noticed by Linnaeus, or indeed by any of the binomial writers before Schneider. In his posthumous edition of the writings of Bloch, the latter has made reference to a figure and description in Duhamel, and has given to a fish, which he figures in plate xxi of this work, the name *Xiphias imperator*. This name was rejected by Cuvier (Règne Animal, l. c.), and has not been recognized by later writers. It seems to me, however, that Schneider has, perhaps unintentionally, yet quite intelligibly, expressed the principal differential characters of *Tetrapturus*. By "dorso scabro" he covers the question of the scales; by "carina caudali nulla" he refers to the absence of the single caudal carina of *Xiphias*, while by figure and by implication in his description he admits the presence of ventral fins. His figure, though bad, is as good as most of the old figures of *Xiphias*—that of Lacépède for example.

T. imperator is said to attain the length of five or six feet, and the weight of 150 pounds. It has been taken in the Straits of Messina with the harpoon, but according to Rafinesque is very rarely seen on the coasts of Sicily, and then only in autumn, when it is following the dolphin and flying-fish, upon which it feeds. It is ordinarily seen in pairs, male and female together, and they are taken often in the nets together. Its flesh is white but not particularly well flavored. At Messina it is called "*Aguglia imperiale*" (Cuvier & Valenciennes, l. c.).

2. *Tetrapturus indicus*, Cuvier & Valenciennes.

Tetrapturus indicus, CUV. & VAL. Hist. Nat. Poiss. viii, 1831, p. 286 (on figure belonging to Sir Joseph Banks).

A species founded on a figure of a specimen obtained in Sumatra communicated by Sir Joseph Banks to Broussonet, who refers to it at the end of his "Memoire sur le Volier".*

The description is worthless. It is stated by Cuvier and Valenciennes that this fish had been supposed to be the male of *Histiophorus gladius*, but that it is much more nearly related to *Tetrapturus* of the Mediterranean, though with a longer beak.

The notes accompanying the figure state that it attains the length of nine feet and the weight of 200 pounds, and was known to the Malays by the name "*Joo-hoo*".

Günther regards it as perhaps synonymous with *T. Herschelii*, Gray.†

3. *Tetrapturus Herschelii*, Gray.

Tetrapturus Herschelii, GRAY, Ann. Nat. Hist. i, 1838, p. 313, pl. x.—LÜTKEN, ll. c. *Histiophorus Herschelii*, GÜNTHER, l. c.

This species was described from a specimen eleven feet long obtained at Table Bay, Cape of Good Hope, in 1837. The description is repro-

* Hist. de l'Acad. des Sciences, Paris, 1786, pp. 450-455.

† Günther, l. c. p. 513, sub. *Histiophorus Herschelii*.

duced in the appendix, and the plate is also here presented. The type of *T. Herschellii* is in the British Museum. The United States National Museum has some fine skins, apparently of this species, brought from Mauritius by Col. Nicholas Pike, United States consul. There is no reason to doubt that this species may be the same with *T. indicus*, Cuv. & Val., just described, there being little probability that there are two species in waters so close as those of Sumatra and the Cape of Good Hope.

4. *Tetrapturus Georgii*, Lowe.

Tetrapturus Georgii, LOWE, Proc. Zool. Soc. viii, 1840, p. 36; Trans. Zool. Soc. iii, 1849, p. 3 (reprint of first).—GÜNTHER, op. cit. p. 512, foot-note.—LÜTKEN, ll. c.

This species known at Madeira as "*Peito*", was described by Lowe thus briefly: "I am enabled to state that it forms a new and very distinct species of *Tetrapturus*, Raf., differing from *T. belone* Raf., as described by MM. Cuvier and Valenciennes, especially in having the pectoral fins proportionately twice as long, and the body clothed with large scales of a peculiar shape and character."

Lütken believes it to be identical with the two species of the Indian Ocean just discussed, as well as with the two Cuban species. It should surely be carefully compared with the latter.

5. *Tetrapturus albidus*, Poey.

Tetrapturus albidus, POEY, Mem. Hist. Nat. Cuba, ii, 1858, p. 237, pl. xv, fig. 1; pl. xvi, figs. 2-13; pl. xvii, figs. 1, 5, 6-9, 10-11, 26; Ib. p. 258; Rep. Fis. Nat. Cuba, ii, 1868, p. 380.—GILL, Cat. Fish E. Coast N. A. 1873, p. 24.—LÜTKEN, ll. c.

6. *Tetrapturus amplus*, Poey.

Tetrapturus amplus, POEY, op. cit. p. 243, pl. xv, fig. 2; pl. xvi, figs. 12-25; Rep. Fis. Nat. Cuba, ii, 1868, p. 380.—LÜTKEN, ll. c.

These two species are described by Poey from Cuba, and one of them, *T. albidus*, is not uncommon on the Atlantic coast of the United States. Lütken is disposed to consider them both identical with the *T. indicus* type, and it seems to me that there is as much reason for this procedure as for merging the Sail-fishes of the Atlantic and Indian Oceans, as has been persistently done by all writers on ichthyology.

7. *Tetrapturus brevirostris* (Günther & Playfair), Lütken.

"*Histiophorus brevirostris*, GÜNTHER & PLAYFAIR, Fishes of Zanzibar, 1866, pp. 53, 145, figure."—DAY, Fishes of India, 1876, p. 199, pl. xvii, fig. 3.
Tetrapturus brevirostris, LÜTKEN, ll. c.
Histiophorus, KNOX, Trans. New Zealand Institute, ii, 1870, pp. 13-16, fig. 1.

This species, the habitat of which is given by Day as "? East coast of Africa, seas of India, perhaps New Zealand", is referred by Lütken to the same species with *T. indicus* and *T. Herschellii*. Day considers it closely allied to *Tetrapturus Lessonii*, Canestrini.

8. *Tetrapturus Lessonii*, Canestrini.

Tetrapterus Lessonii, CANESTRINI, Arch. Zool. 1861, i, p. 259, pl. vii.—LÜTKEN, ll. c.—DAY, ll. c.

This species, described by Canestrini from the Mediterranean, is referred by Lütken to the general cosmopolitan type, of which *T. indicus* and *T. Herschelii* are the representatives.

DESCRIPTIVE NOTES ON THE AMERICAN SPEAR-FISH, *TETRAPTURUS ALBIDUS*.

The following description was drawn up from a fine specimen of the spear-fish taken at Block Island, R. I., in 1875:

A male fish of 2,150^{mm} (84.646 inches), ordinary size.

Body elongated, nape elevated, bringing the greatest height over the operculum (10.27 inches). At the point of the pectoral the height is nine-elevenths of that at the operculum (8.4 inches), and is contained about 10 times in total length.

The head from extremity of lower jaw is contained in the total length 4 times (21.161 inches). The eye is situated midway between operculum margin and tip of lower jaw. The length of the bill beyond lower jaw equals greatest height of head. Palatines with a narrow band of rough denticulations. Asperities on the lower jaw. Bill extremely hard, especially at its extremity; its form is depressed, its edges rounded, its height greater than half its width. Preoperculum situated far back; commences midway between the eye and the opercular margin. The other opercular bones are not visible in fresh specimen.

Lateral line marked by a series of minute apertures on a continuous band, connected at the top of operculum; continues backward in a straight line for a short distance, then bends downward and reaches the middle line of the body at the point of the pectoral. Scales bony, linear, absent from the head, except on the cheeks. Those of lateral line not pierced. All the scales covered by epidermis.

Br. 7; D. 3, 39-6; A. 2, 13-6; P. 19; V. 1, 4; C. 12.

All the rays osseous, not articulated; those indicated as osseous are only distinguished from the others by their terminating in a point, which is not free. The others are flattened towards the extremity and frayed at the ends. The two first anal and three first dorsal rays are ossified to each other and upon the ray behind them, so that they appear to sight and touch as if only a single ray. Dissection shows that the first dorsal is very small (20^{mm}); second, 2½ times as high (50^{mm}); third, 115^{mm}; the fourth twice as long. The same in anal. First, 30^{mm}; second, 70^{mm}; third like fourth dorsal in form. These fins are for the most part hidden in the furrows, and their last rays are extremely short, so that it is necessary to lay them bare by dissection. •

First ray of second dorsal and second anal flat and striated; these fins are crenated. The fourth of first dorsal and third of first anal touch the summits of the fins, which are slightly rounded.

First ray of pectoral very strong and prolonged to the extremity; 8 last short, forming the subbrachial dilation.

Ventral appears at first sight a single ray, but dissection shows 5, the 3 first anchylosed. They are received in a furrow, which extends to the anus.

Caudal stiff; bifurcation making angle of 72° from middle of the two caudal crests to the point of the lobes, and, neglecting points, 80° .

Origin of first dorsal above preopercle, its height surpassing by one-sixth the height of the body beneath it.

Pectoral one-eighth length of body from point of lower jaw.

First anal lower than dorsal.

The two others are small and opposite. The second dorsal a little farther back, a little higher, and a little more "échancrée".

Color.—Pronounced deep blue above, a little lighter on the flanks, passing into white below. Fins intense blue; second anal and outside of pectoral lighter. First dorsal with rounded spots, more intense, of same color. Iris clear blue; cornea blackish.

Four gills of double structure and an accessory, reticulated as in *Xiphias*.

Pylorus attached high up and has great longitudinal folds; also the duodenum, which is swollen and receives, by two openings, the secretions of the compact and glandulous mass which covers it.

Intestine slender, with two short convolutions, embracing in its last the spleen.

Swim-bladder cellulous, showing great puffs, which extend far behind the anus.

A second specimen, the measurements of which are given below (B), suggested the following notes:

Top of head and body, upper lobe of caudal fin, and caudal cartilage bluish black. Belly and throat white. Cheeks and opercular blackish, covered with a pearly sheen. The black hue of the back shades into the white of the belly through an insensible gradation of lines, the most prominent of which are rich purplish brown and light smoky gray. The belly and the sides are pearly up to the lateral line. The boundary between the colors of the back and the belly is indicated by an indistinct line, which may be traced from the base of the rostrum over the top of the orbit and the operculum, then descending across the lateral line at a point above the middle of the pectoral fin; it then rises in the arc of a circle above the lateral line, which it meets again at the tail, the distance between them being the greatest over the anal fin. The lower lobe of the caudal is blackish, with a pearly sheen. The ventrals and second dorsal fins are blue-black. The anterior rays of the first dorsal are also blue-black, the membrane being light bluish purple, irregularly spotted with circular dots from one-quarter to one-half an inch in diameter. The first anal is deep bluish purple at its extremity, but on its basal half bright pearly white. The inner surface of the pectoral is

bluish purple, brightest in the axil; its outer surface is blackish, though completely covered with a pearly sheen.

The ventrals, first dorsal, and first anal, when not erected, are completely hidden in grooves. The second dorsal and second anal are not so hidden. The pectorals are flat, closely clinging to the sides when not in motion; their base received into a depression in the side of the fish.

The lanceolate scales may be seen through the epidermis, giving a reticulated appearance to sides of the fish.

The second dorsal and the second anal have broad, flattened, ultimate rays, which adhere closely to the body of the fish.

Measurements.

Current number of specimen	A.	B.
Locality	New Bedford, Mass., July, 25, 1875.	Wood's Holl, Mass., 1875.
	Inches.	Inches.
Extreme length	80.00	89.00*
Length to end of middle caudal rays	70.50	81.00
Body:		
Greatest height	9.00	{ 11.50†
Height at ventrals	9.00	{ 9.00‡
Head:		
Greatest length	27.00	28.75
Greatest width	5.00	.....
Width of interorbital area	4.25	.....
Length of snout	17.50	19.50
Length of bill .....	.....	12.25§
Length of operculum	3.00	.....
Length of upper jaw to commissure of jaws .....	.....	22.75
Length of lower jaw to commissure of jaws .....	.....	10.50
Distance from snout to orbit	17.50	.....
Diameter of orbit	2.00	2.00
Dorsal:		
Distance from snout	26.00	28.00
Length of base	40.00	37.00
Greatest height .....	.....	12.25
Height at first spine	11.50	.....
Height at second spine	11.75	.....
Height at third spine	11.00	.....
Height at fourth spine	10.75	.....
Height at fifth spine	10.50	.....
Height at sixth spine	9.00	.....
Height at seventh spine	7.25	.....
Height at eighth spine	5.00	.....
Height at ninth spine	5.75	.....
Height at tenth spine	4.50	.....
Height at eleventh spine	3.50	.....
Height at twelfth spine	3.50	.....
Height at thirteenth spine	3.00	.....
Height at fourteenth spine	2.50	.....
Anal:		
Distance from snout	49.00	54.00
Length of base	15.00	10.25||
Height at first spine	7.50	.....
Height at second spine	7.50	.....
Height at third spine	6.75	.....
Height at fourth spine	6.00	.....
Height at fifth spine	5.50	.....
Height at sixth spine	2.75	.....
Height at seventh spine .....	.80	.....
Height at eighth spine .....	.50	.....
Height at ninth spine .....	.35	.....
Height at tenth spine .....	.25	.....
Height at eleventh spine .....	.10	.....
Height of fin above sheath .....	.....	7.25

* To vertical from upper caudal lobe.

† At origin of dorsal.

‡ Over vent.

§ Beyond tip of lower jaw.

|| "Length of anal groove."

Measurements—Continued.

Current number of specimen.....	A.	B.
Locality	New Bedford, Mass., July 25, 1875.	Wood's Holl, Mass., 1875.
	Inches.	Inches.
Caudal:		
Length of middle rays	2. 00	
Length of external rays	16. 00	
Distance between lobe tips.....		24. 25
Pectoral:		
Distance from snout	28. 50	29. 00
Length.....	14. 75	13. 50
Ventral:		
Distance from snout		30. 50
Length of groove from base of ventrals to vent.....	10. 00	18. 50
Dorsal	40+6	39+5
Anal	11+6	14+6
Caudal	6+4+4+5	
Pectoral	18	20
Ventral	1	1
Weight, dressed (pounds)	55½	
Number of vertebrae:		
Dorsal	11	
Caudo-lumbar.....	13	

Genus *Histiophorus* Lacépède.

- <*Istiophorus*, LACÉPÈDE, Hist. Nat. Poiss. iii, 1803, p. 374.
- <*Histiophorus*, CUVIER & VALENCIENNES, Hist. Nat. Poiss. viii, 1833, 291.
- <*Histiophorus*, GÜNTHER, Cat. Fish. Brit. Mus. ii, 1860, p. 512.
- Notistium*, HERMANN, Observ. Zool. 1804, p. 305.

Diagnosis of genus.

Xiphiid, tetrapturine fishes, with body slender and very much compressed. Dorsal single (though the last few rays are nearly abortive), retaining the character of extreme youth, which is lost in *Xiphias* and *Tetrapturus*, and very lofty. Vertebrae 24 (*H. indicus*). Anal fin double. Numerous tooth-like asperities on the jaws. Body covered with elongate scales. Dorsal rays, being unaborting, very numerous. Ventrals consisting each of two or three elongate rays. Intestine short, nearly straight, with two foldings. A single species in the United States, *Histiophorus americanus*, Cuvier.

9. *Histiophorus gladius* (Broussonet), Lacépède.

- Scomber gladius*, BROUSSONET, Mem. Acad. Sci. 1786, p. 454, pl. x.
- <*Scomber gladius*, BLOCH, Ichthyology, pl. cccxlv: Hist. Nat. Poiss.
- <*Istiophorus gladius*, LACÉPÈDE, "iii, pp. 374-5", 2d ed. 8°, 1819, p. 542.
- Histiophorus gladius*, GÜNTHER, l. c. p. 513.—GILL, ll. c.
- <*Xiphias velifer*, SCHNEIDER, l. c. p. 93.
- Histiophorus indicus*, CUV. & VAL. l. c. p. 293, pl. cccxix.

This species, described first by Broussonet from specimens brought from the Indies—"la mer des Indes"—by Banks, has usually been considered, perhaps rightly, by later authors to be identical with the American form.

10. *Histiophorus americanus*, Cuvier & Valenciennes.

Guebucu brasiliensibus, MARCGRAVE, Hist. Brasil. 1648.

< *Scomber gladius*, BLOCH, l. c.

< *Histiophorus gladius*, authors.—

Histiophorus americanus, CUV. & VAL. l. c. p. 303.

Skoponopodus guebucu, NARDO, Isis, Heft iv, p. 416.

The history of this species is given below. Lütken follows the general lead in identifying this with *H. gladius*.

11. *Histiophorus orientalis*, Temminck & Schlegel.

Histiophorus orientalis, TEMM. & SCHLEG. Fauna Japonica, Pisces, 1842, p. 103,

pl. lv (specimen 7 feet long, from Japan).—GÜNTHER, op. cit. p. 514.—

LÜTKEN, Vid. Med. Nat. Foren. 1875, p. 1, pl. i (specimen 7 feet $1\frac{1}{2}$ inches long, from Singapore).

In his first paper on the Sword-fishes Lütken, though doubtful, seemed inclined to consider this a distinct species. In "Spolia Atlantica" he speaks of two species of *Histiophorus*, but I am unable to decide whether it is this or *H. gracilirostris* which he regards as well separated from *H. gladius*. Speaking of the occurrence of this fish in the seas of Japan, Temminck and Schlegel remark that its Japanese name is "Herivo"; that it is occasionally taken in autumn on the southwest coast of Japan during the progress of the tunny fishery, and that its flesh is much esteemed.

12. *Histiophorus immaculatus*, Rüppell.

Histiophorus immaculatus, RÜPPELL, Proc. Zool. Soc. iii, 1835, p. 187 (abstract):

Trans. Zool. Soc. ii, p. 71, pl. xv: "N. W. Fische, p. 47, taf. xi, fig. 3".—

GÜNTHER, l. c.—LÜTKEN, ll. c.—DAY, Fish. India, 1876, p. 199.

Rüppell's specimen came from Djetta on the Red Sea, where the Arabs caught it in a net. He regards it as rare because the Arabs had no common name for it. The specimen is preserved in the museum at Frankfort, and, if I rightly understand Dr. Lütken, is 18 inches long. Dr. Lütken unhesitatingly pronounces it the young of *H. gladius* or *H. orientalis*, considering it to be slightly older than the one figured by Cuvier and Valenciennes as *H. pulchellus*.

Day mentions a specimen of this species in the Madras Museum 5 feet 9 inches long. This, to be consistent with Lütken's theory, must be regarded as a specimen in which the colors have disappeared.

13. *Histiophorus pulchellus*, Cuvier & Valenciennes.

Histiophorus pulchellus, CUV. & VAL. Hist. Nat. Poiss. viii, 1831, p. 305, pl.

cxxx.—GÜNTHER, op. cit. p. 514.—LÜTKEN, ll. c.

Cuvier and Valenciennes described under this name a specimen 4 inches long taken in the Eastern Atlantic, north of the Cape of Good Hope, probably somewhere on the west coast of Africa, by M. Raynaud. There were said to have been a great many more of the same size in the place where it was taken.

Lütken regards it as the young of *Histiophorus gladius*. He uses it to

complete the series of development between the small specimens described by Günther and the adult forms.

14. *Histiophorus gracilirostris*, Cuv. & Val.

Histiophorus gracilirostris, CUV. & VAL. l. c. p. 308 (description of a snout from Seychelles).—LÜTKEN, ll. c.

Cuvier and Valenciennes had in their possession, and described, a beak or spear the breadth of which was contained 25 to 26 times in its length, and the sides of which were more rounded than in the other specimens accessible to them. This was from Seychelles. Lütken is inclined to admit this provisionally as a distinct species. Günther, on the other hand, ignores *H. gracilirostris*, but regards *H. ancipitirostris* as a possibly existing form.

15. *Histiophorus ancipitirostris*, Cuv. & Val.

Histiophorus ancipitirostris, CUV. & VAL. op. cit. p. 309.—GÜNTHER, op. cit. p. 512, note.

A snout (locality unknown), having a flattened surface, its width contained 19 or 20 times in its length, was the basis of Cuvier's description. Probably a species of *Tetrapturus*.

16. *Makaira nigricans*, Lacép.

Makaira nigricans, LACÉPÈDE, Hist. Nat. Poiss. "iv, pp. 688, 689, pl. xiii, fig. 3".—CUV. & VAL. Hist. Nat. Poiss. viii, p. 287.

Xiphias makaira, SHAW, Zool. iv, Fish. p. 104.

Machara velifera, CUVIER, Nouv. Ann. Mus. Hist. Nat. 1832, p. 43, pl. 3.—LÜTKEN.

Xiphias velifer, GÜNTHER, op. cit. p. 512.

This species is undoubtedly mythical. Lütken and others have pointed out the error of arranging it, as Günther has done, with *Xiphias*. He suggests that in the specimens described by Lacépède the ventral rays were hidden in the ventral furrow, and unperceived. In this case, he remarks, it would be identical with *Histiophorus gracilirostris*; but, at all events, whether it has ventral fins or not, its right place is with the subfamily *Histiophorinae*.

The specimen described by Lacépède was never seen by him. It was driven ashore near Rochelle, and his sole acquaintance with it was from a drawing and description given him by M. Traversay, *sous-préfet* of that town. It seems strange that so much stress has been laid upon this description and so much discussion has been held over its true classification.

DESCRIPTIVE NOTES ON THE AMERICAN SAIL-FISH, *HISTIOPHORUS GLADIS*.

Strange as it may seem, the American species of *Histiophorus* has never been studied by an ichthyologist, and no attempt has ever been made to describe it, or to compare it carefully with the similar species

occurring in the Indian Ocean. The identity of the two has been assumed by Dr. Günther,* but since no American specimens have ever been seen by this authority, I hesitate for the present to follow his lead.

This history of the Sail-fish in ichthyological literature is as follows:

The first allusion to the genus occurs in Piso's "Historia Naturalis Brazilie", printed at Amsterdam, in 1648. In this book † may be found an identifiable though rough figure of the American species, accompanied by a few lines of description, which, though good, when the fact that they were written in the seventeenth century is brought to mind, are of no value for critical comparison.

The name given to the Brazilian Sail-fish by Maregrave, the talented young German who described the fishes in the book referred to, and who afterwards sacrificed his life in exploring the unknown fields of American zoology, was *Guebucu brasiliensibus*. The use of the name *Guebucu* is interesting, since it gives a clue to the derivation of the name "Boohoo," by which this fish, and probably the Spear-fishes, are known to English-speaking sailors in the tropical Atlantic.

Sail-fishes were observed in the East Indies by Renard and Valentijn, explorers of that region from 1680 to 1720, and by other eastern voyagers. No species of the genus was, however, systematically described until 1786, when a stuffed specimen from the Indian Ocean, eight feet long, was taken to London, where it still remains in the collections of the British Museum. From this specimen M. Broussonet prepared a description, giving it the name *Scomber gladius*, rightly regarding it as a species allied to mackerel.

In 1803 Lacépède established the genus *Histiophorus* for the reception of this species.

When Cuvier and Valenciennes published the eighth volume of their Natural History of Fishes they ignored the name *gladius*, which had been given to the East Indian fish by Broussonet, redescribing it under

* Catalogue of the fishes in the British Museum, ii, 1860, p. 513.

† 1648, Piso and Maregrave.

Historia Naturalis | Brazilie, | Auspicio et Beneficio | Illustrata | Maurittii Com. Nassan | illius Provincie et Maris summi Præfeti Adornata: | In qua | Non tantum Plantæ et Animalia, sed et In- | digenarum morbi, ingenia et mores describuntur et | Iconibus quingentis illustrantur | (Elaborate engraved title-page, upon which the preceding inscription is inserted upon a scroll, the following upon a shell:) Lvgyn Bataurorum, | Apud Franciscum Hackium | et | Amstelodami, | Apud Lud. Elzevirium 1648 | pp. (12) 122 (2) (8) 293 (7).

SECOND TITLE.

Guilielmi Pisonis, M. D. | Lugduno-Batavi, | de Medicina Braziliensi | Libri Quatuor: | I De Aëre, Aquis & Locis | II De Morbis Endemiis. | III De Venenatis & Antidotis. | IV De facultatibus Simplicium | et Georgi Maregravi de Liebstad | Misnici Germani, | Historiæ Rerum Naturalium | Brazilie, | Libri octa: | Quorum | Tres puores agunt de plantis | Quartus de Piscibus. | Quintus de Avibus. | Sextus de Quadrupedibus & Serpentibus | Septimus de Insectis. | Octavus de Ipsa Regione, & Illius Incolis. | Cum | Appendice de Tapuyis, et Chilensibus | Ioannes de Læt, | Antwerpianus, | In ordinem digessit & Annotationes addidit, & varies ab Auctore | Omissa supplavit & illustravit.

the name *Histiophorus indicus*. At the same time they founded another species upon the figure in Piso's Natural History of Brazil, already mentioned. This they called *Histiophorus americanus*.

In a paper printed in 1833, Dr. Nardo, of Venice, proposed the establishment of a new genus allied to *Tetrapturus* and *Xiphias*, to be called *Skeponopodus*. In this he included the fish described by Maregrave, under the name *Skeponopodus guebuca*, and also a form observed by him in the Adriatic in 1829, which he called *S. typus*. I am not aware that ichthyologists have yet learned what this may have been.*

From the time of Maregrave until 1872 it does not appear that any zoologist had an opportunity to study a Sail-fish from America, or even from the Atlantic, yet in Günther's "Catalogue" the name *Histiophorus americanus* is discarded and the species of America is assumed to be identical with that of the Indian Ocean.†

Günther restores Lacépède's name *H. gladius* for the Indian species. Possibly, indeed probably, this name will be found to include the Sail-fish of our own coast. At present, however, it seems desirable to retain a separate name. To unite species from widely distant localities without ever having seen them, is very disastrous to a proper understanding of the problems of geographical distribution.

The materials in the National Museum consist of a skeleton and a painted plaster cast of the specimen taken near Newport, R. I., in 1872, and a drawing made of the same, while fresh, by Mr. J. H. Blake.

The occurrence of the Sail-fish is, as has been already stated, very unusual. Maregrave saw it in Brazil as early as 1648. Sagra and Poey mention that it has been seen about Cuba, and Schomburgh includes it in his Barbados list. The specimen in the United States National Museum was taken off Newport, R. I., in 1872, and given to Professor Baird by Mr. Samuel Powell, of Newport. No others were observed in our waters until March, 1878, when, according to Mr. Neyle Habersham, of Savannah, Ga., two were taken by a vessel between Savannah and Indian River, Florida, and were brought to Savannah, where they attracted much attention in the market. In 1873, according to Mr. E. G. Blackford, a specimen in a very mutilated condition was brought from Key West to New York City.

DESCRIPTION OF THE SUBFAMILY XIPHIINÆ AND THE GENUS XIPHIAS.

Subfamily XIPHIINÆ, Swainson.

- > *Xiphiuca*, SWAINSON, Nat. Hist. Fish. Amphib. &c. 1839, p. 239.
- > *Xiphicini*, BONAPARTE, Cat. Metod. Pesci Europei, 1846, p. 80.
- Xiphiina*, GILL, Canadian Naturalist, 1867, p. 250.

* Isis, 1833, Heft iv, pp. 415-419.

† The specimens in the British Museum are catalogued as follows:

- a. Eight feet long; stuffed. Indian Ocean. Type of the species.
- b. Seven feet long; stuffed. Cape of Good Hope.
- c. Dorsal fin. N. S. Wales (?). Presented by Dr. G. Bennett.
- d. Snout; dried.

Diagnosis of subfamily.

Xiphiid fishes, with bodies somewhat compressed, scaleless, or in young state covered with rough granulations. Sword flattened horizontally. Teeth absent. Pectorals sublateral. Pelvic arch and ventrals absent. A keel upon each side of the caudal peduncle. Air-bladder simple. Intestine long, sinuous. A single genus, *XIPHIAS*, L.

Genus *Xiphias* Artedi.

Xiphias, ARTEDI, Genera Piscium, 1738, p. 29.

Xiphias, LINN. Syst. Nat. ed. x, 1758, p. 248; ed. xii, p. 432.

Xiphias, CUVIER, Règne Animal, 1817, p. 326, 1829, p. 200.

Xiphias, GÜNTHER, l. c.

Diagnosis of genus.

Xiphiine fishes, with two dorsal fins in adult condition, the continuous dorsal of the young having become rudimentary in its median portion. Preoperculum spineless in adult, the large spine of the young disappearing at an early age. Teeth absent "except upon the pharyngeal bones, which are covered with a villosity of extremely fine and minute denticles." (*Owen*.) Number of dorsal rays probably variable. Vertebrae 26 (*Steindachner*). Branchiostegals 7. Stomach siphonal, pyloric caeca very numerous. Gall-bladder large.

HABITAT.—Tropical and temperate parts of the Atlantic, Mediterranean, New Zealand, South Pacific, and South Sea.

A single species of this genus is now known, *Xiphias gladius*, L. The species recorded in GÜNTHER'S Catalogue of the Fishes in the British Museum, vol. ii, p. 512, under the name *Xiphias relifer*, if not mythical, is probably a *Histiophorus*. Lacépède's figure represents it with two caudal carinae.

17. *Xiphias gladius*, Linnaeus.

Xiphias gladius, LINNÆUS, Systema Naturæ, 10th ed. 1758, i, p. 248; 12th ed.

1766, i, p. 432. ("Habitat in oceano Europæ".)

BLOCH, Ichthyologie, i, 1786, pl. lxxvi, p. 23. (Habits, from statements of Chevalier Hamilton.)

GMELIN, Linn, Syst. Nat. 1788, p. 1149 (includes also under (B) the American *Histiophorus*.)

WALBAUM, Artedi, Genera Piscium, 1792, p. 207.

LACÉPÈDE, Hist. Nat. Poiss. 2d ed. 8vo. 1819, i, p. 538, fig. 2, pl. 24 (grotesque figure).

SCHNEIDER, Bloch's Systema Ichthyologie, 1801, p. 93 (mentions occurrence in Baltic).

SHAW, Zoology, 1804.

RISSE, Ichthyologie de Nice, 1830, p. 99 (obs. on habits): Hist. Nat. Europe Meridionale, 1826-7, iii, p. 208.

CUVIER, Règne Animal, 1 ed. 1817, p. 326; 2d ed. 1829, p. 200: Griffith's ed. 1834, p. 187, pl. xxvii, figs. 1, 2 (taken from CUV. & VAL. Hist. Nat. Poiss. 9, v), Supl. p. 349.

SCORESBY, in Edinburgh Phil. Journ. iii, p. 441 (vessel struck by sword-fish).

- FLEMING, British Animals, p. 220, and in Brewster's Journal, ii, p. 187 (specimens taken in the Tay).
- CUVIER & VALENCIENNES, Hist. Nat. Poiss. viii, 1835, p. 235, pls. cexxxv (figure of young of 12 to 18 inches length), cexxxvi (fig. of adult).
- JENYNS, British Vertebrates, 1835, p. 364.
- YARRELL, History of British Fishes, 1st ed. 1836, p. 143 (fig. of young); 2d ed., p. 164 (fig. of young).
- RICHARDSON, Fauna Bor. Amer. 1866, pp. 78, 81. (Denies its existence in the Western Atlantic.)
- WILSON, Encyclopedia Britannica, art. Ichth. p. 184, pl. cccii.
- PARNELL, Fishes of the Firth of Forth, 1838, p. 55.
- STORER, Report on the Fishes of Massachusetts, 1839, p. 51; Memoirs American Academy of Sciences, 1846, p. 347; 1853, p. 149; Synopsis of the Fishes of North America, 1846, p. 95; History of the Fishes of Massachusetts, 1867, p. 71, pl. xiii, fig. 2.
- DEKAY, Zoology of New York, Fishes, 1842, p. 111, pl. xxvi, fig. 79.
- LOWE, Trans. Zoological Society, London, iii, 1849, p. 5.
- GUICHENOT, Exploration Scientifique de l'Algérie, Poissons, 1851, p. 60.
- GÜNTHER, Cat. Fish. Brit. Mus. ii, 1860, p. 571; Fische der Südsee, i, 1873-5, p. 105; Study of Fishes, 1880, pp. 173, 431 (cuts), and article on Ichthyology, Encyc. Britannica, vol. xii: Journ. Mus. Godeffroy, part ii, p. 170, figs.
- GILL, Cat. Fish. E. Coast N. E. 1861, p. 38; Canadian Naturalist, 1865, p. 250; Cat. Fish. E. Coast N. A. 1873, p. 24; and in Rep. U. S. C. F. i, 1873, p. 802.
- POEY, Syn. Piscium Cubensium, ii, 1868, p. 379 (*Xiphias gladius*).
- STEINDACINER, Sitzb. Ak. Wiss. Wien. 1868, p. 396 (measurement of a Spanish specimen).
- HECTOR, Trans. New Zealand Institute, vii, 1873, p. 246 (occurring at Auckland) (*Ziphius gladius*).
- HUTTON, Trans. New Zealand, part vii, 1873, p. 211 (second occ. at Auckland).
- CHEESEMAN, Trans. New Zealand, part viii, 1875, p. 219 (*Ziphius gladius*, measurements of specimens from Shelly Bay, Auckland).
- GOODE, Cat. Fishes Bermudas, 1876, p. 45.
- GOODE & BEAN, Cat. Fish. Mass. Bay, 1879, p. 14.
- GIGLIOLI, Catalogo Esp. Internat. di Pesca. Berlin, 1880, p. 88.
- LÜTKEN, Vid. Selsk. Skr. 5te. Række, naturv. og math. Afd. iii, 6, (Spolia Atlantica), pp. 441, 592, figs. 1, 2, 3, pl. ii, fig. 10. (Notes upon the young of *Xiphias gladius* and related species.)
- Xiphias Rondeletii*, LEACH, Mem. Wernerian Nat. Hist. Society, ii, 1818, p. 58.
- STEINDACINER, Sitzb. Ak. Wiss. Wien. 1868, p. 396.
- HUTTON, Trans. New Zealand, part viii, 1873, p. 211.

DESCRIPTIVE NOTES ON THE SWORD FISH, *XIPHIAS GLADIUS*.

My notes fail to supply the necessary data for a full description of the species, and since the fish is not likely by any one to be confounded with any other, I do not think it necessary to defer publication until this data can be supplied. I append the following note upon a small specimen, and also partial measurement table for two others, one in inches, the other in millimeters.

A specimen taken off Seáconnet, July 23, 1875. Weight 113 pounds; extremity of sword gone. One of the smallest ever seen in this region.

Dorsal fin in its median part nearly destroyed, but traces of the groove and spines remaining.

Color.—Above rich purplish blue, shading into whitish beneath the sides, and belly with a silvery luster. Fins bluish dark with silvery sheen, except dorsal. Top of the head rich purplish blue, the color extending upon the rostrum. Lower side of rostrum rich brownish purple. Eye deep blue. No trace of scales.

Viscera.—Liver greenish light brown. Stomach siphonal; pyloric cæca infinite in number; intestine spiral 10 inches long when in position, 90 when stretched out. Gall-bladder large, situated on the same line with the spleen, and at same distance from the liver, connected by a duct. Air-bladder simple, large. Spermaries large, 6 inches long. Stomach contained small fish, perhaps *Poronotus*, and jaw of *Loligo Pealii*. Fluke worms in cover of stomach and air-bladder.

Table of measurements.

Current number of specimen.....	A.	B.
Locality.....	Seacomet, R. I., July 23, 1875.	Gloucester, Mass., 1878.
	Inches.	Millimeters.
Extreme length (tip of sword gone).....	91.00	.....
Length to end of middle caudal rays.....	81.50	2,040
Body:		
Greatest height.....	13.50	.....
Greatest circumference.....	35.00	.....
Least height of tail.....		80
Head:		
Greatest length.....	37.00+	.....
Length to tip of lower jaw.....	16.50	490
Greatest width.....	6.75	.....
Width of interorbital area.....	4.35	170
Length of snout.....	26.00+	.....
Length of operculum.....	5.00	150
Length of mandible.....	11.00	310
Diameter of eye.....	2.75	80
Dorsal (<i>first</i>):		
Distance from tip of lower jaw.....	15.50	.....
Length of base (including first and second).....	37.00	470 (1st)
Greatest height.....	12.00	470
Dorsal (<i>second</i>):		
Length of base.....		30
Height at longest ray.....		75
Height at last ray.....	2.25	.....
Anal:		
Distance from snout.....	37.00	.....
Length of base.....	12.25	250
Height at longest ray.....	8.25	300
Height at last ray.....	2.25	.....
Caudal:		
Length of middle rays.....	3.50	160*
Length of external rays.....	16.50	550
Pectoral:		
Distance from tip of lower jaw.....	16.00	.....
Length.....	14.25	390
Branchiostegals.....	8	.....
Dorsal.....	20 (19), 2	.....
Anal.....	11 (X), 3	.....
Pectoral.....	20	.....
Weight (pounds).....	113	.....

*From end of carina.

Table of measurements.

Locality	Portland, Me., Aug. 15.
	Millimeters.
Extreme length	3, 930
Length to end of middle caudal rays	3, 780
Body:	
Greatest height	678
Greatest width	470
Greatest circumference	1, 705
Height at origin of anal	520
Least height of tail	120
Height under second dorsal	220
Length of caudal peduncle	238
Head:	
Greatest length	1, 570
Greatest width	385
Width of interorbital area	223
Length of snout	1, 085 (870)
Length of operculum	260
Length of mandible	435
Diameter of orbit	100
Dorsal (<i>spinous</i>):	
Distance from snout	1, 530
Length of base	500
Greatest height	550
Dorsal (<i>soft</i>):	
Length of base	50
Distance from snout	3, 175
Height	90
Distance between dorsals	1, 208
Anal:	
Distance from snout	2, 538
Length of base	350
Distance of second anal from snout	3, 125
Height at longest ray	240
Caudal:	
Width at caudal torinæ	500
Length of external rays	730
Tip to lip of caudal	1, 140
Pectoral:	
Distance from snout	1, 598
Length	532
Weight, about (pounds)	600

Steindachner has given the following measurements of two specimens obtained by him on the coast of Spain, the largest 3 feet 7 inches in length, the smallest much younger and corresponding to the young specimen figured by Cuvier and Valenciennes in the *Histoire Naturelle des Poissons*, pl. 225.*

Table of measurements.

	A.	B.
	Inches.	Inches.
Total length	43 0	24 6
Length of head	20 7	9 7
Length of intermaxillary from anterior margin of eyes		
Length of mouth-opening from point of intermaxillary to posterior end of upper jaw	15. 6½	8 0
Breadth of forehead	17 2	1 1½
Length of under jaw	1 9	1 1½
Length of pectoral	6 0	
Height of body	4 6	2 3¼
Height of dorsal at first cleft rays	5 8	3 5½
Greatest height of dorsal	6 2	
Length of base of dorsal		3 1½
Height of anal	14 4	
Length of base of anal	3 4	1 11
	4 6	

* Sitzb. Ak. Wiss. Wien, 1868, p. 396.

The following measurements were taken by T. F. Cheeseman, esq., F. L. S., from a specimen stranded in January, 1875, at Shelly Beach, New Zealand:

	Feet.	Inches.
Total length from tip of snout to end of caudal fin	11	3
Length of snout from tip to center of eye	3	11½
Length of snout from tip to gape	4	1
Length of snout from tip to free edge of operculum	4	6
Length of snout from tip to nostrils	3	7
Length of lower jaw from point to gape	0	11
Projection of upper jaw over lower	3	2
Height of dorsal fin	1	3
From dorsal to caudal	4	0
Length of pectoral fins	1	5
Length of anal	0	8
Height of second dorsal	0	2½
From anal to caudal	1	8
Width across the tail	2	3
Girth just behind the eyes	2	11
Girth behind dorsal	4	8
Girth behind caudal	0	11
Diameter of eye	0	3

The extreme point of the snout was broken off, about three inches being wanting.*

GEOGRAPHICAL RANGE OF THE SWORD-FISH FAMILY.

Although it may not seem desirable at present to accept in full the views of Dr. Lütken regarding the specific unity of the Spear-fishes and the Sail-fishes of the Atlantic and Indian Oceans, it is convenient to group the different species in the way he has suggested in discussing their geographical distribution.

THE SWORD-FISH, *Xiphias gladius*, ranges along the Atlantic coast of America from Jamaica, lat. 18° N., Cuba, and the Bermudas to Cape Breton, lat. 47°. Not seen at Greenland, Iceland, or Spitzbergen, but occurring, according to Collett, at the North Cape, lat. 71°. Abundant along the coasts of Western Europe, entering the Baltic and the Mediterranean. I can find no record of the species on the west coast of Africa south of the Cape Verdes, though Lütken, who may have access to facts unknown to me, states that they occur clear down to the Cape of Good Hope, South Atlantic in mid-ocean, west coast of South America and north to Southern California, lat. 34°, New Zealand, and in the Indian Ocean off Mauritius. Good authorities state that sperm-whales, though constantly passing Cape Horn, never round the Cape of Good Hope. Can this be true in the case of the Sword-fish?

THE SAIL-FISH, *Histiophorus gladius* (with *H. americanus* and *H. orientalis*, questionable species, and *H. pulchellus* and *H. immaculatus* young), occurs in the Red Sea, Indian Ocean, Malay Archipelago, and south at least as far as the Cape of Good Hope, lat. 35° S.; in the Atlantic on coast of Brazil, lat. 30° S. to 0, and north to Southern New England, lat. 42° N.; in the Pacific to Southwestern Japan, lat. 30° to 10° N. In a general way, the range may be said to be in tropical and temperate seas, between lat. 30° S. and 40° N., and in the western parts of those seas.

*Transactions New Zealand Institute, viii, 1875, p. 219.

THE BILL-FISH OR SPEAR-FISH, *Tetrapturus indicus* (with the various doubtful species mentioned above), occurs in the Western Atlantic from the West Indies, lat. 10° to 20° N., to Southern New England, lat. 42° N.; in the Eastern Atlantic from Gibraltar, lat. 45° N., to the Cape of Good Hope, lat. 30° S.; in the Indian Ocean, the Malay Archipelago, New Zealand, lat. 40° S., and on the west coast of Chili and Peru. In a general way, the range is between lat. 40° N. and lat. 40° S.

The species of *Tetrapturus* which we have been accustomed to call *T. albidus*, abundant about Cuba, is not very unusual on the coast of Southern New England. Several are taken every year by the Sword-fish fishermen. I have not known of their capture along the Southern Atlantic coast of the United States. All I have known about were taken between Sandy Hook and the eastern part of George's Banks.

THE MEDITERRANEAN SPEAR-FISH, *Tetrapturus belone*, appears to be a land-locked form, never passing west of the Straits of Gibraltar.

Fossil forms.

Agassiz, in his work on Fossil Fishes, has described two species of *Tetrapturus*: one, *Tetrapturus priscus* (vol. v, p. 91, tab. 31), from the London Clay, in the Isle of Sheppey; the other, *Tetrapturus minor* (vol. v, p. 91, tab. 60 a, figs. 9-13), from the Lewes Crag. The types of the former are in the Paris Museum (others similar in the collections of Lord Enniskellen and Sir Philip Egerton); of the latter, in the collection of Mr. Mantell.

He has also described the genus *Calorhynchus*, from fossil fish-beaks which appear to belong to members of the Sword-fish family. These are very long, slender, tapering more gently, even, than in the living forms, and are hollow throughout the entire length. There are two species, distinguished by name, but not described, viz, *C. rectus* and *C. sinuatus*, both from the London Clay of the Isle of Sheppey.

Four extinct species of *Histiophorus* have been described: *H. priscus*, Ag., from the London Clay, the beak of which is not known; *H. minor*, Ag., which has a deeply fluted beak; *H. robustus*, Leidy (Post-pliocene Foss. S. Car. p. 119, *Xiphias*), which is from the Post-pliocene of Ashley River, South Carolina, with beak much depressed, the dentigerous surface a continuous plane, separated by a deep groove; *H. antiquus* (Leidy) Cope, from the New Jersey Eocene, is also a more depressed species, with the dentary surfaces on one plane.*

At a meeting of the Boston Society, October 6, 1852, Professor Wyman exhibited three fragments of the beak of a fossil *Isthiophorus*, from the Tertiary deposits at Richmond, Va.

Paleorhynchus, of the schists of Glaris, has a bill like *Xiphias*; also *Hamorhynchus DesHayes*, first described by Agassiz as *Histiophorus DesHayes*, a Scombroid with elongated bill.

* E. D. Cope, Proc. Bost. Soc. Nat. Hist. xii, 1863, p. 311.