

TRANSACTIONS
OF THE
NEW ZEALAND INSTITUTE.

1869.

I.—NATURAL HISTORY.

ART. I.—*On the NEW ZEALAND SWORD-FISH.* By F. J. KNOX, L.R.C.S.E.
(With Illustrations.)

[*Read before the Wellington Philosophical Society, June 19, 1869.*]

At a meeting of the Wellington Philosophical Society, held September 15, 1868, I communicated a brief notice of the cranium and other portions of a Sword-Fish (*Xiphias*, Linn.), presented by me to the Museum, which was read, with the supplementary note by Dr. Hector. (See "Trans. N. Z. Institute, Vol. i., page 44.) I now communicate the further details which were then promised.

The specimen had been stranded on the west coast of the North Island, near Waikanae, in the month of June, 1867. Like most other strangers, this fish attracted immediate attention, and was so cut up that I was only able to procure the preparations now in the Museum, which are insufficient to enable me to determine, with anything like precision, the particular species. From Dr. Günther's catalogue of the Acanthopterygian fishes in the collection of the British Museum, it appears that there are eight different specimens, divided into two genera :—

1. *Xiphias*, ventral fins, none.
2. *Histiophorus*, ventral fins, present.

Now, the portion I procured being only the cranium and anterior part of the dorsal fin, it is impossible to determine even the genus, with anything like scientific precision. In the meantime, I may remark that in *Xiphias gladius*, according to Dr. Günther, there are "no teeth, neither in the jaws nor on the palate," whilst in the *Histiophorus*, there are *small teeth in the jaws and on the palatine bones*; and it is important to remark that Cuvier (McMurtrie's

Translation, 1834) does not mention the presence of teeth. This, if correctly stated, would place the specimen in the genus *Histiophorus*, as the entire interior of what may be considered the buccal cavity, is covered with almost microscopic teeth, so placed, that the food (supposed by me to consist chiefly of the cuttle fish), when seized or impaled, cannot escape. I would add, that Dr. Günther, in his description of the specific characters of the *Histiophorus*, as distinguishing it from *Xiphias*, says "small teeth in the jaws and on the palate bones; none on the vomer." Now the teeth, in the specimen before the Society, are developed on the mucous membrane covering the hard palate and lower jaw, and are, in no sense, *in the jaws*; so that if the specimen described by Dr. Günther had been macerated, and the osseous surfaces denuded of the mucous membrane and periosteum, there would not have been the vestige either of teeth or socket. I find from a specimen of the eel and hapuka, now on the table, that the system of dentition strictly resembles that of the Sword-Fish (*Histiophorus*). The teeth are so placed as to be pointed from before backwards, allowing the food, or the finger, to pass towards the throat without obstruction, but rendering a retreat impossible, at least in the living animal, when feeding, and probably very hungry. This is probably intended to compensate for the want of cutting (incisor), holding (canine), grinding (molar) teeth. The muscles acting on the jaws (temporal and masseter) are of enormous size, red in colour, and resembling the muscles in the carnivorous mammalia.

When I left Scotland, in 1840, there was, in my brother's private museum, undoubtedly the finest and most extensive collection of the skeletons of fishes in Europe, amongst others, the skeleton of a Sword-Fish. The specimen was taken in the Firth of Forth, and after exhibition, was purchased by my brother. A hurried examination of the anatomy was made, and I think plaster casts of the viscera taken—which, I may remark, is an admirable mode of preserving. The preparation of the skeleton was handed over to me. It proved rather a heavy affair, owing to the complete saturation of every texture with a fine fluid oil. It was too large for any of the glazed cases in the museum, and was accordingly placed on the top of the cases. I may state that this skeleton always appeared to me to present rather an ideal, than a natural, form, as it seemed out of proportion, and deficient in framework.

The fragments I have now presented to the Colonial Museum, are part, therefore, of the second specimen that has come under my personal notice.

In Dr. Günther's Catalogue, Vol. ii., 1860, the *Xiphiidae* form the eighteenth family of the *Acanthopterygian*, or soft-finned fishes, divided into two genera, containing eight species. The British Museum appears to possess only the following specimens:—

I. XIPHIAS.

Gladius—

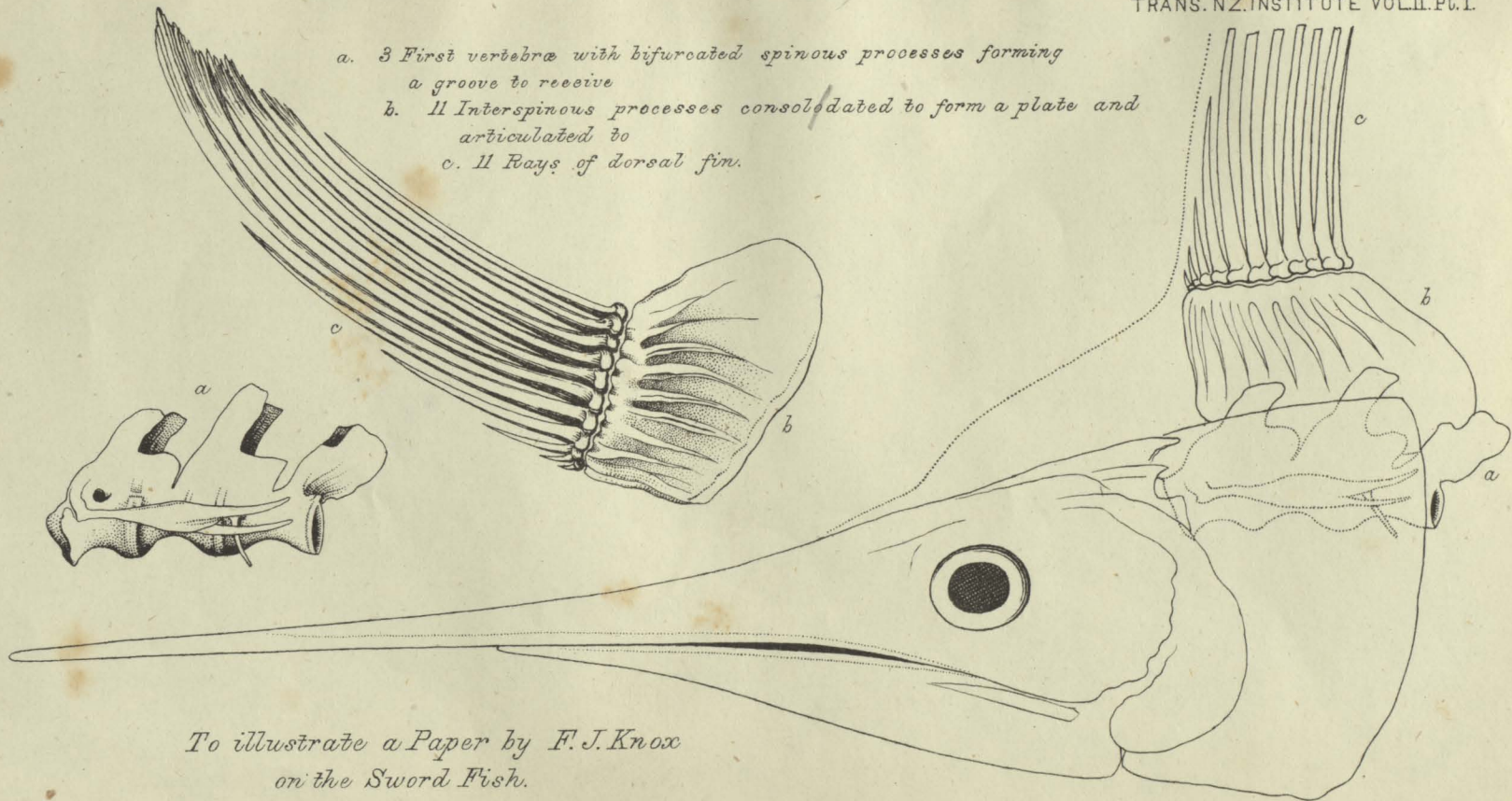
- (a.) Seven feet long. Stuffed. Margate.
- (b.) Half-grown. Stuffed.
- (c.) Upper jaw of a large specimen.
- (d.) Six inches long. Not a good specimen. Caught in Long. 22° W., Lat. 2° N. Presented by J. B. Jukes, Esq.

II. HISTIOPHORUS.

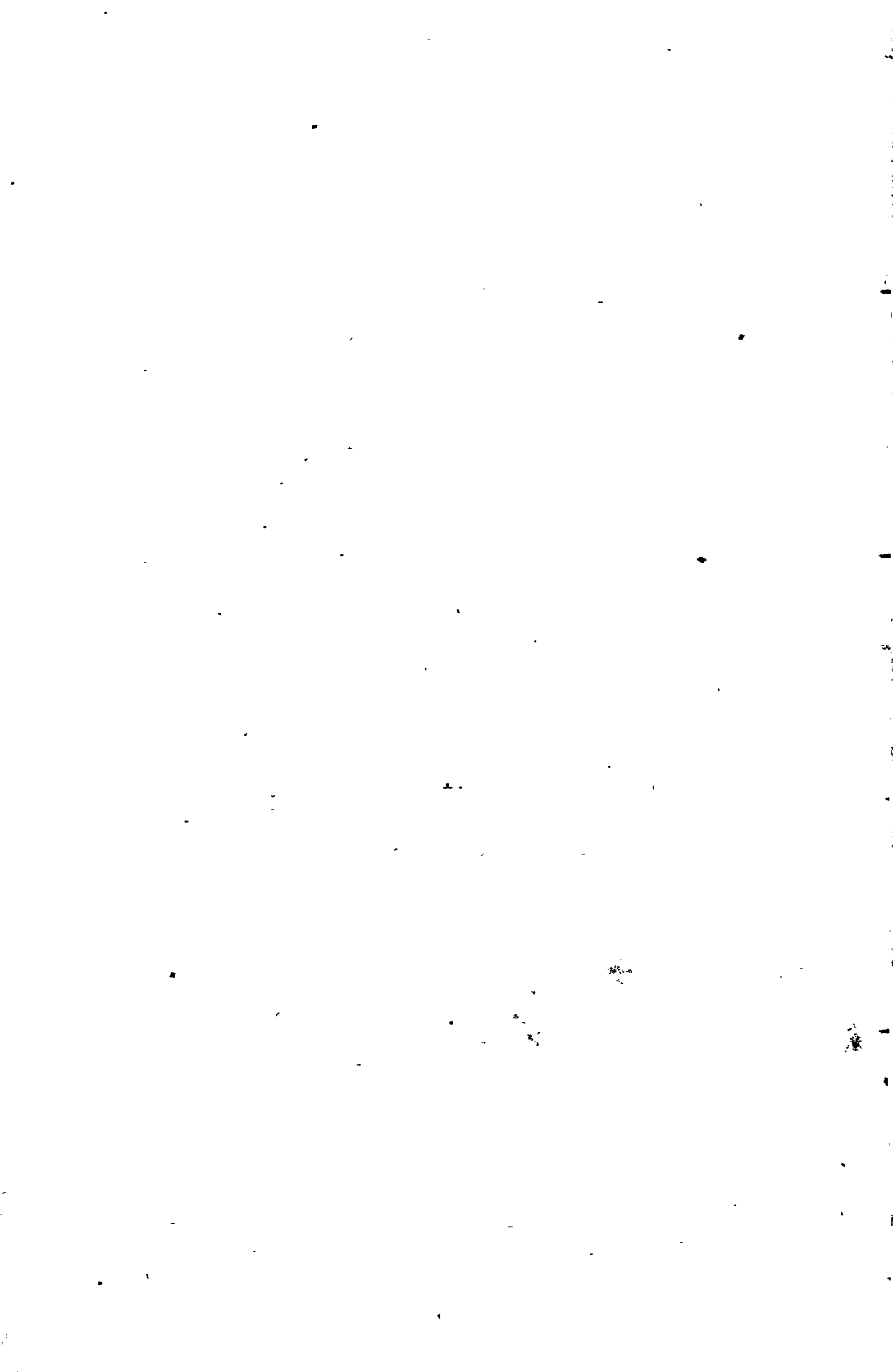
Herchellii—

- (a.) Eleven feet long. Stuffed. Table Bay. Purchased of Mr. Smuts. Type of the species.
- (b.) Head (thirty-seven inches long).
- (c.) Anterior portion of a skull of a specimen of the same size.

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- a. 3 First vertebrae with bifurcated spinous processes forming a groove to receive
 - b. 11 Interspinous processes consolidated to form a plate and articulated to
 - c. 11 Rays of dorsal fin.



To illustrate a Paper by F. J. Knox
on the Sword Fish.



Gladius—

- (a.) Eight feet long. Stuffed. Indian Ocean. Type of species.
 (b.) Seven feet long. Stuffed. Cape of Good Hope.
 (c.) Dorsal fin. New South Wales (?). Presented by Dr. G. Bennett.
 (d.) Snout. Dried.

In quoting the numerous authorities describing the species, Dr. Günther, amongst others, includes:—Penn., *British Zool.*, iii, p. 216, pl. 30; Knox, *Edin. Journal*; *Nat. and Geo. Society*, ii., p. 427.

Thus the material for scientific observation in the British Museum is extremely limited, with regard to the *Xiphiidae*. I may here remark, that in my brother's (the late Professor Robert Knox) description, the comparative anatomy would, to a certainty, be given; and if so, I would have thought Dr. Günther would have availed himself of it.

INTEGUMENTARY COVERINGS AND DERMAL PRODUCTIONS.

The portion of the integuments, placed in the Museum, occupied the anterior part of the dorsal line, corresponding to the neck, reaching from the head, to and past the dorsal fin. I observed no appearance of scales; the whole resembling coarse leather, and so formed as to require a saw to cut it. The tissue thus forms a regular coat of mail made of spiculi of bone so interwoven with the integumentary tissues, as to be completely concealed. I should consequently, imagine this fish to be perfectly secure from any enemy, in or out of the water.

The dorsal fin is, undoubtedly, a striking feature in the *Xiphiidae*, and the *caudal* fin, in the specimen to which I have alluded in my brother's collection, was also prominent. At a first view, it was as if formed of two dorsals, and if included in the length of the fish (which is generally done by naturalists), would have added a foot or more to the total length.

By the very limited observation I could make on the specimen now under review, owing to the non-scientific dissection it had been subjected to before I got it, I found the dorsal fin capable of being moved, to a very considerable extent, in all directions. The interspinal processes (b, Plate 1) are firmly united to each other, presenting a free articular surface to the rays of the fin; and when acted upon by the powerful muscles of the back, will act as a sail, and an oar, the brain being the steersman, the tail, no doubt, answering the cerebral instinct, voluntary or not. The longitudinal fissure seen in the specimen is not the result of dissection, but natural; and is lined by a delicate soft membrane, a continuation of the same covering immediately investing the rays of the fin. The spinous processes of the vertebræ, when examined, will be found bifurcated (c, Plate 1), forming a groove or slide for this unique action of the dorsal fin in the *Xiphiidae*. In many fishes, however, the spinous rays can be depressed, and again erected, at the will of the fish.

The following measurements and weights of the specimen now deposited in the Colonial Museum, were observed before and after their preparation:—

	lbs.	oz.
Weight previous to dissection:—Head, including anterior half of the dorsal fin, <i>but without any portion of the bronchial apparatus</i> }	29	8
Lower jaw	2	8
Total weight	32	0

<i>Measurements.</i>		<i>ft</i>	<i>in</i>
		lbs.	oz.
Snout to gape		2	5
„ to nostrils		2	0
„ to centre of eye		2	3
„ to opercula (free edge of)		3	3
„ to dorsal fin		3	0
Tip of lower jaw to gape		1	4
Projection of upper jaw (the sword)		1	1
Circumference at dorsal fin		3	4
„ over eyes		2	4
Depth from base of dorsal fin to free edge of } opercula		1	4
Height of dorsal fin		1	4

(*Specimen deposited in the Museum, January 10, 1867.*)

<i>Weights.</i>		lbs.	oz.	grs.
Head, including lower jaw		8	0	0
Dorsal fin (anterior half of), including in- } terspinal processes		0	12	0
Eyes (two) sclerotic tunic ossified		0	7	0
Lens (two) dry		0	0	80
Total weight of the osseous portions		9	3	80

Diameter of eye, 3 inches 6 lines.

Abstract of Weights.

	lbs.	oz.	grs.
Total weight of recent specimen	32	0	0
„ of osseous portions	9	3	80
„ of soft parts	22	12	40

CERVICAL VERTEBRÆ.

	in.	lines.
Length of body	{ 1st vertebra	2 0
	{ 2nd „	2 6
	{ 3rd „	2 6
Breadth of articular surface	1	6

RIBS.

Length	{ 1st rib	7 0
	{ 2nd „	5 0
	{ 3rd „	2 6

INTEGUMENTS.

Portion belonging to the neck, and consequently connected with the dorsal fin.