

THE CRAIG FLOUNDER OF EUROPE, *GLYPTOCEPHALUS CYNOGLOSSUS*, ON THE COAST OF NORTH AMERICA.

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An unfamiliar pleuronectoid fish was found in our waters, in 1877, by the United States Fish Commission (Prof. S. F. Baird, Commissioner). Numerous specimens were trawled in the deep water off Salem, Mass., on La Have Bank, and on the coast of Nova Scotia, off Halifax, in Halifax Harbor, and in Bedford Basin, Halifax.

A careful study proves that they belong to a well-known European species, the *Pleuronectes cynoglossus* of Linné, lately referred by Professor Gill to the genus *Glyptocephalus* of Gottsche. We also discover the identity of this species with *Glyptocephalus acadianus*, described by Gill, from a single specimen (No. 12685), taken by the Commission in 1872, from the herring-weir on Treat's Island, Eastport, Me.

Below are given detailed measurements of twenty-two individuals, including authentically named European specimens from the University of Christiania, and the Bonaparte Collection, the type of *G. acadianus*, three specimens from Massachusetts Bay, five from La Have Bank, and eleven from the vicinity of Halifax.

The genus of Gottsche was carefully redescribed by Professor Gill in 1873,\* and at the same time was published a full specific description of the Eastport specimen. Although this description is founded upon an individual which is among the most elongate of the series before us, it is thoroughly satisfactory for all, if the tendency to variation in the following particulars be noted.†

(1) *Height of body*.—This is stated to be about  $2\frac{1}{2}$  of length exclusive of caudal, and  $3\frac{1}{4}$  in total length. In the series studied, the proportions of this element varied, stated in units of hundredths of total length (including caudal), from 0.245 to 0.375, No. 12685 having it 30. An equally wide variation in the European fish is recorded by Parnell.‡

The *Pleuronectes elongatus* of Yarrell is not nearly so elongated as No. 21061 *a* (the figure of Couch has height about 0.275); and since no other diagnostic characters have been described, we place it without hesitation in the synonymy of *G. cynoglossus*.

(2) *Height of caudal peduncle*.—This element is subject to very slight variation, measuring usually 0.07 of total in both European and American specimens. The most elongate, slender forms have it slightly narrower. In No. 12685 it measures 0.06, and 0.065 in No. 21001 *b*.

(3) *Length of head*.—This varies from 0.15 to 0.175. In No. 12685 the

\* On a new American species of Pleuronectoid (*Glyptocephalus acadianus*). By Theodore Gill, M. D. < Proceedings of the Academy of Natural Sciences, Philadelphia, 1873, pp. 360-362.

† Instead of having its radial formula D. 110 ; A. 100, as stated in the description, No. 12685 has it D. 107 ; A. 96.

‡ Fishes of the Frith of Forth, p. 210, pl. xxxviii, and in Memoirs of the Wernerian Society, vii, p. 370.

length is 0.15, and in the European specimens 0.15 and 0.1575 (Christiana specimen). The smallest proportion is represented by specimens from Massachusetts Bay and Halifax.

(4) *Teeth*.—In number these are extremely variable. No. 12685, according to Gill, had on the blind side 17 above and 20 below, on the eye side 6 above and 7 below. A Salem specimen, larger and older, had on the blind side, above 26, below 28, on the eye side, above 13, below 14. In young individuals, the teeth present the characters described by Gill, having the teeth on the eyed side conical and separated. This peculiarity disappears with age, all large specimens showing closely set incisorial teeth upon both sides of each jaw.

(5) *Length of pectoral*.—This is extremely variable within limits of 0.09 and 0.14. This measurement refers to the fin upon the colored side. Its shape is also variable; it is sometimes pointed, sometimes obtuse, owing to difference in comparative length of the upper rays. It is usually black, with a narrow whitish tip. The number of rays varies from 9 to 14.

(6) *Length of ventrals*.—This is also extremely variable on both sides. The range on the blind side is 0.0475 to 0.07, and on the eyed side 0.056 to 0.0775. The difference between the length of the two fins upon the same individual varies from 0.0025 to 0.0155.

(7) *Contour of lateral line*.—In some individuals this is essentially straight, in others considerably arcuated above the pectoral. This appears to be an individual variation. The two European specimens show a perceptible difference in this respect. In his diagnosis of *Pleuronectes cynoglossus*, Dr. Günther states that the lateral line is straight, without curve.

(8) *Position of the eyes*.—Dr. Günther states that in *P. elongatus* the upper eye is in advance of the lower. This is doubtless quoted from Yarrell. Neither the figure of Yarrell nor that of Couch indicates any such character.

(9) *Scales in lateral line*.—The number on the blind side ranges from 109 to 150, on the eye side from 110 to 140, there being no relation between the different sides of the same fish.

(10) *Radial formula*.—In the dorsal this ranges from 102 to 120; in the anal, from 87 to 100. There is no apparent relation between the number of rays and the relative proportions of height and length of body. A large number of rays in the dorsal is usually accompanied by a relatively large number in the anal.

(11) *Transverse rows of scales*.—Their number above and below the lateral line is nearly equal. The range is about from 40 to 50. There appears to be no relation of number of transverse rows to comparative height of body.

The thermal range of the species appears to be defined nearly by the limits 34° and 45° F.

The synonymy of the genus and species stands somewhat as follows:—

GENUS.

*Glyptocephalus*, GOTTSCHÉ, Archiv für Naturg. i, 1835, p. 156.—BLEECKER, Compt. Rend. Acad. Sci. Amsterdam, xiii.—GILL, Proc. Acad. Nat. Sci. Phila. 1873, p. 360.

SPECIES.

*Glyptocephalus cynoglossus* (Linné) Gill.

*Pleuronectes oculis a dextris totus glaber*, ARTEDI, Gen. 14, N. 3; Mus. Ichth. No. 39; Syon. p. 31, N. 3.

*Pleuronectes cynoglossus*, LINNÉ, Syst. Nat. ed. x, i, 1758, p. 269; ed. xii, 1766, i, p. 456.—GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, p. 449.

*Glyptocephalus cynoglossus*, GILL, Proc. Acad. Nat. Sci. Phila. 1873, p. 361.

*Pleuronectes pola*, LACÉPÈDE, Hist. Nat. Poiss. (Suites à Buffon), 1819, iv, p. 401.

*Platessa pola*, CUVIER.—PARNELL, Nat. Hist. Fish. Frith of Forth, 1838, p. 210, pl. xxxviii.—YARRELL, Hist. Brit. Fish. 1841, ii, p. 315.—COUCH, Fishes British Islands, iii, 1864, p. 190.

*Pleuronectes saricola*, FABER, Isis, 1828, p. 877.

*Glyptocephalus saricola*, GOTTSCHÉ, l. c.

*Pleuronectes nigromanus*, NILSSON, Prodr. Ichth. Scand. 1832, p. 55.

*Platessa elongata*, YARRELL, op. cit. p. 318.—GÜNTHER, op. cit. p. 450.—COUCH, op. cit. p. 193.

*Glyptocephalus elongatus*, GILL, op. cit. p. 362.

*Glyptocephalus acadianus*, GILL, op. cit. p. 361, and in BAIRD'S Report on Fisheries of South Coast of New England, 1873, p. 794.

Dr. Günther suggests that the fish first cited by Fabricius (*Fauna Groenlandica*, p. 163), under the name of *Pleuronectes cynoglossus*, and subsequently named by him *Pleuronectes pinguis* (Afhandling. Kongel. Danske Videnskabernes Selskabs, Naturvid. og Math., Copenhagen, vol. i, 1824, p. 45), is probably identical with this species. The true relations of the Greenland fish have already been pointed out by Professor Gill (Proc. Acad. Nat. Sci. Phila. 1864, p. 218), as well as the curious misapprehension by which the synonymy of *P. pinguis* and the halibut has been confounded.

The following tables give detailed measurements of twenty-three specimens, and a list of all the specimens in the National Museum:—

TABLE I.—*Catalogue of specimens in National Museum.*

Catalogue number.	Number of specimens.	Locality.	When collected.	From whom received.	Nature of specimen.
21000	13	Massachusetts Bay, off Salem....	Aug. —, 1877	United States Fish Commission.	Young, Do. Do. Do. Do. Do. Do. Do. Do. Do. Do. Do. Do.
21001	11	La Have Bank .....	.....do .....	.....do .....	
21005	2	Halifax .....	.....do .....	.....do .....	
21017	3	27 miles south by west from Chebucto Head.	Sept. 6, 1877	.....do .....	
21019	20	Halifax .....	Sept. 4, 1877	.....do .....	
21032	1	.....do .....	Sept. 11, 1877	.....do .....	
21047	2	Halifax (trawl 113 and 114) .....	Sept. 24, 1877	.....do .....	
21056	4	Massachusetts Bay .....	Aug. 6, 1877	.....do .....	
21057	1	.....do .....	.....do .....	.....do .....	
21058	2	Massachusetts Bay (trawl 32, 90 fathoms).	Aug. 14, 1877	.....do .....	
21059	1	Halifax (trawl 54) .....	Aug. 25, 1877	.....do .....	
21060	1	Halifax (trawl 44) .....	Aug. 21, 1877	.....do .....	
21061	3	27 miles off Chebucto (trawl 85) ..	Sept. 6, 1877	.....do .....	
21062	1	Halifax (trawl 106, 111 fathoms) ..	Sept. 20, 1877	.....do .....	
21063	1	Bedford Basin (trawl 111, 37 fathoms).	Sept. 21, 1877	.....do .....	
10068	1	Europe .....	.....do .....	Bonaparte Collection .....	
17355	1	Christiania, Norway .....	.....do .....	Norwegian Government .....	
12685	1	Eastport, Me .....	Aug. —, 1872	United States Fish Commission.	

TABLE II.—*Measurements.*

Current number of specimen	10,068	17,355	21,000 a	21000 b	21,000 c	12,685	21,001 a
Locality .....	Europe, Bonaparte Coll.	Christiania, Swedish Coll.	Massachusetts Bay.	Massachusetts Bay.	Massachusetts Bay.	Eastport.	La Have Bank.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches..	15.75	15.15	17.25	19	23	9.5	9.9
Body:							
Greatest height .....	0.315	0.33	0.34	0.325	0.34	0.30	0.307
Least height of tail .....	0.07	0.07	.....do .....	.....do .....	.....do .....	0.06	.....do .....
Head:							
Greatest length .....	0.15	0.156	0.155	0.15	0.165	0.05	0.16
Length of maxillary .....	0.035	0.0375	.....do .....	.....do .....	.....do .....	0.035	.....do .....
Length of mandible .....	0.05	0.05	.....do .....	.....do .....	.....do .....	0.05	.....do .....
Diameter of orbit .....	0.05	0.05	.....do .....	.....do .....	.....do .....	0.05	.....do .....
Pectoral:							
Distance from snout .....	0.16	0.16	.....do .....	.....do .....	.....do .....	0.16	.....do .....
Length .....	0.09	0.105	.....do .....	.....do .....	.....do .....	0.10	.....do .....
Ventral:							
Distance from snout .....	(0.19)	0.18	.....do .....	.....do .....	.....do .....	0.17	.....do .....
Length (blind side) .....	0.05	0.056	.....do .....	0.051	0.055	0.06	0.052
..... (eye side) .....	0.056	0.062	.....do .....	0.057	0.057	0.065	0.065
Dorsal .....	112	103	112	110	110	107	101
Anal .....	99	87	90	93	91	96	87
Pectoral .....	11	11	12	11	13	12	11
Ventral .....	6	6	6	6	6	6	6
Number of scales in lateral line (blind side) .....	117	114	150	138	136	128	113
..... (eye side) .....	115	116	140	133	134	118	117

TABLE II.—Measurements—Continued.

Current number of specimen	21,001 <i>b</i>	21,001 <i>c</i>	21,001 <i>d</i>	21,001 <i>e</i>	21,005 <i>a</i>	21,005 <i>b</i>	21, 017	21,047 <i>a</i>
Locality .....	La Have.	La Have.	La Have.	La Have.	Halifax.	Halifax.	Halifax.	Halifax.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches ..	10.2	11.5	12	12.25	15.75	19	16.25	19
Body:								
Greatest height .....	0.295	0.299	0.33	0.325	0.37	0.35	0.336	0.32
Least height of tail .....	0.065							
Head:								
Greatest length .....	0.16	0.16	0.165	0.16	0.155	0.155	0.157	0.155
Length of maxillary .....	0.04							
Length of mandible .....	0.06							
Diameter of orbit .....								
Pectoral:								
Distance from snout .....								
Length .....								
Ventral:								
Distance from snout .....								
Length (blind side) .....	0.052	0.047		0.055	0.053	0.047	0.055	0.057
Length (eye side) .....	0.065	0.058		0.065	0.062	0.063	0.06	0.063
Dorsal .....	115	110	107	113	105	120	106	111
Anal .....	97	95	83	98	92	100	90	95
Pectoral .....	11	11	12	13	12	11	12	10
Ventral .....	6	6		6	6	6	6	6
Number of scales in lateral line (blind side) .....	112	130	115	117?	109	133	125	127
Length (eye side) .....	119	123	110	117?	115	127	128	125

  

Current number of specimen	21,047 <i>b</i>	21,019 <i>a</i>	21,019 <i>b</i>	21,019 <i>c</i>	21,019 <i>d</i>	21,019 <i>e</i>	21, 032	21,061 <i>a</i>
Locality .....	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches ..	24.25	21.5	19	20	20.25	19	19.25	114 mm.
Body:								
Greatest height .....	0.37	0.365	0.375	0.316	0.33	0.34	0.365	0.245
Least height of tail .....		0.07	0.07					0.055
Head:								
Greatest length .....	0.175	0.16	0.156	0.152	0.155	0.15	0.175	0.165
Length of maxillary .....		0.03	0.03					0.045
Length of mandible .....		0.05	0.05					0.06
Diameter of orbit .....		0.05	0.05					0.06
Pectoral:								
Distance from snout .....		0.157	0.160					0.17
Length .....		0.14	0.11					0.08
Ventral:								
Distance from snout .....		0.17	0.17					0.20
Length (blind side) .....	0.047	0.07	0.057	0.065	0.055	0.05	0.067	0.055
Length (eye side) .....	0.03	0.077	0.067	0.075	0.06	0.06	0.077	0.055
Dorsal .....	106	109	113	106	114	102	106	104
Anal .....	92	93	99	91	97	87	90	87
Pectoral .....	12	12	11	11	11	11	11	14
Ventral .....	6	6	6	6	6	6	6	6
Number of scales in lateral line (blind side) .....	117	117	130	132	131	119	129	.....
Length (eye side) .....	122	121	130	117	127	115	125	.....

NOTE ON SHELLS FROM COSTA RICA KITCHENMIDDEN, COLLECTED BY DRS. FLINT AND BRANSFORD.

By W. H. DALL.

In their archæological explorations in Costa Rica, while examining the shell-mounds of Culebra near the western coast, a number of shells were obtained from the mounds to exhibit the species of which the shell-heaps were composed. They are, of course, in a semi-fossil condi-