INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

Serial No. 445 Document No. 7

ANNUAL MEETING - MAY 1957

Some Biometrical Relations for Cod and Haddock of the Grand Bank of Newfoundland

by Alfonso Rojo

The cod and haddock caught by the Spanish fishing fleet are split and salted on board the trawlers. The salted fish are thus landed without head. The following study of the relations between various body measurements of cod and haddock was made in order that representative samples of the fish landed in this form could be used for population studies. The results can later be compared with others taken in the future from other regions, thus enabling the possibility of describing various populations.

Measurements were therefore taken of several hundreds of specimens during the late campaign on the Grand Bank of Newfoundland in September 1956. The measurements were taken to the cm. below, from the extreme end of the snout to (a) the extreme end of the caudal fin (total length); (b) to the fork of the caudal fin (fork length); (c) to the insertion of the first dorsal fin; (d) by a straight line to the posterior point of the gill cover (length of head).

The relation total length - fork length can be used to compare data of observers using either the total length or the fork length.

The relation total length to length to insertion of first dorsal fin can serve as a meristic character for the various populations.

The relation of total length to head length can be used in the study of the salt fish landings. The length of the split cod is the same as the total length minus the head length. Once the relation between these two is known, samples of the fishes in the holds of the vessels as well as of those landed can be used to study the total length of the round fresh fish. This method will be especially useful for taking samples in port in cases where sea-sampling is not possible.

It has to be noted that the split cod contracts in length during dehydration during the 1-5 months in the holds. This relation will be studied in the coming campaign.

A. COD

The lengths of the cod measured (Fig.1) varied between 28-120 cm. A linear relationship between head length and total length and between length to insertion of first dorsal is apparent from the figure. The best straight lines were fitted to the data by the method of least squares weighting each mean point by the number of specimens measured at that size.

The mean points, as plotted in the figure, are closer to the line in its lower part owing to the larger number of small or medium individuals. In the upper part of the curve, corresponding to the larger and more scarce specimens, the values are mostly based on single individuals, and, therefore, the spreading of the points below and over the curve is more pronounced.

The equation of the relation fork length (f) to head length (h) is:

$$h = 0.215\ f + 0.77.$$

The equation of the relation fork length (f) - insertion of first dorsal fin (d) is:

$$d = 0.301\ f - 0.82.$$

...../2.

The growth of the head and of that part of the body between tl snout and first dorsal fin are not exactly proportional, the latter being the more rapid. As this latter includes the part of the body with the largest girth it might serve as an indication of the value of the individuals to the fishing industry. The angle formed by the two straight lines might be used as a measure of this value.

The distance to the insertion of the first dorsal includes the broadest part of the body, and it is proportional to the total length.

The relation total length to fork length has very little interest, as far as cod is concerned, because the hind margin of the caudal fin is nearly straight. The difference between these two lengths is smaller than 1 cm. (the unit used for measurement).

B. HADDOCK

The same study was made for the haddock of the Grand Bank (Subdivision 3N). 406 specimens were measured for total length and fork length, and 213 specimens for the length of the head and the distance to the first dorsal fin (Fig.2).

In the haddock the difference between total length and fork length is more notable, at times 2 cm., as the hind margin of the caudal fin is more forked than is the case for the cod. Therefore, data on lengt. of this species differs if one uses the one measurement or the other. The relation of both were calculated using as the base the fork length.

The length of the head has about the same relation to the fork length in the haddock as in the cod.

The equation of total length (t) to the fork length (f) is:

$$t = 1.04\ f - 0.18.$$

For the head length (h), the following equation is found (f = fork length):

$$h = 0.21\ f + 0.83$$

or very similar to that already found for the cod.

The relation between the distance snout to insertion of the first dorsal fin (d) and the fork length (f) is:

$$d = 0.25\ f + 0.11.$$

With these relationsknown it is possible to use samples from the fish when landed or stored as split and salted in the fish plant.

- THE END -

TABLE 1

COD. Relation Fork Length (f = fork length minus 28 cm.)

No. of Spec. n	f	To Head Length h	To Dorsal Fin d
1	0	7	8.0
1	5	7	9.0
2	6	8.5	10.0
4	7	7.7	9.5
1	8	8.0	10.0
5	9	8.2	10.4
10	10	8.8	10.9
13	11	8 9	11.2
17	12	9.2	11.3
10	13	9.7	11.7
16	14	9.5	12.0
11	15	9.8	12.1
9	16	10.0	12.2
11	17	10.2	12.7
7	18	10.7	13.1
14	19	10.8	13.2
8	20	11.4	13.6
11	21	11.1	14.1
5	22	11.4	13.8
14	23	11.7	14.4
10	24	12.0	14.9
9	25	11.8	14.9
16	26	12.2	15.5
11	27	12.4	15.7
11	28	12.6	16.1
9	29	13.2	16.1
3	30	12.7	16.0
9	31	13.4	16.4
1	32	14.0	16.0
5	33	14.4	17.8
5	34	14.8	18.4
6	35	14.7	17.8
1	36	13.0	16.0
2	37	15.5	19.0
1	38	16.0	19.0
3	39	15.7	19.3
1	40	16.0	19.0
2	41	16.5	20.5
1	42	16.0	20.0
5	43	16.4	20.6
2	44	17.0	20.5
1	45	16.0	21.0
1	46	18.0	22.0
3	47	17.3	21.3
2	48	18.0	22.0
2	49	18.0	22.0
2	50	18.0	22.0
1	53	19.0	23.0
1	54	19	23.0
1	57	20	26.0
1	59	20	25.0
1	62	22	26.0
2	66	22	27.5
1	78	25	32.0
1	82	27	34.0
1	87	27	35.0
1	92	30	38.0
305	1,95[illegible]	826.2	1,022.5

Σnf = 7,319
Σnh = 3,647.2
Σnf^2 = 230,393
Σnfh = 99,338.8

Equation: $h = 0.215f + 0.77$

Σnf = 7,319
Σnd = 4,522.3
Σnf^2 = 230,393
Σnfd = 125,053

Equation: $d = 0.301f - 0.82$

TABLE 2

HADDOCK. Relation Fork Length (f = fork length minus 21 cm.)

No. of Spec. n	f	To Head Length h	To Snout to 1st Dorsal Fin d	No. of Spec. n	f	To Total Length t
4	0	5.0	6.0	4	0	21.5
3	1	5.0	6.0	3	1	22.3
3	2	5.0	6.0	3	2	23.3
2	3	5.0	6.0	2	3	24.0
4	4	5.8	6.8	4	4	25.5
1	5	6.0	7.0	1	5	27.0
5	9	7.0	8.0	2	7	28.5
3	10	7.0	8.0	4	8	30.0
9	11	7.2	8.2	12	9	31.0
10	12	7.5	8.5	8	10	32.0
9	13	8.0	9.0	16	11	32.9
13	14	8.3	9.3	19	12	34.1
11	15	8.3	9.1	30	13	35.2
13	16	8.6	9.6	30	14	36.2
15	17	8.3	9.9	35	15	37.1
15	18	9.0	10.0	38	16	38.3
5	19	9.2	10.2	26	17	39.3
9	20	9.5	10.5	24	18	40.6
12	21	10.0	11.0	10	19	41.4
11	22	10.0	11.0	16	20	42.7
14	23	10.0	11.4	17	21	43.6
7	24	10.7	12.0	15	22	44.7
10	25	10.8	12.3	16	23	45.7
5	26	11.0	12.4	10	24	46.9
7	27	11.3	12.6	17	25	47.8
2	28	12.0	13.0	7	26	49.2
2	29	12.0	13.0	7	27	49.9
3	30	12.0	13.3	2	28	51.5
3	31	12.3	13.7	3	29	51.7
2	32	12.0	13.0	3	30	53.3
1	41	15.0	17.0	4	31	53.8
				4	32	55.0
				3	33	55.3
				2	34	56.5
				2	35	57.5
				2	37	59.5
				2	38	60.5
				1	41	65.0
				1	42	64.0
				1	54	79.0
213	548	278.8	313.80	406	836	1,733.3
		Σnf = 3,757	Σnf = 3,757			Σnf = 7,101
		Σnh = 1,905.9	Σnd = 2,145.60			Σnt = 16,181.7
		Σnf^2 = 77,177	Σnf^2 = 77,177			Σnf^2 = 144,961
		Σnfh = 35,920.2	Σnfd = 40,664.30			Σnft = 304,803.7
		Equation: h = 0.21f + 0.83	d = 0.25f + 0.11			t = 1.04f - 0.18

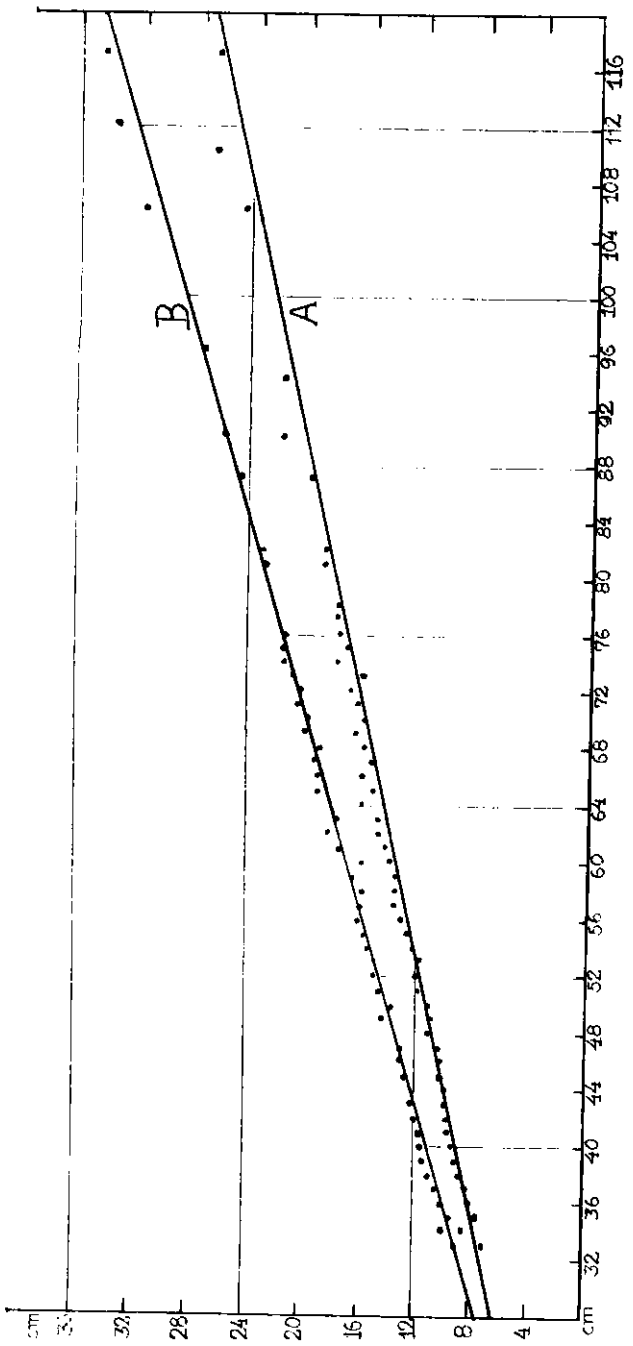

FIGURE 1. COD. Subdivision 3M. Relation between fork-length and head-length (A) and insertion of 1st dorsal fin (B).

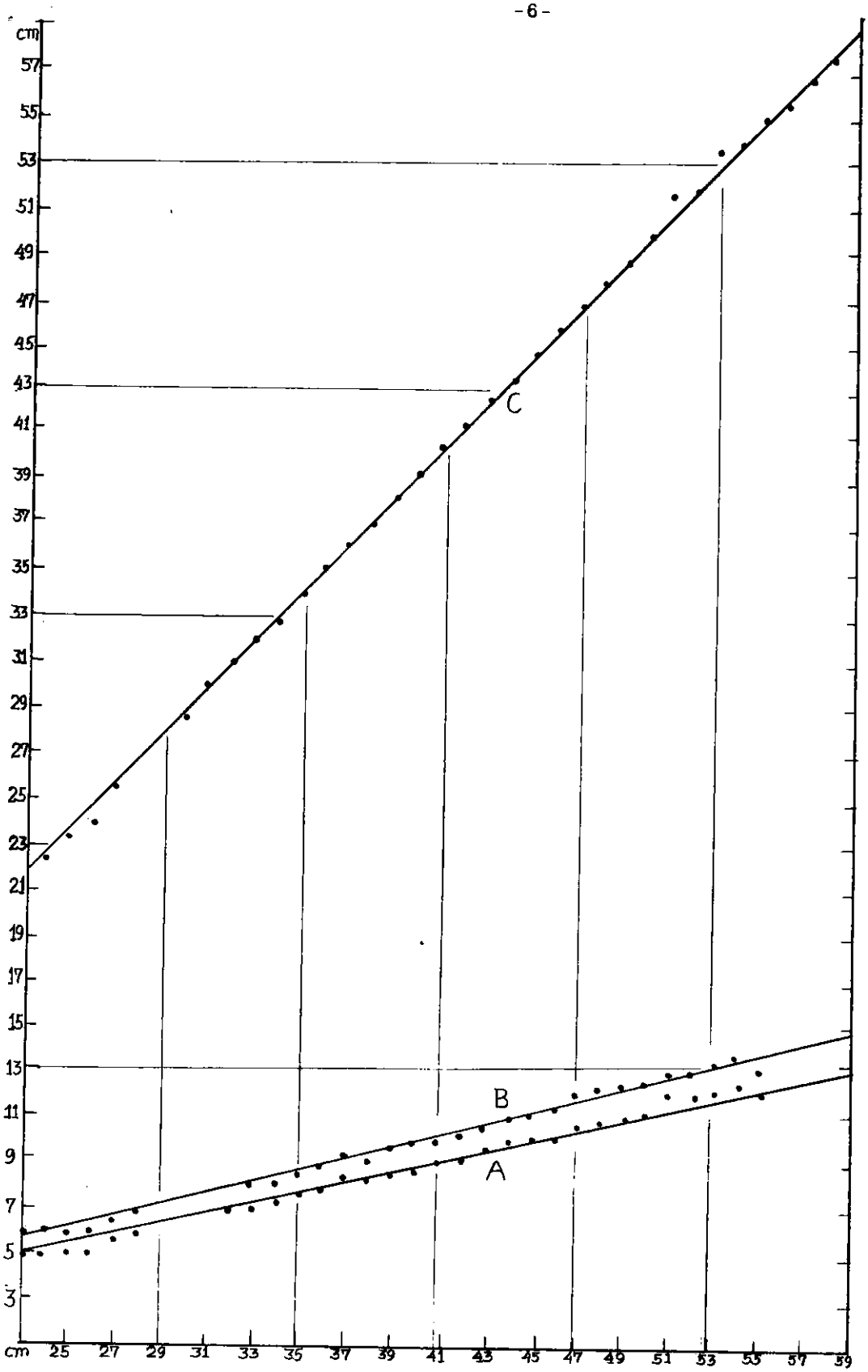

FIGURE 2. HADDOCK. Subdivision 3N. Relation between fork-length and head-length (A), and insertion of 1st dorsal fin (B), and total-length (C).