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Experimental snella fishing for cod on West Greenland banks, August 1965, and comparison of a snella and an otter-trawl catch of cod from the same locality of Store Hellefiske Bank

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Abstract

An experiment was carried out on the West Greenland banks in August 1965 to compare the numbers, weight and length of cod (*Gadus morhua* L.) caught by the 3 sizes of hooks, ~~of sizes~~ No. 10, 11 and 12, used as part of the snella rubber bait handline gear. No. 10, the smallest hook, gave the greatest numbers and total weights but the differences were not as a rule statistically significant. There was also no significant difference in the average lengths of fish caught by the 3 hook sizes. The catch of a line with 3 hooks produced less numbers and weight than lines with 6 hooks but the differences were not significant.

An otter trawl and a snella catch of cod in the same area of Store Hellefiske Bank on the same day showed significantly longer fish caught by the snella gear, when the catch of the otter trawl with the cod end lined by small mesh was modified for selection by meshes of approximately 130 mm double manila, but the actual differences were small - about 2 cm.

In snella fishing, cod catches were much less at temperatures of 1.25 to 2.2°C than at 2.4 to 5.3°C.

Introduction

In recent years snella fishing originating in Norway has become a common method of handlining cod and other fishes in Norway, the Faroes, Iceland and Greenland. The snella is a hand reel, the line is monofilament nylon with usually a leader of somewhat smaller monofilament nylon. A lead or iron weight of 1.4-1.8 kg is used and, above this, hooks with rubber worm baits.

According to Nordafar, the Norwegian-Danish-Faroese Fish Company at Faeringehavn, West Greenland, for their smaller boats the snella is the best gear. In the commercial Faroese fishery in West Greenland 7 hooks are used with assorted colours of rubber. There were 3 sizes of hooks available at Nordafar - No. 10, 11 and 12, of which No. 10 is the smallest and No. 12 the largest.

Snella gear is figured and the gear and its operation are briefly described by Devlin (1963). Devlin's article was also presented by Anon. (1963). For an earlier variation of the method see Anon. (1954).

I am indebted to Mr Steinar Olsen for an explanation of the various forms of Norwegian words which are used at times in relation to the snella operation: snelle = reel; snella = the reel; sneller = reels. I have preferred to use "snella" but either of the two other words could equally well have been used.

Methods and materials

During the cruise of the A.T. Cameron to West Greenland in July-August 1965 with the author as scientist-in-charge, the main trawl winch failed in the middle of the cruise and samples of cod were collected on the West Greenland banks by snella fishing. The reels and equipment were obtained from the Nordafar Company at Faeringehavn.

For the gear obtained at Faeringehavn and used on the A.T. Cameron see Fig. 1-5.

Each reel was rigged with a monofilament line 1.5 mm in diameter. The monofilament nylon leader to which the 6 hooks were attached, each pair 1 m apart, was 1.2 mm in diameter.

An experiment was run to compare cod catches on hooks of sizes No. 10, 11 and 12. (See Table 1 and Fig. 6 for hook sizes and measurements.)

Rubber bait colours were, red, ~~green~~, yellow, black, green and white. It was impossible to obtain the same colours for the

different sizes of hooks, consequently the experiment which follows takes no account of colours.

Three reels were arranged along one side of the A.T. Cameron (Fig. 2), the vessel drifted over the ground and, when the fishing failed, steamed back to drift over the ground again. In some areas and on some days a drift of as great as 3 nautical miles could be made with fishing successful along the whole drift. In other areas and depending on rapidity of change in depth and temperature and on the direction of drift the distance which could be successfully fished was much shorter.

The reels were each rigged with 6 rubber bait hooks and each reel had only one type of hook, either No. 10, 11 or 12. The operation began at the same time with a fisherman at each reel (Fig. 2). Each fisherman fished a particular reel or hook size for ten minutes, then progressed along the rail to the next reel and hook size and a new man began at the first reel aft. Usually 5 fishermen were available at a time on 6-hour shifts, but the fishing period was usually shorter than this, the men were relatively fresh, interest was high and retrieval relatively rapid for men unskilled at this operation but used to hand-line fishing in Newfoundland.

At intervals during the fishing, the positions of the reels containing the different sized hooks were interchanged along the rail so that effects due to differences in position could be equalized.

In fishing, the sharply bent shaft and bend of the hooks (Fig. 4, 5) and the movements of the free tail of rubber produced wriggly motions of the hooks which attracted the fish, and the cod apparently took hold as they would on ordinary bait. They were typically caught with the hook in the mouth. It was unnecessary to jig, merely to move the line up and down to keep the hooks moving and sometimes to set the hook when the fish bit. When one cod was hooked, the motions

imparted to the hooks seemed to be favourable to the attachment of more cod and often 3, 4, or 5 fish were caught in one return of the hooks. This could happen when the first cod was being reeled back, but the fishermen often deliberately moved the line up and down and hooked several cod one after the other before retrieving the line.

The A.T. Cameron fishing was in relatively shallow water on the tops of the banks and fishing was done near bottom, the lead was allowed to strike and pulled up about 2 m before fishing. As the ship drifted and the hooks came off bottom it was necessary to lower them again. Mid-water snella fishing is also often successful in West Greenland especially in August when large quantities of cod are off bottom and relatively near the surface over deep water (Rasmussen, 1957).

Results

Comparative catches on No. 10, 11 and 12 hooks

In fishing with 6 hooks on each line, No. 10 hook produced a greater catch (352 cod, 1213 kg) than No. 11 (310 cod, 1034 kg) or No. 12 (296 cod, 1048 kg) (Table 2). Including, also, 2 other sets in which there were 6 hooks on No. 11 and 12 but not on No. 10, catches of the No. 11 and 12 hooks were approximately equal, 454 cod, 1345 kg for No. 11 and 471 cod, 1375 kg for No. 12 hook.

In Sets 241 and 248, in which for half (Set 241) and the whole (Set 248) of the fishing period No. 10 had only 3 hooks and No. 11 and 12, 6 hooks, the No. 10 hook caught less cod than the larger hook sizes (Table 2).

There was no consistent difference in the average length and weight of cod caught by the 3 different sized hooks (Tables 2, 3).

Comparison of sizes of cod caught by otter trawl and snella

At the time of the cruise to West Greenland, ICNAF had under consideration the proposal of Denmark to ban otter trawl and allow only hook (handline and longline) fishing on Store Hellefiske Bank because of the large numbers of small cod on this bank.

Plans had consequently been made to try snella and otter trawl fishing in the same areas of this bank. The main winch of the A.T. Cameron ceased to operate after one pair of these comparative sets but since as far as we know nothing else of this nature is available for this area it may be worthwhile to present this small result.

The otter trawl was the usual A.T. Cameron No. 41 otter trawl, 24.1 m head rope, 30.5 m foot rope with 127 mm wing and anterior belly meshes declining to 89 mm mesh in the after belly and cod end and with the cod end lined with 29 mm nylon mesh. The net itself was of manila and was towed at about 3 1/2 knots.

The otter-trawl set was made in the shallow water on the northern peak of Store Hellefiske Bank on 5 August, 0600-0630 hours, and the snella comparison taken immediately afterward, 0735-0937 hours on the same day, and in approximately the same position. Since the snella set was by drifting, it was not possible to hold exactly the same depths but only to drift approximately over the otter-trawled area, the otter-trawl set averaging 1.5 m deeper.

The cod caught by the otter trawl with the lined cod end were considerably smaller than those taken by snella. When, however, the otter-trawl length frequency obtained from the lined cod end was treated for selection by a 119.8 mm mesh polypropylene monofilament cod end as in Bohl (1967b), and for 132 and 136 mm double manila as in Anon. (1965), the cod sizes caught by the A.T. Cameron's otter trawl, although somewhat smaller, are little different from those caught by the snella gear (Table 4).

The cod selection data used were all from side trawlers, but the cod selection factor (3.26) for the polypropylene monofilament net operated by the side-trawler Anton Dohrn in SW Greenland (Bohl, 1967b) was very similar to that (3.22) obtained by the larger stern trawler Walther Herwig for the same kind of twine and approximately the same sized mesh on the southern slope of Store Hellefiske Bank in 1965 (Bohl, 1967a).

Temperature and snella catches

Although there was no deliberate and systematic attempt to compare snella catches of cod at different temperatures, some records made during fishing trials show an indication of better catches at higher temperatures (Table 5). At temperatures of 1.2 to 2.2°C, catches were much less than at temperatures of 2.4 to 5.3°C. On the Dana Bank on 19 August, in Set 275 with low bottom temperatures of 1.57°C in 60 m toward the eastern part of the bank cod were scarce but by passing westward to 64 m and 2.50°C excellent cod fishing by snella was obtained.

Discussion and conclusions

Differences in numbers and total weight of cod caught by snella hooks No. 10, 11, 12

In spite of the apparent differences, chi-square tests based on the hypothesis that the same numbers of cod (Table 2) are caught by the different hook sizes, and the numbers caught with each hook size compared in each case in a 3-class table, show no significant differences in numbers of cod caught by the 3 different sized hooks for Set 238, Store Hellefiske Bank, $P > 0.5$ and closer to 0.10; for the total of Dana Bank Sets 271-275, P between 0.5 and 0.3; or for the total of Set 238 and

Dana Bank, P between 0.10 and 0.05. When numbers caught by individual hooks are compared by chi-square, the differences between hooks No. 11 and No. 12 are never close to significance. The greater differences between numbers caught by hooks No. 10 and 11 are also not significant: for Set 238, Store Hellefiske Bank, $P = 0.20$, for the Dana Bank total, $0.30 > P > 0.20$, and for the total of Sets 238 and Dana Bank, $P = 0.10$.

For the somewhat greater differences between the numbers caught by hooks No. 10 and 12: for Set 238, Store Hellefiske Bank and also for the total of Set 238 and Dana Bank the differences are significant $0.05 > P > 0.02$; for the total of Dana Bank the differences are not significant $P = 0.20$.

The chi-square comparison of differences in numbers caught by each of the 3 hook sizes in the total of Sets 241 and 248 in which there were only 3 hooks on No. 10 for half or the whole of the set and 6 hooks on each of No. 11 and No. 12, showed no significance, $P = 0.20$. Similarly, for the individual Sets 241 and 248, there were no significant differences in the numbers caught by different hooks in the individual sets; for both Set 241, and for Set 248, $0.50 > P > 0.30$.

The only significant difference, therefore, between the catches by the 3 hook sizes is between those for No. 10 and 12 for Set 238 because the significance of the total of Set 238 and Dana Bank for these 2 hook sizes is due to differences between these catches in Set 238 on Store Hellefiske Bank rather than to differences between the larger catches on Dana Bank which are not significant. Because the much greater numbers for Dana Bank show no significant differences between hook sizes, this difference between the small numbers caught on hooks 10 and 12, though statistically significant, cannot be given much weight and it is concluded that no real differences have been shown between the numbers of cod caught by the different hook sizes.

Because, also, the small differences in sizes caught by the different hooks have been shown later not to be significant, it may be

assumed that the differences in quantities shown as caught by the 3 hook sizes in Table 2 are also not significant.

Differences in sizes of cod caught by snella hooks No. 10, 11, 12

Some of the length frequencies of Table 3 are bimodal but moderately well balanced and of the same shape relative to one another and with fairly large numbers in the samples, and it is allowable in view of the central-limit theorem to apply the usual statistical tests (Snedecor, 1956).

None of the differences in average lengths of cod caught by the different hook sizes within the experiments or combinations of experiments shown in Tables 2 and 3 approach statistical significance. For the greatest difference, that of 1.32 cm between the average lengths of cod caught by No. 10 and No. 12 hooks in the total of Sets 271-275 on Dana Bank, P = 0.25.

The lack of difference in average length of the cod caught on the 3 hooks of different sizes is unexpected and is different from McCracken's (1963) results from longline catches in which considerably greater numbers of small cod were caught on smaller than on larger hooks. In longline catches the cod must hook themselves whereas there is some effect of the fisherman's hooking the fish in the snella fishery.

Actually as may be seen in Fig. 4, in spite of the considerable differences in the overall proportions of the actual hooks (Table 1, Fig. 4), the rubber lengths were variable and did not necessarily correspond in relative size to the hook sizes. Thus, because the rubber was more visible than the hook, the overall appearance of hooks of sizes 10-12 often differed little. Snella hooks, measured overall between perpendicular planes in their natural shape between the extreme ends of the swivel and rubber, had lengths as follows, each of these lengths representing averages of usually 10 hooks as bought in bundles of 10 from Nordafar: No. 10 - 18.4, 18.3, 18.7; No. 11 - 18.6, 19.1, and No. 12 - 18.7, 18.8, 19.0. This lack of

considerable differences in overall appearance very likely contributed to the lack of considerable differences in the quantities and sizes caught.

General

Although the cod caught in the Newfoundland hand-line fishery are rather small, the hooks used (with about 31-33 mm width of bend and approximately similar in size to the larger snella hooks) are much larger than those (only 20-21 mm width of bend) used in the longline fishery and evidently must be efficient for catching the smaller as well as the larger commercial sizes of cod present, or presumably they would not be used. For the sizes of cod fished in West Greenland, the ease of taking the smaller hook or of getting hooked more deeply by this hook in the snella fishery, which resulted in the catching of more cod and a greater weight of cod by the smaller hook, must have extended approximately equally throughout the size range of cod taken by the hooks.

The work described is a first approach whose imperfections were largely due to its ad hoc nature with a resulting lack of a completely adequate range of hook sizes and colours.

The differences shown, however, in the numbers and weights of cod caught on the different hooks during the experiment are worthy of further investigation with greater numbers of fish (which if the same relative level of numerical difference were maintained would raise the level of significance), a wider range of hook sizes, and with rubber baits of the same colour and of the same length, and in another experiment of lengths proportional to hook sizes. The Manager of Nordafar at Faeringehavn said that their fishermen usually buy No. 10 and 11 hooks. Thus, in spite of the lack of significance in the present tests, the capture of more cod by the No. 10 hook may have some reality. The effects that the use of different colours with the same size of hook would have on the catch would also be worth investigating.

Differences between otter-trawl and snella catches

The 1.8-2.4 cm smaller average sizes of the otter-trawl catch, when transformed by selection corresponding approximately with that of 130

mm double manila, are highly significantly different (statistically) from the snella catch in the same area of Store Hellefiske Bank (Table 4). However, the actual differences are small and indicate that the effects on cod selection of the 130 mm (manila) mesh regulation for West Greenland proposed by ICNAF (1966) might not be greatly different from selection by the No. 10-12 hooks of the snella gear.

Cod ~~Fish~~ and temperature in West Greenland

I have found no record of comparative temperature relationships to cod catches by snella gear. However, for pelagic longline cod fishing in the Holsteinborg Deep, Anon., actually Rasmussen, (1953) showed reasonably good catches for 0.6-1.0 to 4.1-4.5°C, with better catches for 1.6 to 4.0°C and the peak catches at 2.1 to 2.5°C. For cod fishing by longline on Disko Bank, Rasmussen states that in some places the bank was covered with water of temperatures below 1°C and here the fishery mostly gave poor results. Fishing was best where the transition layer of 4 to 2°C touched the bottom. Rasmussen (1955) for pelagic longlining in Holsteinborg Deep shows the best catches of cod in 1953 at 2.2°C and in 1954 at 0.8 to 0.9°C.

Bratberg and Hylen (1964) in a summary of Norwegian longline cod catch and temperature observations off West Greenland show best catches between about 1.8 and 3°C with moderate but declining catches down to 0.5 or 0°C with occasionally excellent catches between 1.0 and 1.5°C.

It has been recorded (Lee, 1952) that when concentrations of food animals such as capelin which prefer low temperatures are available, cod, feeding on them, will be found at lower temperatures than usual. The longline fishing recorded above appears to be relatively more productive at temperatures below 2.0°C than our few records for snella gear and it may be that there is a different temperature relationship to catches by the two gears which is worthy of further investigation.

Acknowledgements

I am grateful to Mr L. M. Cluett for the drawing of Fig. 1, to Mr Steinar Olsen of the Fiskeridirecktoratets Havforskningsinstitutt of Bergen for assistance ~~in~~ regarding variations of Norwegian names for the reel used in snella fishing and to Mr E. L. Rowe and Mr E. M. LeGrow for the photographs.

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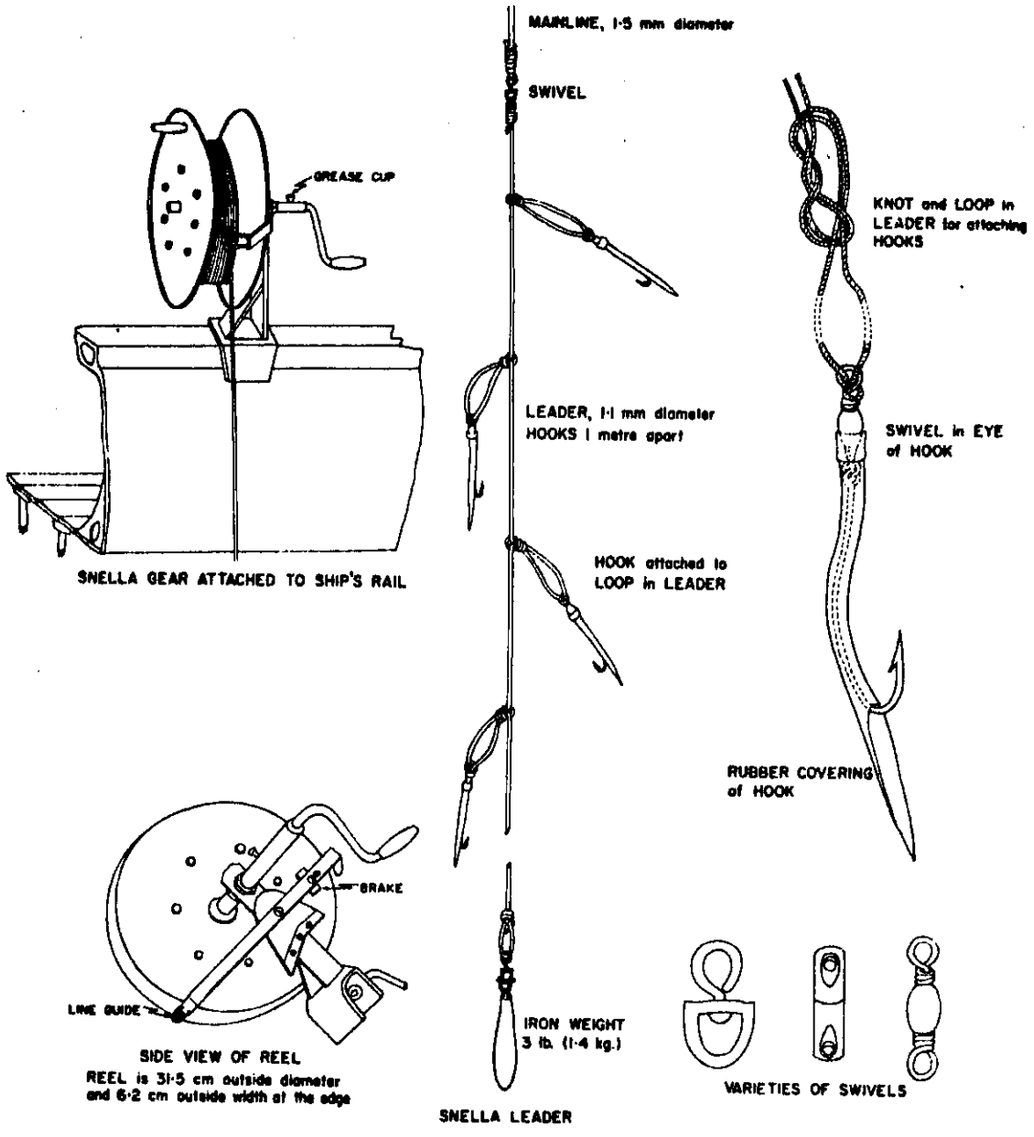

Fig. 1. Drawing of snella gear as used by the A.T. Cameron on West Greenland banks, August 1965.

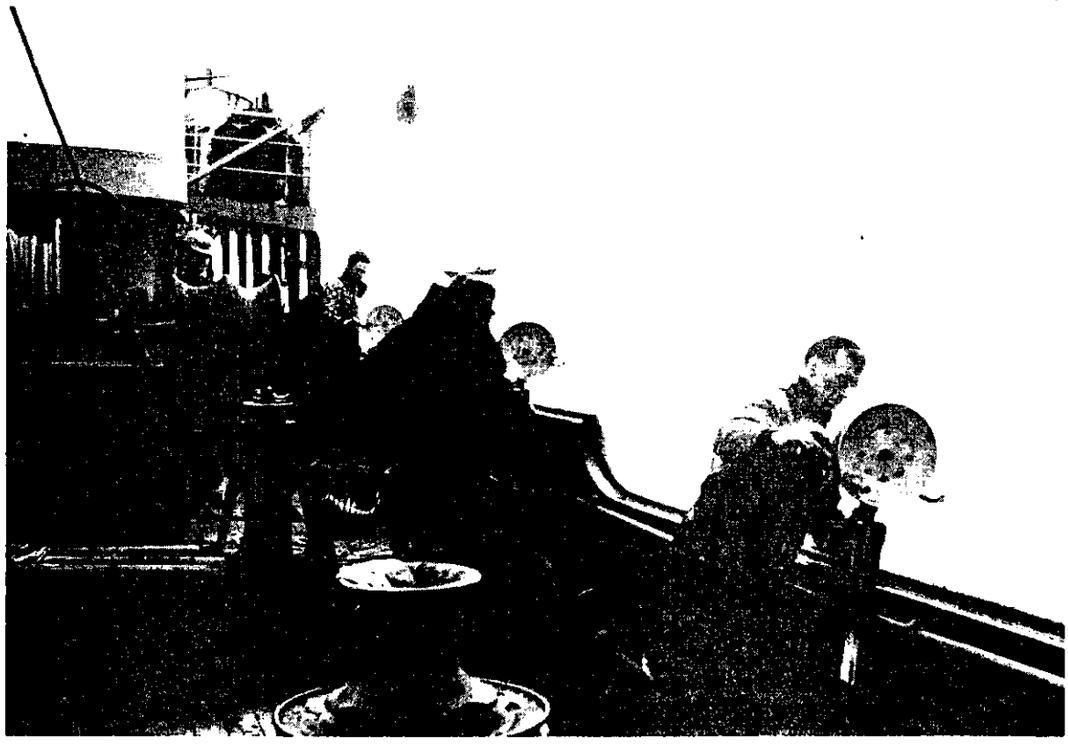

Fig. 2 Snella gear on the A.T. Cameron in West Greenland, August 1965.

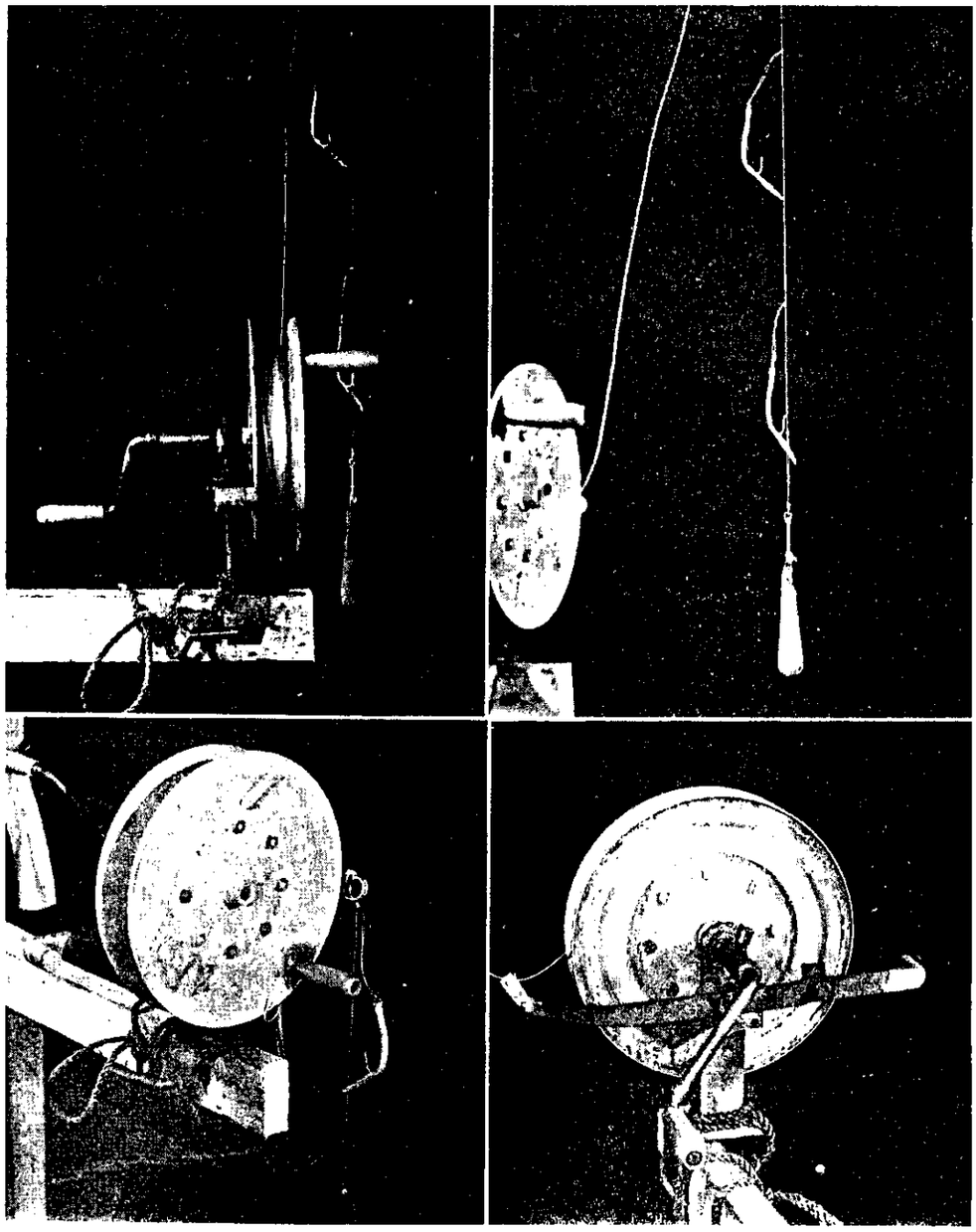

Fig. 3 Various views of snella gear used by the A.T. Cameron on West Greenland banks, August 1965.

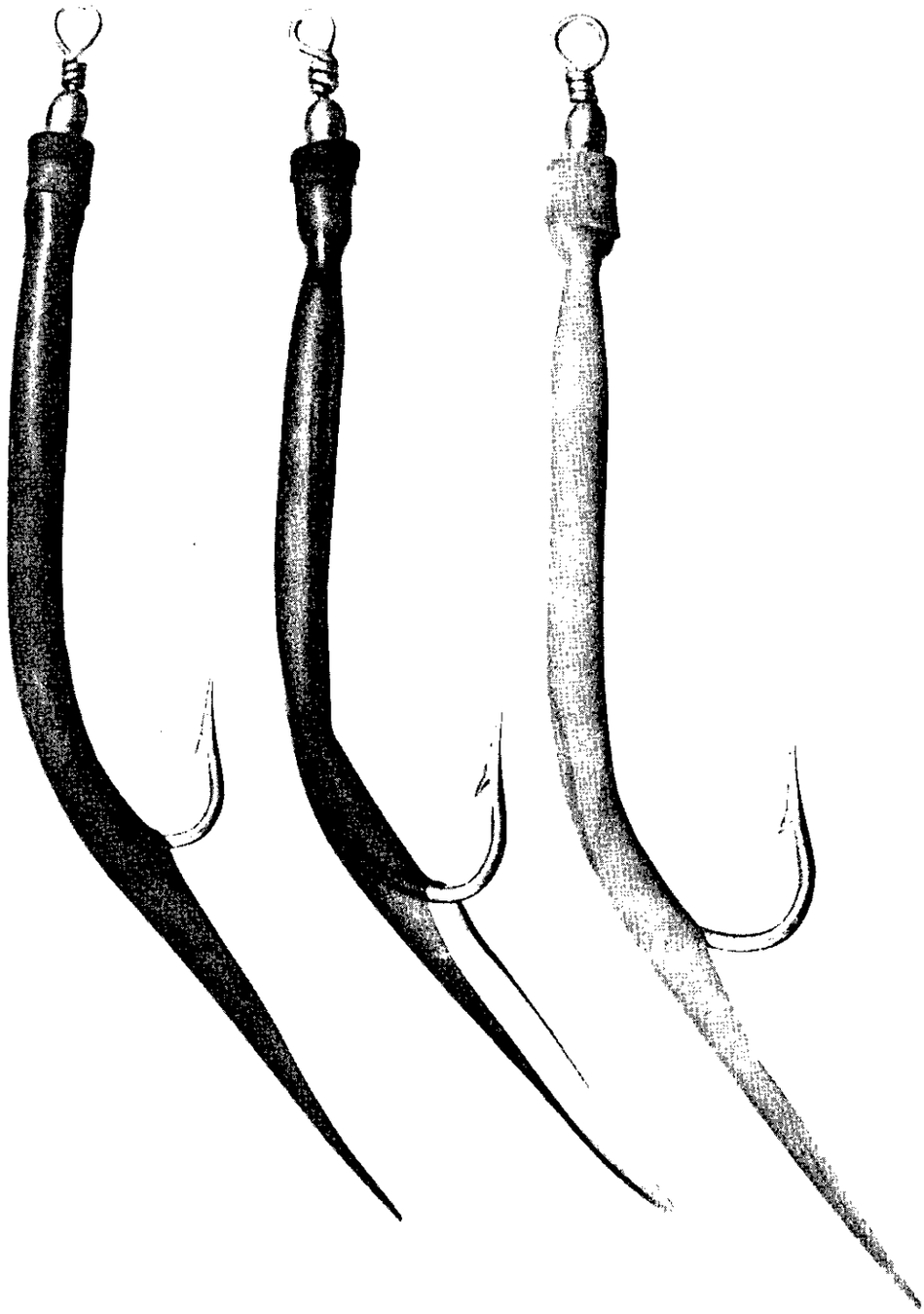

Fig. 4 No. 10, 11 and 12 snella hooks, natural size.

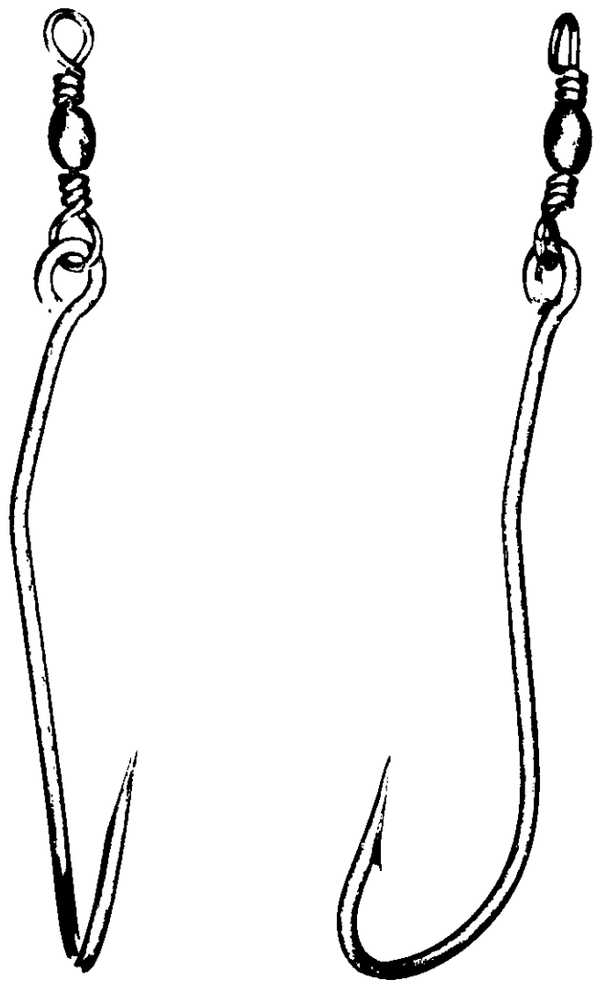

Fig. 5 Two views of a No. 12 snella hook with the rubber removed, natural size.

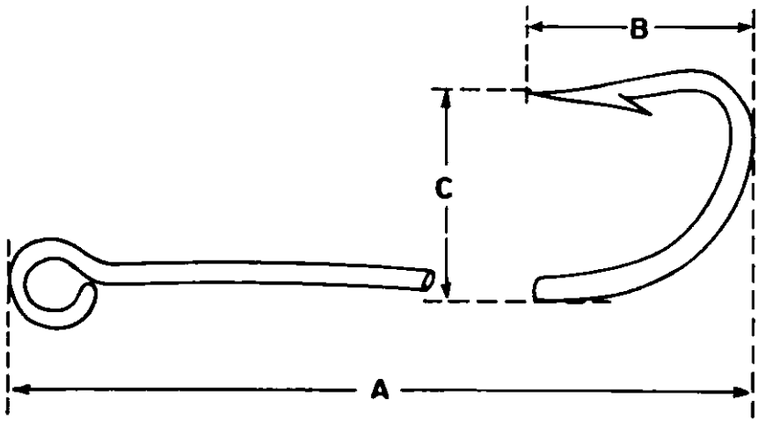

Fig. 6 Parts of hook measured for Table 1: A, length of shaft; B, depth of bend; C, width of bend.

Table 1. Measurements of hooks used in snella fishing, West Greenland, August 1965.

(For A, B and C refer to Fig. 6.)

	Length of shaft or shank (A)			Depth of bend (B)			Width of bend (throat) (C)		
	No. 10	No. 11	No. 12	No. 10	No. 11	No. 12	No. 10	No. 11	No. 12
Hooks measured, No.	9	9	9	9	9	9	9	9	9
Range of dimensions, mm	94-96	102-103	109-110	25-28	28-31	33-35	26-27	28-31	34-35
Average of dimensions, mm	96	103	110	26	30	34	26	30	34
Diameter of wire in hook, mm	2.4	2.7	3.0						

Table 2. Catches and sizes of cod in experimental snella fishing by the A.T. Cameron, West Greenland banks, August 1965.

Area	Set	Date 1965	Range of depths fished m	Range of bottom temperatures °C (depth m)	Time each hook fished minutes	Catch of cod on hooks No. 10, 11 and 12 — Number No. 10	No. 11	No. 12	Catch of cod on hooks No. 10, 11 and 12 — Weight No. 10 kg	No. 11 kg	No. 12 kg	Average sizes of cod caught on hooks No. 10, 11 and 12 — Length No. 10 cm	No. 11 cm	No. 12 cm	Average sizes of cod caught on hooks No. 10, 11 and 12 — Weight No. 10 kg	No. 11 kg	No. 12 kg
N. peak of Store Hellefiske Bank	238	5 Aug.	22-24	5.27 (24)	117	83	67	57	121	93	82	52.7	51.8	52.1	1.5	1.4	1.4
	241	6 Aug.	24-31	4.98 (29)	90	57*	68	71	115	152	150	57.4	59.8	57.9	2.0	2.2	2.1
Lille Hellefiske Bank	248	9 Aug.	27-70	3.42 (66)	205	90*	106	105	155	159	177	55.3	54.0	55.3	1.7	1.5	1.7
Dana Bank	271	18 Aug.	64-73	2.96 (66) to 3.49 (60)	268	93	89	84	300	304	261	68.7	71.9	68.4	3.2	3.4	3.1
	274	19 Aug.	64-73	3.34 to 3.60 (60)	240	83	71	61	401	312	298	79.7	77.6	80.4	4.8	4.4	4.9
	275	19 Aug.	60-64	2.42 (58) to 3.02 (60)	300	93	83	94	392	325	406	75.2	73.3	75.7	4.2	3.9	4.3
Total with 6 hooks on each line for No. 11 and 12 hooks and 3 hooks for all or half of the set on No. 10	241-248	5-9 Aug.	24-70	3.42 (66) to 4.98 (29)	295	147	174	176	270	311	327	56.1	56.2	56.3	1.8	1.8	1.9
Total Dana Bank (6 hooks on each line)	271-275	18-19 Aug.	60-73	2.42 to 3.60 (58-66)	808	269	243	239	1093	941	965	74.7	74.0	74.3	4.1	3.9	4.1
Total all sets with 6 hooks on each line	238, 271-275	5-19 Aug.	22-73	2.42 to 5.27 (24-66)	925	352	310	296	1213	1034	1048	69.5	69.2	70.1	3.4	3.3	3.5
Total all sets for No. 11 and 12 hooks, 6 hooks on each line	238-275	5-19 Aug.	22-73	2.42 to 5.27 (24-66)	1220	...	484	471	...	1345	1375	...	64.6	64.9	...	2.8	2.9

* Sets 241 and 248 had only 3 hooks on No. 10 instead of usual 6 - in Set 241 for half the fishing time and in Set 248 for the full period fished.

Table 3. Total length frequencies of cod caught by the M.T. Cameron on hooks No. 10, 11 and 12 in snella fishing, West Greenland, August 1965. (Total length = snout to end of caudal fin in the mid line. *Only 3 hooks instead of the usual 6 for half of Set 241 and the whole of Set 248. See Table 2. The frequencies have been adjusted for small differences in actual times fished by the various hook sizes, hence the fractional numbers.)

Length,	Set 238			Total Sets 241 and 248			Total Sets 271-275			Total Sets 238, 271-275			Total Sets 238-275	
3-cm	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
groups	10	11	12	10	11	12	10	11	12	10	11	12	11	12
27-29	...	...	...	1	...	...	...	...	...	...	...	...	...	...
30-32	...	...	...	...	...	1.1	...	...	...	...	...	...	...	1.1
33-35	...	...	1	1	1	...	...	...	...	...	...	1.0	1	1.0
36-38	1	4	...	2	1	2.3	...	...	...	1	4	...	5	2.3
-41	3	2	1	2	5	3.3	...	...	...	3	2	1.0	7	4.3
42-44	4	9	9	11	10	12.8	...	...	...	4	9	9.0	19	21.8
45-47	13	6	2	13	18	19.5	...	...	...	13	6	2.0	24	21.5
48-50	13	11	9	22	21	16.4	7	2	7.3	20	13	16.3	34	32.7
51-53	14	5	16	14	17	26.0	9	5	7.2	23	10	23.2	27	49.2
54-56	12	10	3	13	22	14.3	14	13	14.4	26	23	17.4	45	31.7
57-59	4	8	8	16	23	19.3	10	20	13.3	14	28	21.3	51	40.6
60-62	10	6	1	19	16	14.0	16	16	13.3	26	22	14.3	38	28.3
63-65	8	2	5	6	16	21.4	20	19	13.4	28	21	18.4	37	39.8
66-68	1	3	2	10	3	7.3	17	14	9.2	18	17	11.2	20	18.5
69-71	...	1	...	5	10	4.4	13	11	10.3	13	12	10.3	22	14.7
72-74	...	...	...	3	1	2.1	15	13	14.3	15	13	14.3	14	16.4
75-77	...	...	...	3	3	2.1	16	22	21.5	16	22	21.5	25	23.6
78-80	...	...	...	3	3	1.0	23	25	26.5	23	25	26.5	28	27.5
81-83	...	...	...	1	...	1.0	30	15	27.6	30	15	27.6	15	28.6
84-86	...	...	...	...	1	4.4	32	28	17.4	32	28	17.4	29	21.8
87-89	...	...	...	1	...	2.1	18	14	18.3	18	14	18.3	14	20.4
90-92	...	...	...	...	2	1.0	15	15	9.3	15	15	9.3	17	10.3
93-95	...	...	...	1	1	...	6	6	8.2	6	6	8.2	7	8.2
96-98	...	...	...	...	...	...	4	3	5.1	4	3	5.1	3	5.1
99-101	...	...	...	...	...	...	1	2	2.0	1	2	2.0	2	2.0
102-104	...	...	...	...	...	...	3	...	...	3	...	...	...	...
Total	83	67	57	147	174	175.8	269	243	238.6	352	310	295.6	484	471.4
Average length, cm	52.69	51.78	52.11	56.10	56.24	56.34	74.66	74.04	73.34	69.48	69.23	70.05	64.56	64.94
Standard deviation	6.96	8.13	7.20	10.74	10.35	10.95	12.81	12.27	12.81	14.97	14.70	14.82	14.70	15.03
Standard error	0.76	0.99	0.95	0.89	0.78	0.83	0.78	0.79	0.83	0.80	0.83	0.86	0.67	0.69

Table 4. Comparisons of frequencies of cod from snella and otter-trawl catches.

gth cm ups	Total frequencies A.T. Cameron: Snella Set 238 22-24 m 117 min.	Total frequencies A.T. Cameron: Otter trawl[a] Set 237 22-27 m 30 min.	Calculated no. retained in cod end in A.T. Cameron otter-trawl Set 237 after application selection for: Anton Dohrn[b] 119.8 mm polypropylene cod end	Ernest Holt[c] 132 mm manila cod end	Anton Dohrn[d] 138 mm manila cod end	Percentage of total: A.T. Cameron 1965 snella	Anton Dohrn[b] 1966 119.8 mm polypropylene	Ernest Holt[c] 1962 132 mm double manila	Anton Dohrn[d] 1962 138 mm double manila
-23	0	3	0	1	0	0	0	0.4	0
-26	0	1	0	0	0	0	0	0	0
-29	0	4	0	1	1	0	0	0.4	0.4
-32	0	7	0	2	2	0	0	0.9	0.9
-35	1	7	1	3	2	0.5	0.4	1.3	
-38	5	20	6	10	7	2.4	2.5	4.3	3.1
-41	6	18	10	11	9	2.9	4.2	4.7	4.0
-44	22	42	31	29	28	10.6	13.0	12.3	12.4
-47	21	47	41	36	36	10.1	17.2	15.3	15.9
-50	33	45	41	37	38	15.9	17.2	15.7	16.8
-53	35	35	34	31	32	16.9	14.2	13.2	14.2
-56	25	31	31	30	28	12.1	13.0	12.8	12.4
-59	20	18	18	18	17	9.7	7.5	7.7	7.5
-62	17	13	13	13	13	8.2	5.4	5.5	5.8
-65	15	5	5	5	5	7.2	2.1	2.1	2.2
-68	6	3	3	3	3	2.9	1.3	1.3	1.3
69[e]	1	5	5	5	5	0.5	2.0	2.0	2.2
tal	207	304	239	235	226	99.9	100.0	99.9	100.0
rage gth, cm	52.23	47.78	50.48	49.83	50.23				
ndard riation	7.41	...	7.08	8.01	7.62				
ndard or	0.51	...	0.46	0.52	0.51				

[a] A.T. Cameron, No. 41 trawl, cod end lined with 29 mm mesh nylon. See text.

[b] Anton Dohrn, polypropylene monofilament, 119.8 mm cod-end mesh, average total cod-end catch of cod per set, 622 kg, S.F. (cod) 3.26, W Greenland, Div. 1F, 27 September-30 October 1966 (Bohl, 1967b).

[c] Ernest Holt, double manila, 132 mm cod-end mesh, average total cod-end catch per set, 2640 kg, S.F. (cod) 2.8, N Iceland, 24-25 July 1962 (Anon., 1965).

[d] Anton Dohrn, double manila, 138 mm cod-end mesh, average total cod-end catch per set, 555 kg, S.F. (cod) 2.9, N and NW Iceland, 9-14 July 1962 (Anon., 1965).

[e] ≥ 69 has been treated as an average of 70.

Table 5. Cod catches near bottom by snella gear at various bottom temperatures.

Set	Date 1965	Time (Greenland standard)	Bank area	Bottom temp. °C	Time fished minutes	Cod catch per hour No.	Cod catch per hour kg	Remarks
238	5 Aug.	0735-0935	N peak of Store Hellefiske Bank	5.27 (24 m)	117	106	152	
241	6 Aug.	1830-2100	S edge of Store Hellefiske Bank	4.98 (29 m)	90	131	278	Temp. at 36 m, 5.2°C
248	9 Aug.	1200-1620	Lille Hellefiske Bank	3.42 (66 m)	205	84	137	Temp. at 75 m, 3.4°C
249	9 Aug.	1925-1955	Banana Bank	1.49 (48 m)	30	2	0.8	Temp. at from 37 to 53 m, 1.5°C
250	9 Aug.	2100-2115	Banana Bank	1.83 (93 m)	15	0	0	Temp. at 70 m, 1.5°C and at 103 m, 1.8°C
252	10 Aug.	0915-0935	Fylla Bank	1.80 (35 m)	20	3	6	Temp. at 43 m, 2.1°C
254	12 Aug.	1920-1940	Fylla Bank	2.20 (40 m)	20	6	9	Temp. at 32 m, 2.5°C
255	12 Aug.	2045-2115	Fylla Bank	1.30 (75 m)	30	14	18	Temp. at 65 m, 1.5°C
270	18 Aug.	0650-0720	Dana Bank	1.19 (51 m)	30	20	60	
271	18 Aug.	0835-1300	Dana Bank	3.49 (60 m) 2.96 (66 m)	268	59	194	Temp. at 77 m, 3.50°C
274	19 Aug.	0623-1132	Dana Bank	3.60 (60 m) 3.34 (60 m)	240	54	253	Temp. at 64 m, 3.74 and 3.64°C
275	19 Aug.	1155-1945	Dana Bank	2.42 (58 m) 3.02 (66 m)	300	54	225	