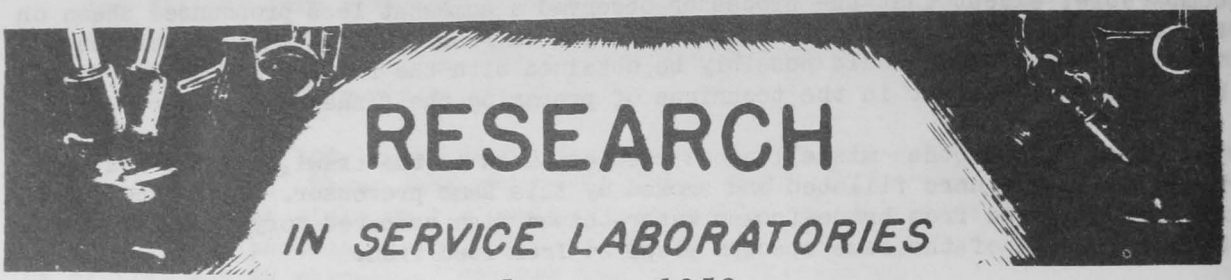

January 1952

COMPOSITION: Composition and Cold-Storage Life of Fresh Water Fish: Data on the composition of ten additional samples of yellow pike are presented in the following table. (Data on the first six samples of yellow pike were presented in the Commercial Fisheries Review, December 1951, vol. 13, no. 12, p. 14.)

Composition of the Edible Portion of Yellow Pike

Sample Number	Length of Fish	Weight of Fish	Fillet Yield	Moisture	Fat	Protein	Ash
	Centimeters	Grams	Percent	Percent	Percent	Percent	Percent
7	41	555	59.0	80.4	0.80	19.0	1.26
8	39	505	53.5	79.5	1.42	19.5	1.17
9	39	492	60.0	80.4	0.84	19.0	1.18
10	42	685	59.0	80.5	1.14	18.7	1.12
11	36	425	57.0	80.6	0.80	19.4	1.31
12	43	845	56.0	80.0	1.16	19.0	1.20
13	47	892	62.0	81.2	1.26	18.7	1.12
14	45.5	970	59.0	79.6	0.78	19.4	1.31
15	48	1100	60.0	80.1	1.28	19.0	1.20
16	52	1400	59.0	80.1	0.79	19.4	1.15

(Seattle).

* * * * *

Freezing Fish at Sea, Defrosting, Filleting, and Refreezing the Fillets: The refrigeration plant of the Service's experimental trawler Delaware was reconditioned and modified in accordance with findings from previous sea trials. The changes consisted of (1) installation of controls to permit regulation of the temperature of the brine in the brine freezer; (2) separation of the ammonia supply leading to the heat exchanger which cools the brine for the brine freezer and the exchanger which cools the coils supplying refrigeration to the fish hold (this allows individual control of the refrigeration for the brine freezer and the refrigerated hold, as necessary); and (3) changes in the coils of the refrigerated hold to permit more efficient flow of the alcohol-type refrigerated medium. A 24-hour test of the equipment, including the freezing of one charge of fish, indicated that the operational characteristics have been markedly improved and the possibility of rupture of the brine cooler tubes has been minimized.

(Boston).

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TECHNICAL NOTE NO. 17--REFRACTIVE INDEX OF FREE OIL IN CANNED SALMON

INTRODUCTION

Data on the refractive index of free oil from cans of each of the five species of salmon are presented in this report. (Data were collected by a U. S. Fish and Wildlife Service laboratory.)

Harrison, Anderson, Pottinger, and Lee (1939) reported that essentially a straight-line relationship exists between the iodine numbers and refractive index values of oils from salmon waste. Their studies reported refractive index values of samples of salmon waste oil, but no samples of oil from cans of salmon were included. As an extension of their studies, the refractive index was determined on oils from samples of canned salmon. It was thought that establishment of the range of refractive index values for the different species of salmon might be of value as a means of identification of salmon in the can. A more certain method of identification can be made by examination of the scales, but this requires special knowledge possessed by very few persons. Furthermore, recently some salmon has been canned without the skin and in such cases no scales would be available for identification. Because of the probability that governmental standards for canned salmon will be set up in the not too distant future, it was thought, also, that publication of the refractive index values on these samples might be of interest.

In 1936 and in 1938 oil samples from 1,469 cans of salmon were examined for refractive index. The values, as reported by Fiedler (1941), are reprinted in table 1.

In 1939 additional refractive index values were obtained on 557 samples of oil from cans of salmon packed in 1938 (table 2)—these data have never been published elsewhere.

Table 1 - Refractive Index of Free Oil in Canned Salmon[1/]

Species	Year of Pack	Number of Samples	Refractive Index		
			Range	Mean	Standard Deviation
Chinook or king	1936	109	1.4693-1.4743	1.47159	0.00101
	1938	77	1.4698-1.4753	1.47178	.00109
Red or sockeye	1936	275	1.4705-1.4768	1.47328	.00104
	1938	225	1.4710-1.4773	1.47475	.00116
Chum or keta	1936	104	1.4720-1.4766	1.47444	.00090
	1938	103	1.4734-1.4771	1.47489	.00068
Silver or coho	1936	125	1.4718-1.4787	1.47584	.00089
	1938	113	1.4744-1.4788	1.47665	.00074
Pink or humpback	1936	186	1.4707-1.4789	1.47634	.00126
	1938	152	1.4750-1.4796	1.47718	.00101

1/DATA IN THIS TABLE ARE REPRINTED FROM FIEDLER, R.H., FISHERY INDUSTRIES OF THE UNITED STATES, 1939, ADMINISTRATIVE REPORT NO. 41 (1941), P. 224.

PROCEDURE

Samples of oil were obtained in most cases by pouring the free oil and liquid into a graduated cylinder and pipeting the oil from the surface layer. Certain single cans of salmon did not contain sufficient free oil to readily recover an adequate sample, and in such cases the liquid contents from two or more cans were combined. The oil was filtered through cotton and the refractive index at 25° C. was determined using an Abbe refractometer.

In table 2 are listed the number of times each refractive index value was found for each of the five species of salmon. Values obtained on oil from more than one can of fish are listed separately with notation as to the number of cans of fish used to collect the sample. Tables 2 and 3 do not include data previously reported by Fiedler (1941).

Table 2 - Distribution of Refractive Index Values of Free Oil from Canned Salmon[1]

Refractive Index Values (25° C.)	Number of Times Refractive Index Value Occurred					Refractive Index Values (25° C.)	Number of Times Refractive Index Value Occurred				
	King or Chinook	Chum or Keta	Red or Sockeye	Coho or Silver	Pink		King or Chinook	Chum or Keta	Red or Sockeye	Coho or Silver	Pink
1.4700	3					1.4750		6; 3[a]; 14[c]	3	3; 1[c]	5
01	-					51		1[c]	-	-	1
02	1					52		5; 3[c]	1	2	3; 2[c]
03	-					53		3[c]	2	1	2; 2[c]
04	2					54		1; 1[c]	3[a]	4	3[c]
05	1					55		1[c]	1	3	1; 2[c]
06	1					56		-	-	2	5; 3[c]
07	1					57		1[c]	2[a]	2	1; 4[c]
08	1					58		1[c]	4; 1[b]	4	7; 5[c]
09	3					59		-	2	4; 1[c]	7; 6[c]
1.4710	3					1.4760		1	2	22; 1[a]; 2[a]	10; 5[c]
11	1					61		-	1	5	10; 3[c]
12	-					62		1	1	6	9; 1[c]
13	1					63		-	-	4	8; 1[c]
14	2					64		-	1	5	4; 2[c]
15	4					65		-	-	1	4; 2[c]
16	-					66		-	1	4	8; 1[c]
17	2					67		2	-	1	5; 2[c]
18	3					68		-	1	6	14; 5[c]
19	1					69		-	-	4; 1[a]; 1[b]	9; 1[c]
1.4720	5					1.4770				4	19; 4[c]
21	3					71				2	8; 1[c]
22	1					72				1	16; 2[c]
23	-					73				-	6
24	1					74				1	7
25	-					75				-	6
26	-					76				1	-
27	-					77				-	14
28	-					78				-	12
29	-					79				-	8
1.4730	-					1.4780					18
31	-					81					8
32	-					82					8
33	-					83					5
34	-					84					5
35	-	-				85					2
36	-	1[c]				86					3
37	-	-				87					1
38	-	-				88					4
39	1	-				89					1
1.4740	-	-	-	-	1	1.4790					3
41	-	1[c]	-	-	-	91					1
42	-	-	-	-	1	92					-
43	-	1[c]	1	-	-	93					-
44						94					1
45	-	1[a]	-	-	-	95					-
46	-	1; 1[a]	1	-	-	96					-
47	-	2[c]	1; 1[a]	-	-	97					1
48	-	1[a]; 3[c]	1[b]	1	-						
49	-	1[c]	1	2	-						

1/ VALUES IN THIS TABLE HAVE NEVER BEEN PUBLISHED BEFORE.
a INDICATES OIL SAMPLE OBTAINED BY COMPOSITING 2 CANS OF SALMON.
b INDICATES OIL SAMPLE OBTAINED BY COMPOSITING 3 CANS OF SALMON.
c INDICATES OIL SAMPLE OBTAINED BY COMPOSITING 12 CANS OF SALMON.
ALL OTHER FIGURES WITHOUT LETTERED SUFFIX ARE FOR OIL SAMPLES OBTAINED FROM SINGLE CANS OF SALMON.
- INDICATES NO DATA AND HAS BEEN INSERTED TO FACILITATE READING.

Table 3 - Summary of Refractive Index Values of Free Oil From Canned Salmon[1/]

Species of Salmon	Number of Individual Cans Examined	Total Number of Samples Examined	Refractive Index at 25° C.		
			Range of Values	Average of Samples From Individual Cans	Weighted Average of Samples From All Cans
King or Chinook (Oncorhynchus tschawytscha)	41	41	1.4700 to 1.4739	1.47137	1.47137
Chum or Keta (O. keta)	17	57	1.4736 to 1.4767	1.47539	1.47500
Red or Sockeye (O. nerka)	24	32	1.4743 to 1.4768	1.47556	1.47475
Coho or Silver (O. kisutch)	95	98	1.4748 to 1.4776	1.47613	1.47602
Pink (O. gorbuscha)	272	329	1.4740 to 1.4797	1.47708	1.47640

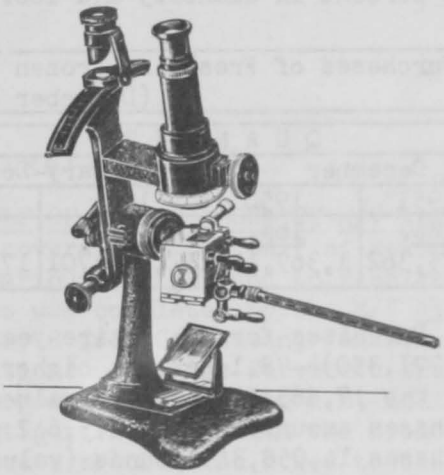
1/DATA IN THIS TABLE HAVE NEVER BEEN PUBLISHED BEFORE.

DISCUSSION OF DATA

King or chinook salmon is the only species for which there is a marked difference in refractive index from the other species. In this series, the refractive index of the oil from only 1 of the 41 samples of this species tested overlapped values for another species. Refractive index values of samples of all the other species showed extensive overlapping.

Table 3 shows the average and range of refractive index values for the five species of salmon. Average values for each species are presented separately: (1) for samples of oil taken from individual cans only and (2) for all samples.

In the latter case, the averages were calculated on a weighted basis; that is, a sample from 12 cans was weighted by a factor of 12, a sample from 3 cans by a factor of 3, etc.



REFRACTOMETER USED FOR DETERMINING REFRACTIVE INDEX OF FREE OIL IN CANNED SALMON.

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