SUMMARY

The study of the acidic polysaccharides from *K. scleromatis* and *K. ozaenae* in a centrifugal field has made it possible to regard them as polydisperse homogeneous substances with differing molecular masses and has permitted the shape of the molecules entering into their composition to be estimated.

LITERATURE CITED

1. Y. Eriksen and S. D. Henriksen, Acta Pathol. Mikrobiol. Scandinav., 52, 163 (1961).
2. A. P. Krasil'nikov, M. D. Myakinnikova, and I. A. Krylov, Ozena [in Russian], Minsk (1974), p. 128.
3. S. Claesson and I. Moring-Claesson, "Ultracentrifugation," in: Analytical Methods in Protein Chemistry [in Russian], Moscow (1963), p. 218.
4. H. K. Schachman, Ultracentrifugation in Biochemistry, Academic Press, New York (1959).
5. G. G. Elias, Ultrazentrifugen-Methoden, Beckman Instruments, GMbH, Munich (1961).

FATTY ACID COMPOSITION OF THE LIPIDS OF WHITEFISH OF THE OB BASIN. II. INFLUENCE OF LOCALIZATION ON THE COMPOSITION OF TOTAL AND NEUTRAL LIPIDS

V. N. Ushkalova, N. A. Artamonova,
N. M. Storozhok, and M. I. Goryaev

UDC 547.915+665.213

The composition of methyl esters of the fatty acids of the total and neutral lipids from the viscera, dark muscles, and brain of pelyads from the water bodies of the Ob basin have been studied by gas-liquid chromatography in comparison with the fatty acid composition of the total lipids of the light muscles. In all the lipids, 29 acids were detected and 27 were identified, six of which made up 75 to 79% of the total. It has been shown that the uniqueness of the total lipids of the viscera and dark muscles is due to a high content of eicosapentaenoic acid, while the brain lipids are distinguished by a high palmitic acid content. In the neutral lipids, regardless of their localization, the concentration of polyenes falls and the concentration of monoenes rises.

There is extremely little information in the literature on the dependence of the fatty acid composition of fish lipids on their localization in the body of the fish, although this is of interest not only for physiologists but also for technologists. It is obvious that the fatty acid composition of the lipids must depend on their localization. There are descriptions of quantitative differences in the fatty acid composition of the dark and light muscles of the tunny [1] and of two species of hake [2]. Drozdowski et al. [3] have given the results of an investigation of the fatty acid compositions of the lipids of the muscular tissue, head with skin, backbone with fins, and viscera. All these workers found differences in the amounts of palmitic, stearic, oleic, eicosenoic, docosenoic, and docosahexaenoic acids.

Our aim was to show the dependence of the fatty acid composition of the lipids of the whitefish *Coregonus peled* (Gmelin) on their localization. The whitefish belongs to the fatty fish [4], and therefore the bulk of its lipids consists of "depot" lipids. The fatty acid compositions of the lipids of the dark muscles, the brain, the internal fatty tissues, and the lipids of the light muscles were studied by gas-liquid chromatography. The results are given in Table 1.

Tyumen State Medical Institute. Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 428-430, July-August, 1982. Original article submitted October 26, 1981.

 0009-3130/82/1804-0394$07.50

TABLE 1. Fatty Acid Composition of Whitefish Lipids

Index	Localization, percentage amount						
	light muscles	viscera		brain		dark muscle	
		total	neutral	total	neutral	total	neutral
10 : 0	0 10	0,05	0.06	0,05	0,03	0,10	0,06
12 : 0	0 09	0,06	0,05	0,03	0,02	0,09	0,03
12 : 1	0,03	0.05	0,04	0,06	0,01	0 04	0,03
13 : 0	0,01	0.05	0.02	0,03	0,01	0.09	0.04
13 : 1	0,04	0,01	0,01	0;06	0.02	0 10	0;01
14 : 0	3.60	2,80	1,70	3.10	2,20	3.70	3,30
14 : 1	0.40	0,20	0,40	0,20	0,50	0.60	0,70
14 : 2	1.90	1,10	0,40	0.60	0 50	1,80	0,70
15 : 0	0,00	0,50	0,20	0 60	0,40	0,20	0,80
15 : 1	0.20	0,02	0,08	0,10	0,10	0.09	0,20
16 : 0	16.00	19,10	20,10	31.80	26,40	17,80	25,70
16 : 1	16,80	9 30	15,50	15 40	15,50	11,60	14,90
16 : 2	0.90	0,50	0,40	2,00	0.50	1.20	0,40
16 : 3	1,50	0,90	0,30	1,90	0,40	0.90	0,30
17 : 0	1,00	1,20	0,20	0,30	0,30	0,50	0.20
17 : 1	0 80	0,60	0.20	0,50	0 20	0,20	0.30
18 : 0	1 60	1.80	1,40	1,10	1,30	2,50	1,20
18 : 1	18.90	26,60	41,40	22,20	31.20	27 60	37,20
18 : 2	3,80	2,40	1,90	2,90	2,80	1,80	1,30
18 : 3	9.40	6,30	5,40	6,10	6,20	5.70	3,20
18 : 4	11.20	6.40	6.30	3.90	3,90	4,50	2,20
20 : 1	0 80	0,50	0,20	0,90	0,50	0.20	0,30
20 : 2	0 10	0,30	0.20	0,50	0.50	0,40	0.30
20 : 3	1.30	1,90	0,40	0,60	1,00	1,60	0.50
20 : 4	1.70	2,80	0,50	0,50	0,50	0,90	0.50
20 : 5	7,30	10,80	0,20	1.80	2.00	10,90	1,50
21 : 5	0.30	0,20	0.20	0,30	0,80	0,90	0,50
22 : 5	0,90	0,90	0,70	1,00	1,20	1,30	1,50
22 : 6	1,90	1.90	1,60	1,50	1.20	2,70	2.10
Total saturated	25,10	25,56	23.70	37.00	30,60	24,98	31,30
Total monoenoic	31.87	37,28	58.20	39,40	48 30	40.23	54,30
Total polyenoic	42.70	36,40	18,10	23,60	21,00	34,80	14,30

Analysis of the figures in the table shows that only the quantitative amount of the same set of fatty acids varies according to localization. The most substantial quantitative differences are observed among the macrocomponents. In the lipids of the viscera (iodine No. 161.1) the amount of monoenoic acids were highest, and the concentration of polyenoic acids the lowest. A feature of the fatty acid composition of the lipids of the viscera is the high eicosapentaenoic acid content.

In the lipids of the dark muscle (iodine No. 153.1), the concentration of oleic and of penta- and hexenoic acids is increased and the amount of linoleic, linolenic, and octadecatetraenoic acids is diminished. The lipids of the dark muscles are characterized by a greater content of pentaenoic acids than the lipids of the other sites of localization.

The lipids of the brain (iodine No. 107.2) differ most substantially from the lipids of the other parts of the whitefish. The difference consists in a higher content of palmitic, palmitoleic, and oleic acids and a marked decrease in the amount of polyunsaturated acids: linolenic, octadecatetraenoic, and, particularly, docosapentaenoic. The brain lipids are characterized by the lowest amount of polyenoic acids.

As compared with the total lipids, the neutral lipids of the viscera contain a higher amount of palmitoleic and oleic acids and a lower concentration of myristic, eicosatetraenoic, and eicosapentaenoic acids, the amounts of all the other polyunsaturated acids being slightly diminished.

The smallest differences between the total and neutral lipids were found in the brain lipids. In them the amounts of the main macrocomponents do not change. There are more substantial differences in the concentrations of only two acids: palmitic and oleic. In the total material, the amount of saturated, polyenoic, and di- and trienoic acids falls slightly and the amount of monoenoic and tetraenoic acids rises. It is obvious that the mono- and tetraenoic acids are the most specific components of the neutral lipids.

The neutral lipids of the red muscles are characterized by a high content of palmitic and oleic acids and a low concentration of linoleic, octadecatetraenoic, eicosatrienoic, and particularly eicosatetraenoic acids. On the whole, in the neutral lipids of the red muscles the amount of saturated and monoenoic acids has risen and the amount of polyenoic acids has fallen considerably.

EXPERIMENTAL

The characteristics of the material, the method of taking the samples, the extraction of the lipids, transesterification, and the purification of the esters, the isolation of the neutral lipids, and the conditions of chromatography and identification have been described previously.

SUMMARY

1. Differences have been detected in the concentrations of individual components of the fatty acids in the lipids localized in different sites of the whitefish.

2. It has been established that the highest degree of unsaturation is possessed by the lipids of the internal fatty tissues, while the brain lipids are the most saturated.

3. In the neutral lipids of all parts the amounts of monoenoic acids rises and the amount of polyenoic acids falls.

LITERATURE CITED

1. E. H. Gruger, R. W. Nelson, and M. E. Stansby, J. Am. Oil Chem. Soc., 41, 662 (1964).
2. I. P. Wessels and A. A. Spark, J. Sci. Food. Agr., 24, 1359 (1973).
3. B. Drozdowski and H. Wiewiadowski, Pr. Mor. Inst., Ÿdyne, 15, 131 (1970).
4. K. A. Altuf'eva, O. M. Sokolova, and V. N. Ushkalova, Rybnoe Khozyaistvo, 5, 64 (1970).

STEREOSPECIFIC ANALYSIS OF THE TRIACYLGLYCEROLS OF COTTONSEED OIL

S. G. Yunusova, S. D. Gusakova, and A. U. Umarov

UDC 547.915:665.31

A stereospecific analysis has been made of the triacylglycerols of cottonseed oil, as a result of which it has been established that the saturated and 16:1 acids mainly occupy the sn-1 position, while 18:1 and 18:2 acids esterify the sn-2 and sn-3 positions of the triacylglycerides to equal extents.

The physiological action and nutritional value of an oil and also its stability in the processes of treatment and storage depend not only on the type and amount of the constituent fatty acids but also on the positions of the acids in the molecules of the triacylglycerols (TAGs).

The study of the structure of TAGs by lipase hydrolysis has permitted definite laws in the distribution of fatty acids in position 2 of the glycerol residue to be established [1]. The calculation of all the types of TAGs by this method assumes the equivalence of the positions of 1 and 3 with respect to the fatty acid composition, which is not always in harmony with the results obtained by other methods. Thus, the stereospecific analysis of some plant oils has shown that the distribution of the acids between the positions 1 and 3 in the TAG molecule does not bear a random nature in many cases and takes place in such a

Institute of the Chemistry of Plant Substances, Academy of Sciences of Uzbek SSR, Tashkent.

Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 430-433, July-August, 1982. Original article submitted October 26, 1981.

0009-3130/82/1804-0396$07.50