

Relative Enrichment of Furan-containing Fatty Acids in the Liver of Starving Cod

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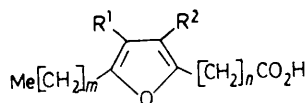
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Summary Furan-containing fatty acids, which occur widely at a low level in fish lipids, become dominant in the liver lipids of starving cod.

A FATTY acid (**1**) containing the furan ring system was first isolated from a seed oil¹ and subsequently synthesised.^{2,3} Some isomers of (**1**) and the C₁₇ acid (**2**) have also been prepared^{3,4}

More recently and perhaps more significantly, Glass *et al.*⁵ reported the presence of a series of long-chain furan acids (3)—(10) in several tissues of the Northern Pike



	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
R ¹	H	H	Me	H	Me	Me	H	Me	H	Me
R ²	H	H	Me	Me	Me	Me	Me	Me	Me	Me
m	5	4	2	4	4	2	4	4	4	4
n	7	7	8	8	8	10	10	10	12	12

(*Esox lucius*). They claim that these acids, of which (8) is the major component, are more common in fresh water fish than in sea water fish, in male rather than in female members, and tend to concentrate in the cholesterol esters. The high content (92%) of furan acids in the cholesterol esters from a male liver is particularly noteworthy.

Two of us (R.C.W. and F.D.G.) have developed an analytical procedure based on urea crystallisation and silver ion t.l.c. which has enabled us to establish the presence of furan acids such as (3)—(10) and some new members in the total liver lipids of several fish of both fresh and sea water origin. The esters have been identified by g.l.c.—mass spectrometry. We have examined the following fish liver oils and find total furan acids in the approximate amounts shown: cod (1%), dog fish (1%), powan (1% in the male and

2% in the female), male roach (4%), salmon (2%), and salmon cholesterol esters (5%). In the samples available to us, furan acids amounted to <0.5% in capelin oil and in the liver oils of sea trout (male and female), brown trout (male and female), and perch (female). The C₂₂ acid (8) is dominant among the furan acids followed usually by (4), (6), and (7); the remainder are minor components.

The results with cod liver oil are of special interest in view of the independent study (by D.R. and R.M.L.) of cod liver lipids during starvation. The extracted lipids are then increasingly cholesterol esters and the total lipid contains furan acids at a much higher level with two components (8) (27%) and (6) (7%) predominant among the total acids in a fish starved for five months. The furan acids increase in concentration during the period of starvation and the proportion of these acids is linked to the degree of starvation rather than to the sex of the fish. Differing aspects of this work are being continued in each laboratory and will be reported independently.

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