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A Preliminary Note on the Biosynthesis of Octadeca-9,12-dienoic

Acid (Linoleic Acid) from cis-2-Octenoic Acid.

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1-C¹⁴-cis-2-octenoic acid was prepared from 1-heptyne (Knight and Diamond, 1959), and fed to a laying hen. The linoleic acid, isolated from subsequent eggs as the tetra-bromide as well as by preparative gas-liquid chromatography, had an activity of 91,140 dpm/mole. It was demonstrated that the isolated acid was, in fact, octadeca-9,12-dienoic by identification of the products of oxidation, caproic and azelaic acids and 3 moles of CO₂. The acids were identified and isolated by gas-liquid chromatography. There was no radioactivity in the isolated caproic acid moiety, but the azelaic fraction had an activity of 43,416 dpm/mole. This is equivalent to 8,687 dpm/mole for the number 1,3,5,7 and 9 carbon atoms, assuming that they were the only active atoms. By calculation the number 11 carbon atom, the original labeled acid of the 1-C¹⁴-2-octenoic acid, had 47,724 dpm/mole.

A second aliquot of the linoleic acid was oxidized with permanganate in acetic acid, and the number 10, 11, and 12 carbon atoms were isolated as Ba C¹⁴O₃. The radioactivity of these 3 carbons was 12,569 dpm/mole, or 37,708 dpm/mole for the carbon number 11 in contrast to the 47,724 dpm/mole obtained by difference. Thus, carbon number 11 had between 4.4 and 5.4 times the activity of the carbons in the proximal end of the molecule. The latter activity presumably arose

from β -oxidation of some of the 1-C¹⁴-2-octenoic acid and from some 1-C¹⁴-octanoic and 1-C¹⁴ octynoic acid contaminants.

The number 1 and 9 carbon atoms of the azelaic acid isolated as benzoic acid by Dauben degradation (Dauben et al 1953) had an activity of 8616 dpm/mole, which compares favorably with that as calculated above. The number 2 and 8 carbon atoms had no activity, which demonstrated that the 10 proximal carbons were added to the 1-C¹⁴-cis-2-octenoic acid after partial β -oxidation of some of the 1-C¹⁴-cis-2-octenoic, octanoic and octynoic acids.

It is concluded that the 1-C¹⁴-cis-2-octenoic acid was extended into octadeca-9,12-dienoic acid by the hen.

REFERENCES

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