CLXXXV. FATTY ACIDS FROM THE LARVA-FAT OF THE BEETLE *PACHYMERUS DACTRIS* L.

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WHEN the nuts of *Manicaria saccifera* Gaertn. [Collin, 1933] were being prepared for extraction, many of the kernels were found to contain living grubs, which were identified as the larvae of the beetle *Pachymerus dactris* Linn. This insect has also been found in the kernels of the cohune nut (*Attalea cohune*) and is a common pest of these species [Hilditch and Vidyarthi, 1928]. The larvae had eaten all the fat-bearing endosperm, and in some cases had undergone metamorphosis into the beetles, which were boring their way through the hard shell of the nut. The fat from the larvae was extracted and obtained in sufficient quantity for a rudimentary analysis by the ester-fractionation method.

8.5 g. of semi-solid fat were obtained from 53 larvae (18 g.) by soaking them in acetone, drying, extracting with low-boiling petroleum and combining the acetone and petroleum extracts. This had saponification equivalent 260.7, iodine value 37.4 and acid number 3.2, and was analysed in the usual way by distilling the methyl esters of the "liquid" and "solid" acids (obtained by lead salt separation) from a 50 cc. flask with column into small receivers carried on a rotating support inside a vacuum desiccator. The quantities dealt with were so small that the accuracy of the analysis is not of a very high order.

The acids were separated into "solid" acids (57.5 %, iodine value 3.0) and "liquid" acids (42.5 %, iodine value 70.9): the calculated approximate composition of the mixed esters is given below:

								Esters % by weight
Lauric	...	...	...	...	...	...	...	24
Myristic	...	...	...	...	...	...	...	21
Palmitic	...	...	...	...	...	...	...	8
Oleic	...	...	...	...	...	...	...	32
Linoleic	...	...	...	...	...	...	...	3
Stearic, oleic or linoleic (present in residual fractions)								12

Comparing these figures with those for the kernel fat of *Manicaria saccifera* [Collin, 1933], it appears that the acids of lower molecular weight (of which lauric acid is the chief) are present in the larva-fat in only about half the amount in which they occur in the kernel-fat, while oleic and linoleic acids probably form about 40 % of the mixed acids in the larva-fat, as compared with only 11 % in the kernel-fat. This rather suggests that the insect has derived its fat partly by direct assimilation of the preformed vegetable fat, and partly by synthesis from carbohydrate (or other non-fatty) components of the kernel. If this be the case, it would appear that the development of fat in insects may follow a course not very different from that which takes place in the larger land vertebrates, such as the pig.

Unfortunately there is little information in the literature on insect fats. The cocoon of the silkworm, *Bombyx mori* Linn., contains about 25 % of fat

consisting of mixed glycerides of palmitic, oleic, linoleic and linolenic acids, and the mixed fatty acids include about 25 % of saturated (palmitic and stearic) with about 22 % oleic, 38 % linoleic and 15 % linolenic acids [Tsujiimoto, 1908; 1916; Suzuki and Yokoyama, 1928]. The only other instances of larva-fats are those from two insects of unknown origin [Desvergnès, 1920], the mixed acids of which had a mean molecular weight of 263-269 and contained unsaturated acids (50-60 %) with iodine values of 140 and 95. The general characteristics of a few fats of insects belonging to the Coleoptera, Diptera and Orthoptera have been reported, from which it appears that the major components are oleic and linoleic acids and that, although palmitic acid is probably also present, acids of lower molecular weight are absent. An exception to this statement is, however, found in the fat of *Pemphigus* species (Aphidae), the acids of which are reported by Schultz [1922] to have a mean molecular weight of 218 and to include butyric, caprylic and lauric as well as palmitic acids.

On the whole, it seems likely that insects, in the larval as well as mature state, lay down fats somewhat similar in type to those produced by mammals, and that, like the latter, they can assimilate fats present in their diet and also synthesise fat from other constituents of the food. More complete study of insect fats than has hitherto been made might well be of interest from a biochemical standpoint.

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