Organic Body Constituents of *Protophormia terrae-novae* (Dipt.) from Spitsbergen Compared with Flies from a Laboratory Stock

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**Summary.** Main storage substances in blowflies from Spitsbergen are protein (313.9 mg/g d.w.) and lipids (365.1 mg/g). Laboratory stock individuals (30°C) on the contrary, do not accumulate such quantities of lipids but have low-molecular carbohydrates for their main organic constituent. Mean caloric values range from 5.41 to 5.73 kcal/g dry weight in Spitsbergen species, but reach only 4.52 kcal/g in laboratory cultured *Protophormia*. Results are discussed in relation to the effect of biotop conditions on the calorific value of flies and their importance as food quality.

**Introduction**

During studies of metabolism in different insects, spiders and crayfish, temperature induced accumulations of protein, lipids and polysaccharides have been found by Collatz (1969, 1973), Hoffmann (1973) and Teckelmann (1974). At low adaptation temperatures (AT) of 2–10°C (corresponding to autumn and winter temperature conditions) for example a storage of fat reserve materials is observable as against AT 20–35°C, and leads to an increase in total lipids of about 200% in *Orconectes limosus* and juvenile *Gammarus fossarum*, 70–150% in adult amphipods and *Gryllus bimaculatus* and around 100% in *Tegenaria atrica*. Temperature dependent changes in lipid contents are mostly attended by alterations in the saturation pattern of fatty acids (Root, 1968; Hoffmann and Stockmeier, 1975).

A speed-up in metabolism at high temperatures on the other side is accompanied by a definite increase of low-molecular substances in the intermediary metabolite fraction (Collatz, 1973), preferably in very active arthropods. *Protophormia terrae-novae* may be considered as such an activ insect and depends on a regular food consumption (Collatz and Speck, 1970).

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It was of high interest therefore, to compare the chemical composition of flies, cultured in a laboratory at 30°C with individuals of the same species from Spitsbergen, an area with low temperatures, poor digestibility of food (Remmert, 1972; Schramm, 1972) and unfavourable conditions for flight activity.

Material and Methods

Adults of *Protophormia terraenovae*, Empididae (*Rhamphomyia caudata*) and different other Brachycerae have been captured in summer 1973 near Longyearbyen, Spitsbergen. The separation process is given in Collatz (1973). Identification and quantitative determination of fatty acids were conducted by GLC analyses (Hoffmann and Stockmeier, 1975). Caloric values have been calculated from the energy values of protein, lipids and carbohydrates. No significant differences in body size could be found between adult laboratory flies (12.24 mg d.w./individual) and Spitsbergen *Protophormia* (13.59 ± 2.52 mg/individual).

Results and Discussion

Results are presented in Figure 1a and b and Table 1. Concentrations of total lipids, protein and ninhydrin-positive substances are highest in flies from Spitsbergen. No significant differences are obtained between the different Spitsbergen species. A laboratory stock (AT 30°C) of *Protophormia* on the contrary shows 10–45% less protein and lipids, but 2–4 times higher concentrations of low-molecular carbohydrates. No differences could be found in the degree of saturation (Hoffmann and Stockmeier, 1975) for fatty acids of total lipids between Spitsbergen and warm cultured flies. Temperature influenceable phospholipids

![Graph](image-url)