CALORIC VALUE AND ASH CONTENT IN RELATION TO BODY LENGTH AND DRY WEIGHT OF *PORCELLIO SPINICORNIS* SAY (ISOPODA, PORCELLIONIDAE)

BY

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INTRODUCTION

Isopods have been used as analog models of saprophagous terrestrial arthropods to establish quantitative relationships between energy turnover rates, food consumption, and metabolism of forest cryptozoans (Reichle, 1965, 1967). As a consequence, information on the caloric value and ash content in relation to body length and dry weight would be useful in the calculation of the energy budget of the isopod.

The purpose of this report is to present data on the caloric equivalence, the ash content, the total body weight and the dry weight of the common north ontarian woodlouse. *Porcellio spinicornis* Say, 1818.

MATERIALS AND METHODS

*Porcellio spinicornis* adult females (7th/8th growth-stages) were drawn from a stock colony, maintained on pieces of carrots, in a glass tank at 20°C (± 2°C), 85-100% r.h., and somewhat irregular light-darkness cycle of LD 10:14 (0800-1800 hours, five days a week). The progeny of these females formed a single nymph-pool from which experimental animals were obtained. Growth-stage of the isopod was determined by the criterion of Alikhan (1972).

Plastic petri-dishes, lined with filter paper, each containing ten nymphs (approximately of 4th growth-stage), were placed inside incubators at 20°C (± 2°C). Illumination was provided by fluorescent tubes, programmed to maintain a 16-h photophase. Relative humidity varied between 85-100%.

The increase in the body length (head to uropod) was measured with the aid of a vernier caliper every third day for 132 days. Fresh weight determinations were made at each body-length-measurement time and converted to dry weights, using dry weight (for 24 hours at 50°C) to fresh weight ratios calculated for thirty individuals. Caloric equivalences of isopods were determined with a Parr adiabatic oxygen bomb calorimeter. With the bomb calorimeter used, approximately 300 mg of isopod dry tissue weight was re-
quired to obtain a measurable rise in temperature. The experimental colony could not at any time supply such a large number of animals to make up the sample. Furthermore, preliminary studies showed that isopod dried tissues did not give a complete burn. Both problems were solved by the addition of equal amounts (1:1 by weight) of benzoic acid to the isopod tissue. Caloric equivalences, for comparison sake, are expressed on both oven-dry and ash-free weight basis.

The ash contents of the isopod body tissue were determined by the weight-loss-on-ignition method of Stewart et al. (1974). Percentage ash contents were calculated as

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\text{Ash percentage} = \frac{\text{Ash weight (mg)}}{\text{Dry wt of isopod (mg)}} \times 100
\]

Student’s t-test was employed to determine the significance of differences between mean expressions.

RESULTS

A. Fresh and dry weight ratio

The relationship between the fresh and the dry weights of the isopod is presented in fig. 1. The females in general were significantly \((P<0.05)\) heavier than the males. In males, the fresh weight ranged from 54.9 mg to 62.1 mg (mean fresh weight = 58.1 mg), and the dry weight from 17.3 mg to 19.5 mg (mean dry weight = 19.2 mg). In females, the fresh weight varied from 56.9 mg to 118.4 mg (mean fresh weight = 79.8 mg), and the dry weight from 17.5 mg to 38.9 mg (mean dry weight = 29.3 mg). On the average, the dry weight amounted to about 32 per cent of the fresh live weight of the isopod.

B. Growth rate

The data on the increase in the body length (head to uropod) in Porcellio spinicornis over the experimental period of 132 days are summarized in table I. In a 9.96 mm female, the increase in the body length averaged 0.0079 \((\pm 0.0004)\) mm/day, while in a 10.1 mm long male it averaged 0.0069 \((\pm 0.0006)\) mm/day.

C. Body length and dry weight

The relationship between the total body length (head to uropod) and the dry weight of Porcellio spinicornis, based on observations on 15 males and 15 females, is depicted in fig. 2. As it is shown in the graph, there was an exponential relationship between the total body length and the dry weight of the isopods.

D. Caloric value

The data on the caloric equivalents of the experimental isopods are summarized in table II and III. The mean caloric value in the 7th growth-stage