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THE EFFECT OF STORAGE ON THE ENERGY VALUES OF SOME PLANT AND ANIMAL MATERIAL

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Both plant and animal tissues were stored for extended periods of time to determine the effect on energy value. Animal tissues were found to have significantly lower calorific content after 7 to 10 mo storage in covered petri dishes at -15°C, but significant differences were not detected in the energy values of plant tissue after storage for 1 yr in a desiccator at 20°C.

Introduction

Recent literature is replete with data on the energy content of ecological material (see Cummins & Wuycheck 1971), but to date there appears to be no information about the effect of storage on such determinations. Parr Manufacturing Co. (cited in Paine 1971) recommends a period not exceeding 30 days between collection and combustion; however, no empirical evidence to support this is presented. Because time limitations may prevent ecologists from processing their material this rapidly, baseline data on the effects of prolonged storage on the energy value are needed. This note is a report of such data.

Materials and Methods

The energy values of isopod tissue *(Idotea baltica)* and blueberries *(Vaccinium & Cyanococcus)* collected at various times of the year were determined by microbomb calorimetry following methods outlined elsewhere (Strong & Daborn 1978). Carbonate corrections were not necessary for blueberrs tissue and all energy values are expressed as J/mg-dry weight**. Both isopods and blueberries were stored as pellets, the former at -15°C in loosely covered petri dishes for 7 to 10 months, and the latter in a desiccator at 20°C for 12 months. Consequently it cannot be assumed that the isopod tissue remained dry during storage. The statistical significance of the changes in mean energy value was examined with a Student's *t*-test.

Results and Discussion

The results are presented in Table I. The isopod tissue decreased in energy value as a result of storage (mean change -4.56%), whereas the energy value of the blueberry tissue showed no significant change following storage (mean change 0.72%).

The change in mean energy value between stored and fresh isopod tissue is more than can be tolerated for replicate pellets (Golley 1961), and in some cases may exceed the correction for endothermy (Paine 1966). This change is probably attributable to partial hydrolysis or oxidation of the highly reduced fatty acids, as neither 0_2 nor H_2O were totally excluded from the petri dishes containing the

**1J = 0.239 cal.

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TABLE I. Energy value of some ecological material before and after storage

Material Combusted		Energy Value ± 1 SD Before Storage (J/mg-dry wt)	n	Energy Value ± 1 SD After Storage (J/mg-dry wt)	n	%Change	Method of Storage	Length of Storage	Result of *t*-test on Means *t*-value	Significance
Isopod *(Idotea baltica)*	1	15.168 ± 0.188	4	14.887 ± 0.360	4	-1.85	freeze at -15°C	9 mo	1.38	n.s.[1]
	2	12.762 ± 0.109	4	12.018 ± 0.288	4	-5.83	in covered petri	7 mo	10.62	p 0.005
	3	12.352 ± 0.117	4	12.005 ± 0.192	4	-2.81	dishes	7 mo	3.09	p 0.05
	4	14.419 ± 0.172	4	13.302 ± 0.218	4	-7.75		10 mo	8.05	p 0.005
Blueberry *(Vaccinium ϕ Cyanococcus)*	1	17.389 ± 0.255	8	17.623 ± 0.192	4	1.35	desiccator at 20 °C	12 mo	1.78	n.s.
	2	17.088 ± 0.222	9	16.929 ± 0.105	3	-0.93		12 mo	1.66	n.s.
	3	17.234 ± 0.322	10	17.535 ± 0.673	3	1.75		12 mo	0.75	n.s

[1] not significantly different ($p > 0.05$)

pelleted material (A. Dick, in verb.). Therefore, prolonged freeze storage of animal tissue must be considered a potential source of error in routine bomb calorimetry.

The lack of a significant change in energy content of blueberries is not surprising. Except for the seeds, blueberries are predominantly carbohydrate (Hall et al. 1971). Because carbohydrates are highly oxidized in comparison to lipids, and because free H_2O was excluded during storage, it is highly unlikely that any appreciable loss of energy would be associated with storage of blueberry tissue.

In conclusion, freeze-stored animal tissue cannot be assumed to have remained unchanged in energy content. More research, however, is required to determine the total effect of type and duration of storage on the energy content of different ecological materials.

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