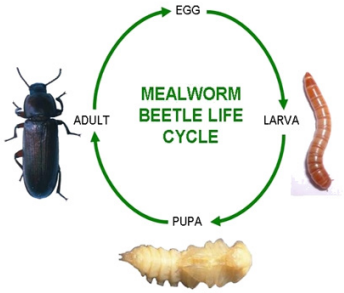
Metabolism of mealworms monitored by microcalorimetry

INTRODUCTION

Mealworms are the larva of the mealworm beetle. The mealworm beetles go through four life-stages: egg, larva, pupa, and adult. Mealworms are food for other animals and are sold at pet stores to feed pet reptiles and birds. Worms like other living organisms generate heat when they move and consume nutrients. These result in heat flow measured by a calorimeter.

EXPERIMENT

The Setaram MICROCALVET ULTRA used in the study is a very sensitive calorimeter which is capable of measuring heat flow above a few microwatts and is well suited for probing metabolism of small animals. Four or one meal worms are placed in the standard stainless steel cell of about 1ml.



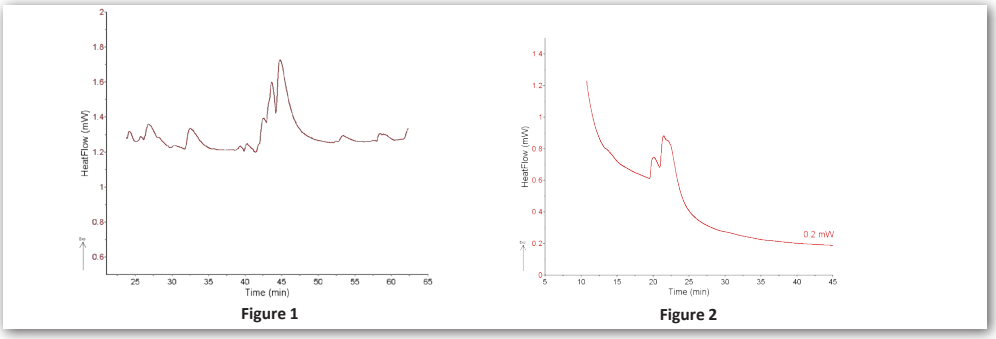


Figure 1 Figure 2

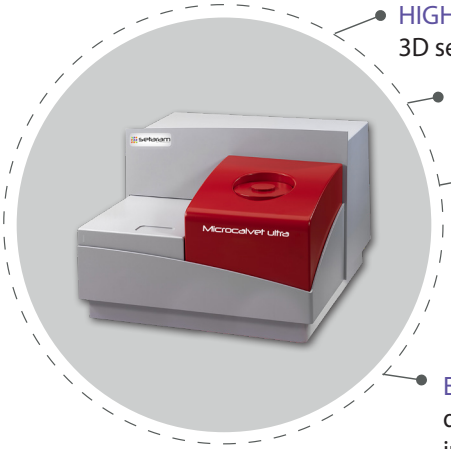
RESULTS AND CONCLUSION

Figure 1 shows the metabolic rate as a near constant level plus peaks, likely due to activity or motion of the mealworms in the vessel. Figure 2, in comparison, shows diminishing activity of the meal worms deprived of oxygen and nutrients as decreasing heat flow which in turn levels off after 2 hours .
These two curves clearly show that high sensitivity calorimetry is a very powerful technique to characterize the metabolism of living species in various environmental conditions (atmosphere, pollution, food, light…)

INSTRUMENT

MICROCALVET ULTRA

-20 to 170°C



HIGHEST HEAT MEASUREMENT ACCURACY
3D sensor based on Peltier elements with Joule effect calibration.

MODIFIABLE TEMPERATURE CONDITIONS
for increased flexibility and replication of real life conditions.

CONVENIENT INTERCHANGEABLE CRUCIBLES AND CELLS
to perform even the most demanding experiments using one instrument :
- high pressure (1000bar) and high vacuum
- pressure measurement and control
- mixing experiment

EXTERNAL COUPLING CAPABILITY
designed to increase your research options including manometry, BET instrumentation, gas analyzers, humidity controllers and gas panels

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