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Inexpensive Apparatus for Measuring Respiration and Photosynthesis Based on CO₂

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Abstract

This workshop presents a modification of a previous ABLE workshop (Winnett-Murray et al. 2000) that involved a comparison of the metabolic rates of an ectotherm (lizard) and an endotherm (mouse) at various temperatures. They sampled gases over time from closed containers containing the organisms. In our modification of this lab exercise, students monitor respiration continuously in a closed, circulating system, using a CO₂ sensor, an analog to digital interface (Lab Pro**), and a laptop computer running Logger Pro software**. Students are able to work in groups of 3 because each setup is relatively inexpensive. CO₂ sensors are usually based on infrared light absorption, and tend to be expensive, ranging from \$1000 on up. However, Vernier** has a CO₂ sensor for about \$250 that has a sensitivity of + 20 ppm, which is quite adequate for educational use. With some modifications, this sensor can be built into a closed, circulating system to accurately monitor respiration of a single cricket in as little as 5-10 minutes. By simply switching chambers, the same apparatus and software can be used to monitor photosynthesis in a subsequent lab exercise.

Winnett-Murray, K., K. G. Murray, L. Hertel, and C. C. Barney. 2000. Energetic strategies of terrestrial vertebrates. Pages 356-379, in *Tested studies for laboratory teaching*, Volume 21 (S. J. Karcher, Editor). *Proceedings of the 21st Workshop/Conference of the Association for Biology Laboratory Education (ABLE)*, 509 pages.

**Both the Lab Pro interface and Logger Pro software are available from Vernier Software and Technology, www.vernier.com