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* Fellow of the Commonwealth Fund of New York. Present address: Department of Zoology, Sheffield University, England.

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Differentiation of Activity of Three Mouse Strains with Magnetic Pickup Apparatus

Abstract. An activity pickup, when used with a high-gain amplifier, permits records to be made of essentially all the activity of a mouse. The sensitivity is such that the differences in the activity patterns of strains of mice can be determined.

When the activity of small animals is appraised, the animal is usually required to cause movement of a relatively large mass, most commonly a pan or an entire cage, which is then connected to a recording device of some sort (*1*). Problems frequently encountered in such apparatus are incomplete recording of activity, artifacts due to resonance, and feedback to the animal due to pan or cage inertia and noise in the recording apparatus.

The apparatus described in this report (*2*) apparently circumvents all these difficulties. The activity pickup employs the principle of movements of a small iron plate which induces electric current in a coil with a bar magnet core. The currents thus produced are amplified electronically and recorded as activity.

Figure 1 shows the apparatus schematically. Movements of the mouse or other small animal cause micromovements of the galvanized iron plate *A*. Magnetic lines of force flowing between the poles of the magnet *NS* are altered by the movement of the plate, and thus current proportional to the movement is induced in the windings; the current is fed (*C*) to a preamplifier, amplifier, and recorder. Specifications are as follows: *A*, galvanized iron plate, 22 gauge, 3 by 4 in.; *B*, latex tubing, ½ in., ¼ in. I.D., cemented to the plate by rubber-to-metal cement. *NS*, 3-in. bar magnet wound with one layer of magnet wire. The specifications are for a mouse apparatus; with slight changes the apparatus could be adapted to larger or smaller animals. A Grass EEG machine was used for amplification and recording.

The plate is doubly damped, by the latex tubing and the attraction of the magnet, and resonance is kept to a minimum without friction. Use of larger plates tended to cause resonance. Three such plates were used, the leads being connected in parallel. For multiple-plate recording, adjacent magnets should be arranged with like polarity (or repulsion) for maximum sensitivity. Clear plastic walls of dimensions that allow 1/16-in. clearance of the plates act as the cage and permit observation of the mouse. All exposed wire is covered with rubber tubing to protect it from urine. The plate is built up to allow ½-in. clearance between the magnet and the plate. The apparatus is mounted on firmly damped ¼-in. mesh screening material.

Sensitivity is such that virtually all activity can be recorded, from shaking and trembling to running and jumping. Artifacts appear to be minimal or absent. On the records obtained, activity resolves into three major components: (i) large discrete deflections, correlated with jumping, jerking, and sudden movements in general; (ii) moderate, continuous deflections, correlated with walking, shaking, trembling, and scratching; (iii) quiet periods.

Figure 2 shows representative records of three mouse strains. Ten male mice were tested in each strain, and the activity patterns illustrated are characteristic for the given strains. The top record is of *Peromyscus gracilis*, a wild mouse exhibiting much running and jumping behavior. The middle line shows activity of strain C57BL/6, an aggressive, fighting mouse, which is characterized by many sudden movements with a moderate amount of continuous activity. Strain A/JAX, a standard laboratory albino, shows less activity of all kinds than the other two strains.

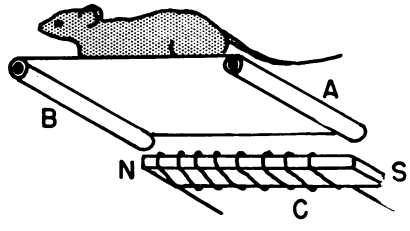

Fig. 1. Schematic representation of pickup apparatus.

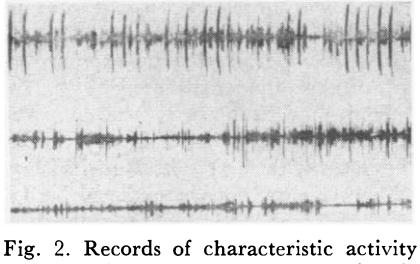

Fig. 2. Records of characteristic activity patterns of three different strains of male mice: (top) *Peromyscus gracilis*; (middle) C57BL/6; (bottom) A/JAX.

The sensitivity of the activity pickup apparatus described suggests possible application in psychopharmacological studies.

WALTER G. MITCHELL*
Hamilton Station, Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine

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* Present address: Box 281, Crozet, Va.

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Tartaric Acid Metabolism of Neurospora crassa

Abstract. The growth of wild type *Neurospora crassa* is stimulated by various organic acids including tartaric, tartronic, and mesoxalic acids. Evidence is presented that this organism converts *d*- or *l*-tartaric acid to tartronic and mesoxalic acid, probably by fixation of CO_2.

The function of tartaric acid has been a biochemical enigma since Pasteur initiated research on this substance. Recently its metabolism by several organisms or tissues has been reported with varying results. Cleland and Johnson (*1*) find that it is converted quantitatively to oxalate by *Aspergillus niger*. Nomura and Sakaguchi (*2*) find that the principal product is succinate with *Pseudomonas incognita*, while Kun and Hernandez (*3*) propose that, with animal mitochondria, the first product is oxaloglycolic acid which can then be converted to a number of products, including diketosuccinic acid and glyoxylic acid. When, therefore, we found that *Neurospora crassa* is stimulated by tartrate as well as by several other organic acids, we made an effort to determine the mechanism of this stimulation and the fate of the tartrate.

Conidia were taken from cultures of *Neurospora crassa*, strain 74A (wild type), grown on minimal medium (*4*) with 2 percent (wt./vol.) sucrose and 1.5 percent (wt./vol.) agar. Aliquots were inoculated into 20-ml portions of Westergaard-Mitchell medium (*5*) containing 2 percent (wt./vol.) sucrose and supplements. Pads were harvested after 72 hours, dried, and weighed.

Among the organic acids which were