TECHNICAL NOTE

*A FOOTREST-LEG EXERCISE DEVICE FOR LONG-TERM
RESTRAINT STUDIES WITH PRIMATES¹*

A recent study (Braun, Farrer, Zappini, and Crook, 1966) required six monkeys (*Macaca mulatta*) to be restrained continuously in modified, pillory-neckplate restraint chairs (inset Fig. 1, over page) for 30 consecutive days.

Throughout the study, the animal had to be prevented from lifting its buttocks and thighs from shock bars that formed the seat of each chair. In studies involving long-term restraint, such restriction is not typically maintained; from time to time an animal can sit on its haunches, turn around 360 degrees or assume a number of different resting positions. The added restriction of a single seating position had several adverse effects on the subjects during a 30-day trial before the actual study.

During the trial, all six monkeys developed edema and psoriasis of the feet and legs, and decubital ulcers in and around their ischial callosities. They were unable to walk for almost an hour after being removed from the chairs. No decrements in operant behavior were observed, but it appeared that further restraint could cause more serious physical debilitation and possibly confound the interpretation of data collected during the actual study.

A combined footrest-leg exercise springboard (Fig. 1) that enabled an animal to exercise its legs isotonically against pressure was designed, assembled, and mounted on the restraint chair. It was assumed that this added feature would increase blood circulation and muscle tonus during the 30 days of the actual study, thereby combatting recurrence of the physical debilitation incurred during the trial.

Each unit, which can be modified to individual design needs, consisted of a 9-in. by 12-in. by $\frac{3}{4}$ -in. Plexi-

glas sheet, three 20-in. lengths of 1-in. aluminum tubing, four commercially produced T-fittings, and four expansion springs. The unit can be simply assembled and mounted in about 20 min.

The device worked perfectly. There was no clinical evidence of injury from the restraint situation in any of the subjects. All exhibited normal locomotion when removed from the restraint chairs; their movements could not be differentiated from those of other unrestrained animals in the colony. Another study currently in progress produced similar results from 16 different subjects restrained for 35 days. After 60-days rest in their home cages they were restrained an additional 30 days and the same asymptomatic results were obtained.

On the basis of these findings it was concluded that restraint periods in excess of 35 days, with use of the exercise device, will not produce the pathological symptoms that occurred during the trial and that long-term behavioral studies requiring continuously restrained primates are feasible.

REFERENCES

- Braun, R. G., Farrer, D. N., Zappini, W., and Crook, G. H., II. Performance of rhesus monkeys during continuous low-level gamma radiation: an exploratory study. 6571st Aeromedical Research Laboratory Technical Report ARL-TR-66-18, October 1966.

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Fig. 1. Close-up of the footrest-leg exercise device mounted on a restraint chair. The inset shows the total restraint configuration.