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Combined Primate Transport and Restraint Device

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and
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DIVISION OF OCULAR HAZARDS RESEARCH

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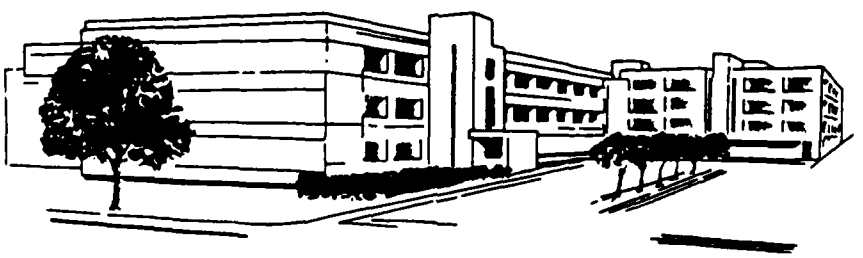

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This paper describes a practical, inexpensive alternative to the standard poling and chairing method of transferring awake primates. Employing this device, a technician working alone can retrieve, restrain and position an awake primate without endangering either the animal or the technician. The device, basically a Plexiglas box, is placed against an animal's home cage. The animal is trained to avoid the squeeze mechanism of its home cage by entering the box. We describe modifications made to the box to adapt the standard one-ring animal collar and to accommodate animals of various sizes. We also present a top panel that can be angularly adjusted to allow for the animal's normal head carriage, thus avoiding the strain of holding the chin up for long periods of time.

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ABSTRACT

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COMBINED PRIMATE TRANSPORT AND RESTRAINT DEVICE

INTRODUCTION

The visual performance and retinal anatomy of humans and rhesus monkeys are remarkably similar; therefore, the rhesus monkey is an excellent human prototype for ocular studies that require long-term, daily periods of visual, behavioral, and physiological response evaluation. The major drawback in the regular use of nonhuman primates is that they are unpredictable and can be very difficult and sometimes dangerous to handle.

In studies that require daily periods of physiological experimental manipulation by awake, task-oriented rhesus monkeys (1), a technique is needed to transfer the animals cautiously and expeditiously from their home cage to a transport and restraint device, thereby making the daily administration of anesthesia unnecessary. In the past a poling method was used to transfer awake primates. The poling method required that a permanent, lightweight, plastic collar be fitted around an anesthetized animal's neck. The collar had a metal fastening ring that could be hooked with a spring-loaded pole while the animal was in its home cage. By maneuvering the pole and employing positive reinforcement, an animal could be conditioned to go from its home cage to a standard temporary restraining chair with little difficulty.

The poling technique works well with average-sized, young monkeys. Older, larger animals that have been pole-trained can become difficult to transfer and may require two handlers. For older, larger animals that have not been previously pole-trained, initiation of pole training is nearly impossible. In this instance, the likelihood of harm to the laboratory technician as well as the animal is high. Therefore, we have explored several alternative techniques for transporting unanesthetized primates to experimental settings.

APPARATUS

A new, simple, and inexpensive alternative to pole transferring and the standard primate chair was recent-

ly developed and described (2). This new transfer apparatus is designed to allow easy removal of fully conscious monkeys from their home cages to the capture box. The transfer procedure requires a minimum of cooperation from the animal, uses no form of anesthesia, and significantly decreases the possibility of escape or injury to the animal or handler. The top panel of the box provides head restraints for experimental tasks which require that the animal's visual line of fixation remain constant. The capture box also serves as the transport device to and from the laboratory.

The apparatus, basically a portable Plexiglas box with a vertically sliding door on the front side, is mounted onto a portable hydraulic lift platform and aligned with the vertically sliding door of a standard, nonhuman primate cage. With both vertical doors open, the animal is then trained to avoid the squeeze mechanism of the home cage by entering the Plexiglas box. Once the animal is inside the Plexiglas box, two aluminum rods are used to hook the animal's two-ring collar and draw it up against the top panel of the box. The animal's head protrudes through a 14 cm diameter hole cut in the center of the panel. The rods are then secured with base plates and the collar is locked into position, thus positioning the animal by its collar and maintaining the correct line of fixation and visual pathway to the viewing screen. Employing this practical restraint and transport device, a technician working alone can retrieve, restrain, and position an awake rhesus.

MODIFICATIONS

This paper describes modifications made to the Plexiglas box (1) to capture and hold the standard one-ring animal collar, (2) to accommodate a variety of animal sizes, and (3) to allow the top panel to angularly adjust to the animal's normal angle of view. The modified Plexiglas box is shown in Figure 1 with overall dimensions that can easily accommodate the larger-sized rhesus monkeys.

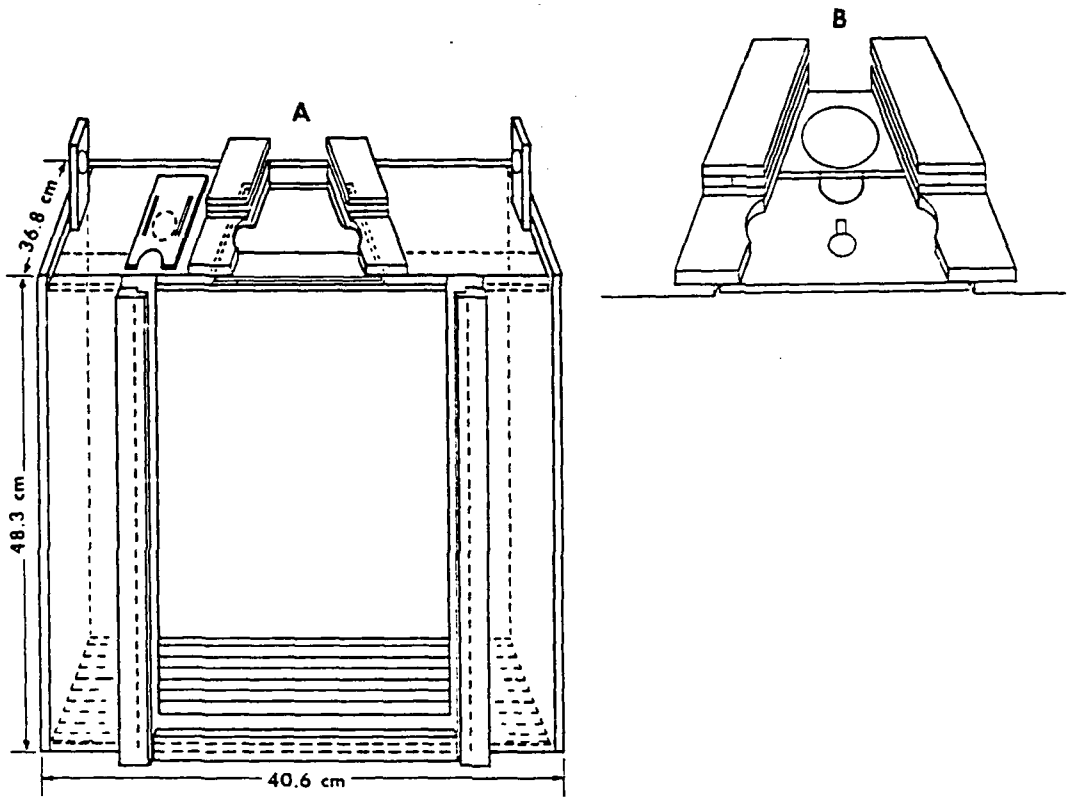

Figure 1. Diagram of the Plexiglas restraint device. The box is constructed with 3/8" Plexiglas all around and 3/8" diameter aluminum rods form the floor.

The front panel of the box has a 26 cm wide center opening that runs the full height of the box. This allows the animals maximum height clearance while being transferred to and from their home cage, and provides more room for the task manipulation keys and levers in the behavioral task procedure. Before transport, the front opening is closed by inserting the removable, vertical panel into slots located on both sides of the opening (Figure 2).

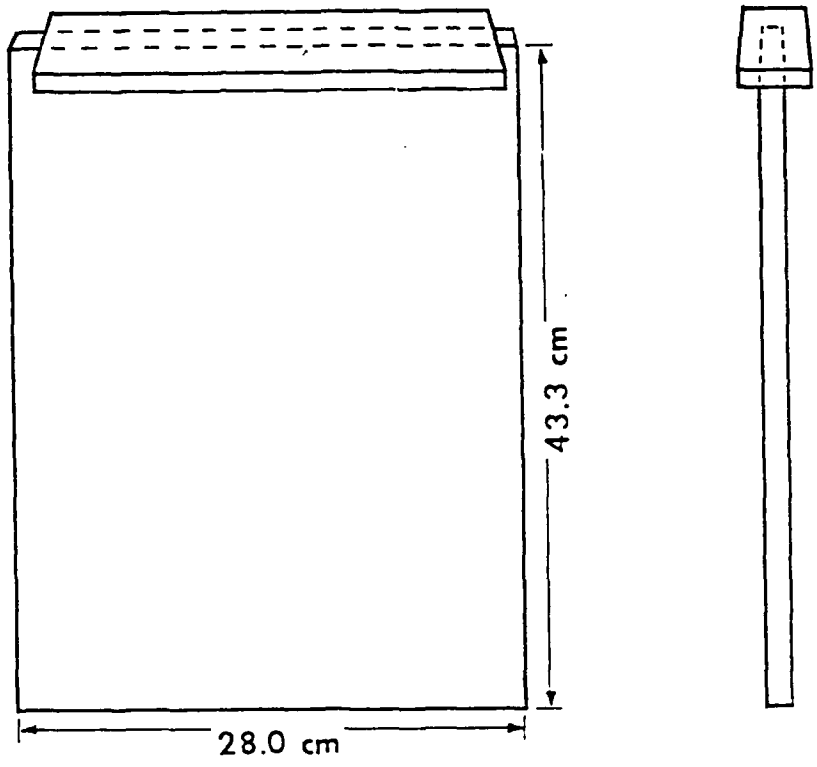

Figure 2. Removable Front Panel

The top panel of the Plexiglas box is adjustable for the animal's height and angle of view (Figure 3), and is constructed with a center opening 12 cm wide. Thin strips of Plexiglas (1.5 cm X .5 cm) are used to construct slots for the removable plates and animal collar. All Plexiglas strips used to construct the slots have smooth, rounded edges. The slot to hold the animal's restraint collar is formed by overlapping (1.5 cm) both sides of the opening with strips that are attached to the bottom of the top panel with screws. These strips are 23 cm long and leave a 10.5 cm opening in front for pulling up and capturing the animal's collar. The top of this slot is formed by two strips

that run the full length of the opening and overlap it 1.5cm on each side. Both strips have a 1 cm indentation at the collar capture opening which provides an 11 cm clearance to allow passage of only the animal's head. By constructing the opening in this fashion, the commercially available single-ring, Plexiglas animal collar can be utilized. The front end of this slot is also used to hold a plate mounted with a drinking spout. The spout delivers 1 ml squirts of fruit juice as positive reinforcement during the behavior task procedure. The topmost slot is formed with two strips identical to the strips forming the bottom of the animal's collar slot. This slot holds the removable, sliding top cover plate that seals the center opening during capture and transport (Figure 4).

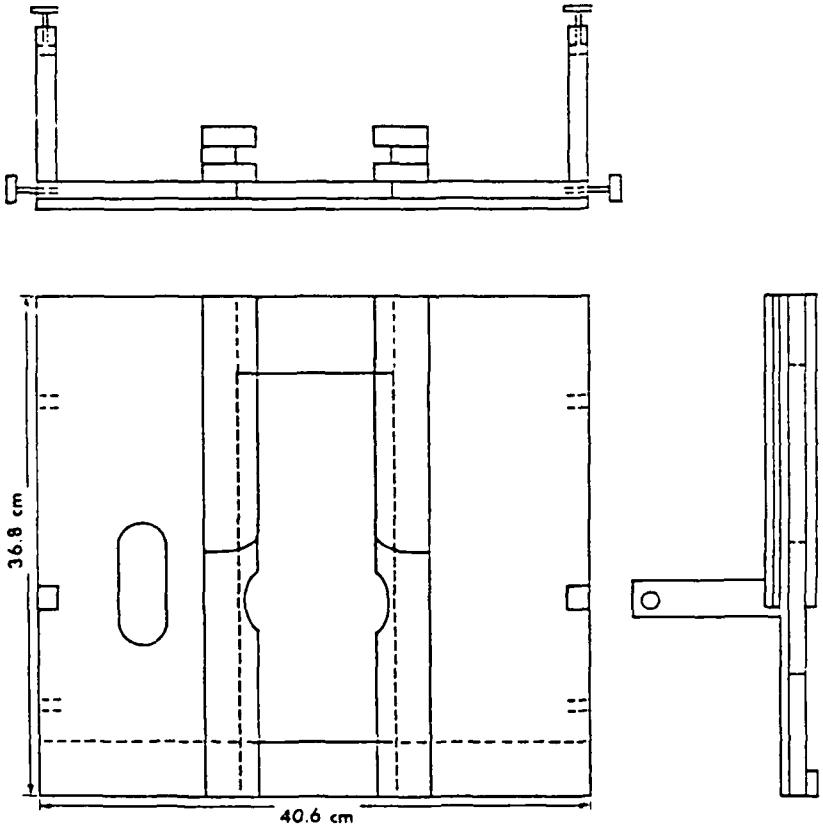

Figure 3. The Plexiglas adjustable, restraining top is diagramed from three different views. It is constructed with a center neck opening 12 cm wide x 28 cm long, and slotted for the removable plates (juicer plate, animal collar, top cover plate).

When the animal is first moved from its home cage to the restraint device, the top opening of the box is completely covered by the top sliding cover and the juicer plate (Figure 4a). Initially, the tightening bolt on the juicer plate is loosened and the plate is pulled out of the center opening only far enough to secure the latching pole to the animal's collar ring. The juicer plate is then removed as the ring and collar are pulled up and forward into the juicer slot (Figure 4b). To eliminate any possibility of escape, only the animal's head is allowed to pass through the indented front opening (for much larger animals the back cover plate can be opened slightly). After the collar is in the juicer slot, the tightening bolt on the cover plate is loosened. By pressing down on the collar ring with the pole and pushing back, the collar and animal are moved back into the collar restraint slot. The juicer plate is replaced in the slot in front of the collar ring and tightened; the collar is secured (Figure 4c) and the pole is removed from the ring.

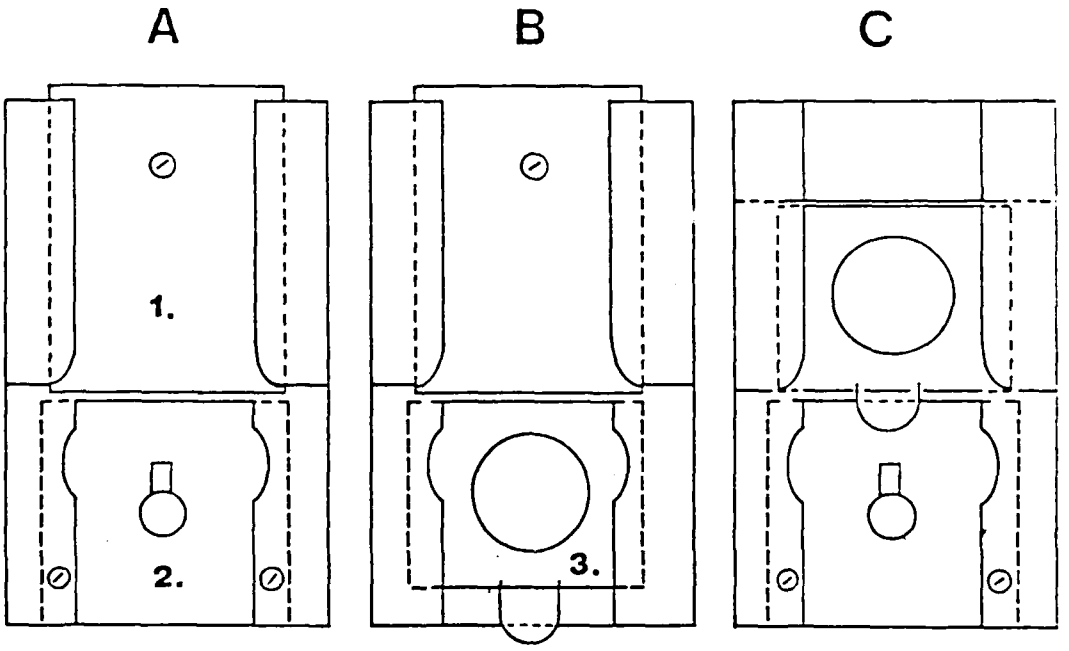

Figure 4. Center opening of the top panel (enlargement in Figure 1). (A) Covered with the top sliding cover 1 and juicer plate 2. (B) Animal collar 3 replaces juicer plate. (C) Collar pushed back into collar restraint slot and juicer plate replaced.

The angularly adjustable top has screw-in tightening knobs fitted through the vertical slots in both side panels. This allows the height to be varied by 14 cm and the animal's angle of view to be adjusted from 0 to 15 degrees, thereby relieving the animal of possible head and neck discomfort (Figure 5). The vertical adjustment can be checked from the see-through sides to assure that a comfortably crouched animal's shoulders barely touch the restraining top panel. There is 8.5 cm of space between the back of the restrained collar and the back of the box. When the animal is crouching, this space allows for the natural curvature of the spine. Each animal should be checked for comfortable positioning and for the absence of neck stretching or body cramming.

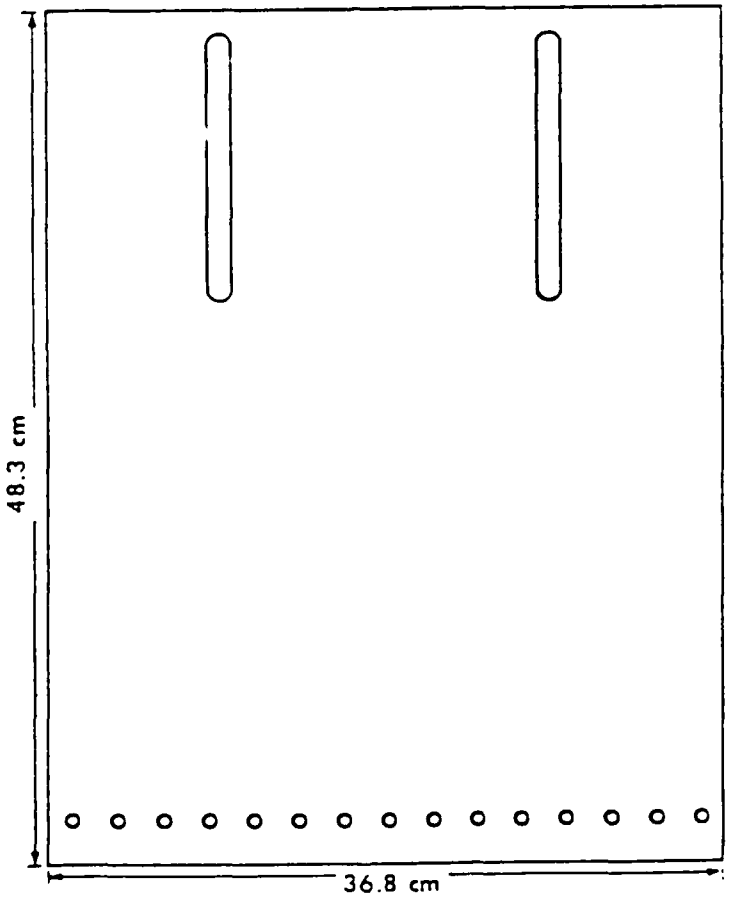

FIGURE 5. Side Panel with Slots for Tightening Knobs

We have tested this apparatus on two mature rhesus monkeys. Both animals wear one-ring collars and were previously pole transferred, but have now become too large to pole transfer. The procedure and apparatus described above were successful in allowing both animals to be transferred from their home cage and utilized in experimental behavioral situations.

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