

## A SIMPLE METHOD OF IMMOBILIZING ANIMALS FOR LABORATORY PURPOSES<sup>1</sup>

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Nearly every one who has had much experience in medical laboratories is aware of the difficulties frequently encountered in immobilizing various kinds of animals used in experimental work. Many types of animal boards, or holders, ranging from the simple piece of board with a nail and string in each corner to high priced manufactured articles, are in use for this purpose. In general, these boards are usually satisfactory if the period of restraint is for a short time only and a certain amount of movement of the animal's torso is of no importance. If it is necessary, however, for the animal to be held for a matter of several hours and if almost complete immobility is wanted the usual animal boards leave much to be desired.

Throughout a number of years the writer has at various times carried out numerous investigations on the transmission of diseases by means of arthropod vectors with various kinds of animals being used for experimental hosts. Two great difficulties were usually experienced in these investigations. One of these was the immobilizing of the animals for a sufficient length of time to allow all the arthropods that were being used to feed upon the animal without injury to the latter from too prolonged a period of restraint. It is sometimes necessary to keep an animal restrained for several hours when a large number of arthropods are being used in an experiment. The second difficulty, and usually the major one, was to fasten the animal in a manner that would prevent movement of its torso sufficient to deter the arthropods from feeding. Various types of animal boards were tried but since most of these held only the feet and the head of the animal rigid the torso could be moved from side to side to some extent. If the animal was stretched out too tightly the string or clamp used for holding each foot usually caused intense swelling which

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undoubtedly was extremely painful to the animal. On the other hand, if the clamps were applied too loosely the animal's struggles caused chafing that frequently resulted in the skin being broken and sores formed.

In attempts to overcome these movements of the animal's body various measures have been employed. Hypodermic injections of morphine administered to the animals just after they were placed in restraint were of some value but the effect of this drug was so variable with the different kinds and sizes of animals that it lacked much of being satisfactory.

Holes made in the animal boards so that wooden pegs could be inserted at intervals very closely along either side of the animal's body aided in reducing to some extent the side to side movement. Lacing of twine from peg to peg over the animal to hold it firmly on the board and prevent the upward movement was next tried with some measure of success.

Experiments along these lines finally led to trials with only a bandage and one or two pieces of wood being used as a means of restraint. This method proved so satisfactory that it is now used for practically all animal work done at this laboratory and the use of the regular animal boards has been discontinued. A description of this method as applied to various animals is given herewith.

#### MONKEYS

Two light strips of wood are tacked together to form a cross when monkeys are to be restrained. The size of this cross, as well as the width of the bandage, depends on the size of the monkey that is to be used. A 1-inch bandage is satisfactory for holding the small marmosets, or squirrel monkeys, while a 4-inch bandage is more suitable for the large *Macacus* species. Gauze bandages answer the purpose much better than do the cotton ones. The end of the bandage is first securely anchored to the cross by winding it several times around the lower stem of the latter just below the cross arms. The monkey is then stretched out on the cross with one assistant holding the legs while a second one extends the animal's arms on the cross. Two or three fairly tight turns of the bandage are first made around the



breast of the animal and the stem of the cross. The bandage is then brought up under the left arm of the animal and drawn diagonally over the breast and right shoulder and continued down under the right arm of the cross. On the second turn it is brought up under the right arm and across the breast and down over the left shoulder. These turns are simply those of a figure-of-eight with an arm of the animal and arm of the cross in each loop. After several of these alternating diagonal turns, or loops, have been made the bandage is then wound around the left arm of the animal and also of the cross to the wrist and back to the shoulder. It is then carried over the breast and the right arm is wrapped in like manner. Several turns are then taken around the upper part of the cross and the neck of the animal, the bandage being brought well up to the lower jaw. The lower part of the torso must necessarily be left exposed when an abdominal operation is to be performed on the monkey or when mosquitoes, flies, ticks, lice, or other arthropods, are to be fed on its abdomen. In such cases, after the immobilization of the arms, neck and breast is complete, the bandage is brought down and two or three turns are taken around just the stem of the cross itself to give the bandage a second anchorage. These turns are made around the cross at a point slightly below the upper part of the animal's hips. The bandage is then brought across the lower part of the animal's abdomen just above the hips. It is next brought up on the right side and over the right thigh diagonally across and down between the cross and the left leg. After passing under the cross it is carried up between it and the right leg to continue diagonally over the left thigh and underneath to the right side again to complete the figure-of-eight. These turns over the lower part of the abdomen and the thighs must be drawn fairly tight to prevent the animal from freeing its legs. The hind legs are now brought closely together and with the tail are well bandaged to the cross, a number of turns being used for this, and continued to the animal's feet. The end of the tail may be brought up and fastened by the last few turns of the bandage. The remainder of the bandage may be held to the cross near the end with a rubber band.

If it is not necessary to leave the abdomen exposed the entire

torso may be bandaged. When the monkey is a large one it is best to put the cross on a table with the assistant holding the animal's arms standing on one side of the table while the other assistant and the person doing the bandaging are on the opposite side. One bandage is seldom long enough for a large monkey and in such cases it is necessary to tie on a second one. A block of wood placed under the upper end of the cross permits the bandage to be passed underneath it and this greatly facilitates the work.

At this laboratory during the past year many monkeys were restrained by this method while various operations were carried out upon them. These operations ranged from feeding blood sucking arthropods on the animals to splenectomizing them and restraint was also necessary while they were being etherized. This number also includes the immobilization of monkeys while infected food cultures were passed directly to the stomach of each one through a rubber catheter.

#### GUINEA PIGS

A single flat piece of wood is used in the place of the cross in immobilizing a guinea pig. The bandaging is done with turns quite similar to those applied to the monkeys except that the diagonal turns over the breast and shoulders are carried around the single stick instead of under the arms of the cross when the latter is used. The fore legs are left free to extend up through the turns of the bandage around the shoulders. The diagonal turns about the thighs must be carried well up over the hips and drawn fairly tight. This method is much easier on guinea pigs than using the animal board that draw the fore legs out level with the body in a spread eagle manner. It eliminates the acute arching of the chest and reduces the danger of congestion of the lungs that occasionally occurs in guinea pigs after long periods of restraint.

#### RATS

The single stick is used in immobilizing white rats and the bandaging is the same as with the guinea pigs. When a rat is small it sometimes succeeds in freeing its hind legs if it struggles



too vigorously. To avoid this, a piece of soft twine is tied with a clove-hitch around each hind leg and the ends of the strings brought back and passed through a hole in the stick. A wooden peg is then pushed into the hole and this serves to hold the string as taut as desired. These strings need only be drawn tight enough to prevent the rat from working its hind feet up into the turns of the bandage. When a rat becomes quiet and ceases to attempt to free its hind legs the peg may be loosened in the hole which allows the strings to become slack and relieves the rat from the pull on its legs. If necessary to tighten the strings again, hardly more than a second is required to draw them through the hole far enough to put on tension and push the peg in the hole to hold them. When the clove-hitch is used, the loop around each leg remains only as tight as it is drawn when first applied and movements of the animal do not make it any tighter. After the strings are applied to the hind legs the latter are then bandaged to the stick. Only the turns around the legs and stick are used, however, as the diagonal turns across the thighs and between the legs are omitted.

#### FOWLS

Chickens and pigeons are frequently used for tick feeding at our laboratory and they are easily and successfully restrained by the same method. A frame made of two sticks is used for fowls. This consists of a main stick, or stem, with a second shorter piece tacked on it to extend from one side a short distance from one end thus forming an angle rather than a cross. A bandage of approximately  $1\frac{1}{2}$  inches in width is used for a large fowl.

The wings of the fowl are first drawn up and placed together over the back of the bird and are held in this position by three or four turns of the bandage. Each of these turns of the bandage is brought well up between the feathers to the wing itself. The fowl is then placed on its side on the frame and the wings bandaged to the extending piece of wood. When this is completed a number of figure-of-eight turns are taken around the breast and the main stick. The neck is then well wrapped and the bandage is brought back and wound around the legs and the posterior part of the bird and the stick. Fowls trussed up in this manner

for periods of four or five hours seem to suffer but little discomfort and are able to run about very actively as soon as released.

#### BATS

A number of bats have been used for various experimental purposes at the laboratory during the past year. Since these mammals are vicious biters, until after they have been handled for some time, it was frequently found necessary to have them well restrained while working with them. A single stick is used for this purpose. The size of this depends greatly upon the size of the bat that is to be worked with. The large bats, *Phyllostomus hastatus panamensis* Allen and *Artibeus jamaicensis jamaicensis* Leach, require a stick about 3 inches wide and 24 inches long. Near the middle of the stick a hole is bored into its side or edge. The end of a wooden peg is inserted in this hole with about 2 inches of its length left extending from the side or edge of the stick. In the opposite edge of the stick a small nail or tack is driven to about half its length. The bat, held by the outstretched wings, is placed on the stick and the wings secured to it with numerous turns of a bandage. Several diagonal turns across the body and around the stick are next taken after which the neck is bandaged to the peg extending from the side of the stick. A string is then fastened about the feet and drawn fairly taut and tied to the nail. The bat has but little chance for movement when secured in this way.

Experience has shown that in using this method for restraining monkeys, guinea pigs, rats, etc., it is very essential that the stick be slightly narrower than the animal's body.

#### PLATE 1

FIG. 1. Monkey bandaged to cross. Abdomen left exposed for experimental work.

FIG. 2. Guinea pig bandaged to single stick. Abdomen not covered with bandage.

FIG. 3. Cockerel immobilized. Breast left uncovered for arthropod biting experiment.

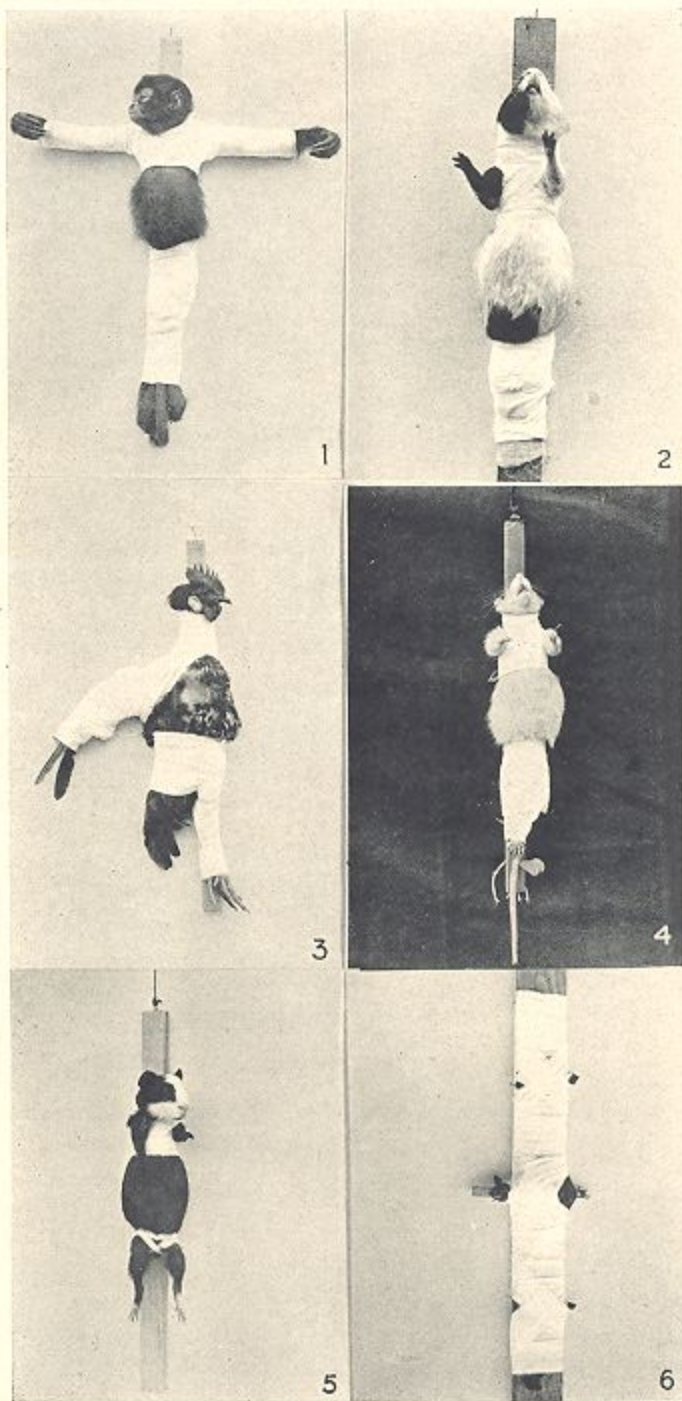
FIG. 4. White rat immobilized. Showing relative width of stick to body of rat and peg used for holding string fastened to the hind feet.

FIG. 5. Showing preliminary turns of bandage used in fastening hind legs and posterior part of body of guinea pig.

FIG. 6. Bat with wings outstretched bandaged to stick. Showing top center peg to which head is bandaged and lower peg to which the feet are tied.



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*Photographs through courtesy of Mr. W. H. W. Kemp*