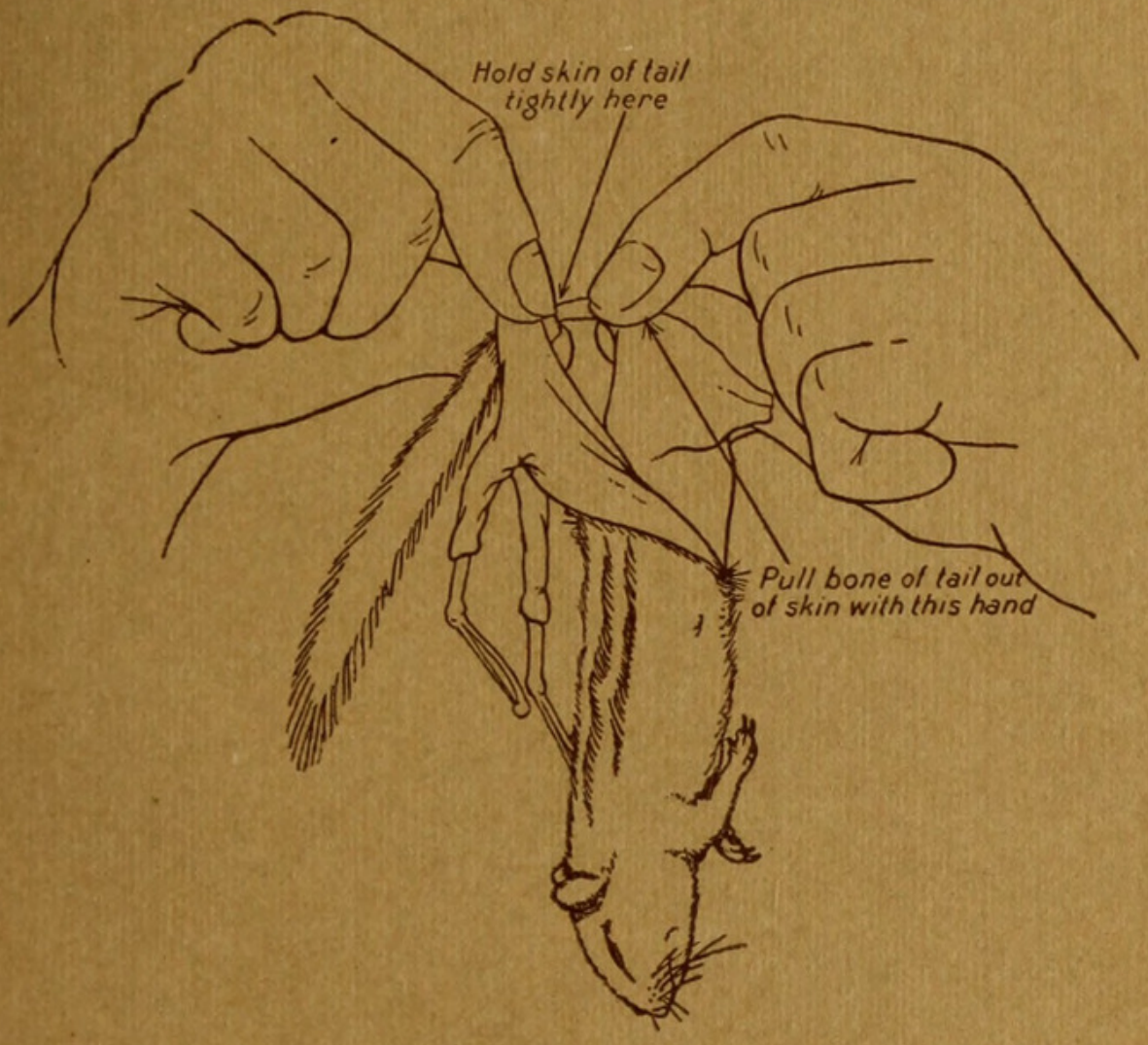
THE AMERICAN MUSEUM OF NATURAL HISTORY

The Capture and Preservation of Small Mammals for Study



By H. E. ANTHONY

GUIDE LEAFLET No. 61

NOTE

This leaflet is one of a series intended to furnish accurate information in regard to the preparation of specimens of various kinds for Museum purposes.

The following have been issued and may be purchased at the sales booth or from the Librarian; others are in the course of preparation;

The Capture and Preservation of Small Mammals for Study
By H. E. Anthony. Price 15 cents

The Preparation of Birds for Study
By James P. Chapin. Price 15 cents

How to Collect and Preserve Insects
By Frank E. Lutz. Price 10 cents

The Preparation of Rough Skeletons
By Frederic A. Lucas. Price 10 cents

Suggestions to Collectors of Reptiles and Amphibians
May be had on application to the Curator, Department of Herpetology

Brief Directions for Preparating Skins of Large Mammals
May be had on application to the Curator, of Mammals

THE CAPTURE AND PRESERVATION
OF
SMALL MAMMALS FOR STUDY

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The American Museum of Natural History
Guide Leaflet No. 61
New York, November, 1925


AMERICAN·MUSEUM·PRESS

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THE CAPTURE AND PRESERVATION OF SMALL MAMMALS FOR STUDY

By H. E. Anthony

The small mammals of any region are apt, with certain exceptions, to be less known than the large mammals. Small species which are active in the daytime, such as squirrels, are quickly noted and become familiar, but by far the greater number of small mammals are nocturnal in habit and hence escape observation unless special methods are adopted for their capture. The sportsman and large-game hunter acquaints himself in a short time with the appearance and habits of the large mammals of a region. He may spend years in a place without knowing by sight more than ten per cent. of its smaller mammal fauna.

As a consequence of this ability of the small mammals to escape notice, there is far less known about them than about the large, more or less spectacular mammals which the sportsman hunts for the pure love of the chase. Many of these game mammals range over extensive territory without becoming differentiated in any way or at the most differing only as subspecies. There is very little chance today for a large-game hunter to shoot a species new to science. On the other hand, there are very excellent opportunities for him to collect small mammals which have never before been taken, if only he will divert some of his attention to the mammals which he has been in the habit of considering beneath his notice. The shooting of a bear or lion is an achievement attained by thousands and often only a question of a moderate expense of time and money. These creatures were known to the ancients and the very nature of these animals demands that attention be paid them. There is no thrill of the chase, in the sense that one is risking his life, in the capture of some obscure, timid, and secretive small mammal, but if the species

is one that has never been known to Natural Science before, the discoverer should feel a satisfaction beyond that which attaches to ordinary trophies. It is distinctly worth while for the sportsman to spend some of his time and efforts upon the smaller mammals of the region he visits; especially is this true if he is hunting in some out-of-the-way corner of the globe, for the study skins he may bring back might be of far more value to Natural Science than the large animals which have always been filling the eyes of the sportsmen.

This is not intended as a dissertation against the scientific value of the large mammals,—far from it. Many of the large species are rapidly becoming extinct and if life-histories and intimate knowledge of these last survivors are to be obtained, surely no time must be lost. It is true, however, that a strong plea for the collecting of study skins exists, and men who go to great expense to reach new hunting fields could do a great service to museums, and to the knowledge of Natural Science, if they brought back with them as many of the small mammals as they could conveniently secure without interference with their plans for large game. Natives are often able to attend to the routine preparation of the material, or can be taught to do so, and the operation of a trap-line will not disturb the large mammals in any way.

This handbook has been written in response to a definite demand coming from two separate sources. Many of the sportsmen who plan trips to remote regions have made inquiry at this Museum as to what they might collect which would be of value for museum purposes. Their willingness to assist the aims of the Museum extends not only to the securing of the larger species for the exhibition halls, but also to a desire to be on the lookout for any mammals which have an especial interest or some particular bearing on any problem before the Museum. It may happen that the region under contemplation is the home of some much-desired small mammal and the offer of coöperation is decidedly welcome.

It is necessary then to instruct the sportsman in the methods of capture and preparation of small mammals.

The other class of naturalists for whom these pages are written is the man or boy who feels a definite calling to take up the study of wild life and who wants to know how to go about it. He may know something about removing the skin of a small mammal but he knows nothing about what constitutes museum methods and practice.

What is a Study Skin?

A well-equipped museum has, in addition to the mounted specimens of mammals on public exhibition, large series of specimens made up into what are called study skins. These series are necessary in order that the species may be studied to best advantage; that we may know whether the color of the animal varies with season, sex, or age, whether two mammals of similar external appearance really are the same in internal structure, etc., etc. It would be out of the question to attempt to care for the large collections brought together for this purpose by mounting them and placing the animals in the glass cases of the public halls. Study skins must be kept in storage cases that are light-tight, to prevent fading of color, and insect-proof; and the skins must be so prepared that many can be placed in one storage case. The method of making study skins strives to accomplish these two ends,—the preservation of all of the characters possessed by the animal when alive, and the production of a specimen which will be easy to store, protect and study. There is nothing in the preparation of a study skin which prevents the later mounting of the specimen for exhibition.

Tools Needed

Study skins of small mammals may be prepared with a small pocket-knife as the only tool, but skins may be made better and with less time if a few simple tools are secured.

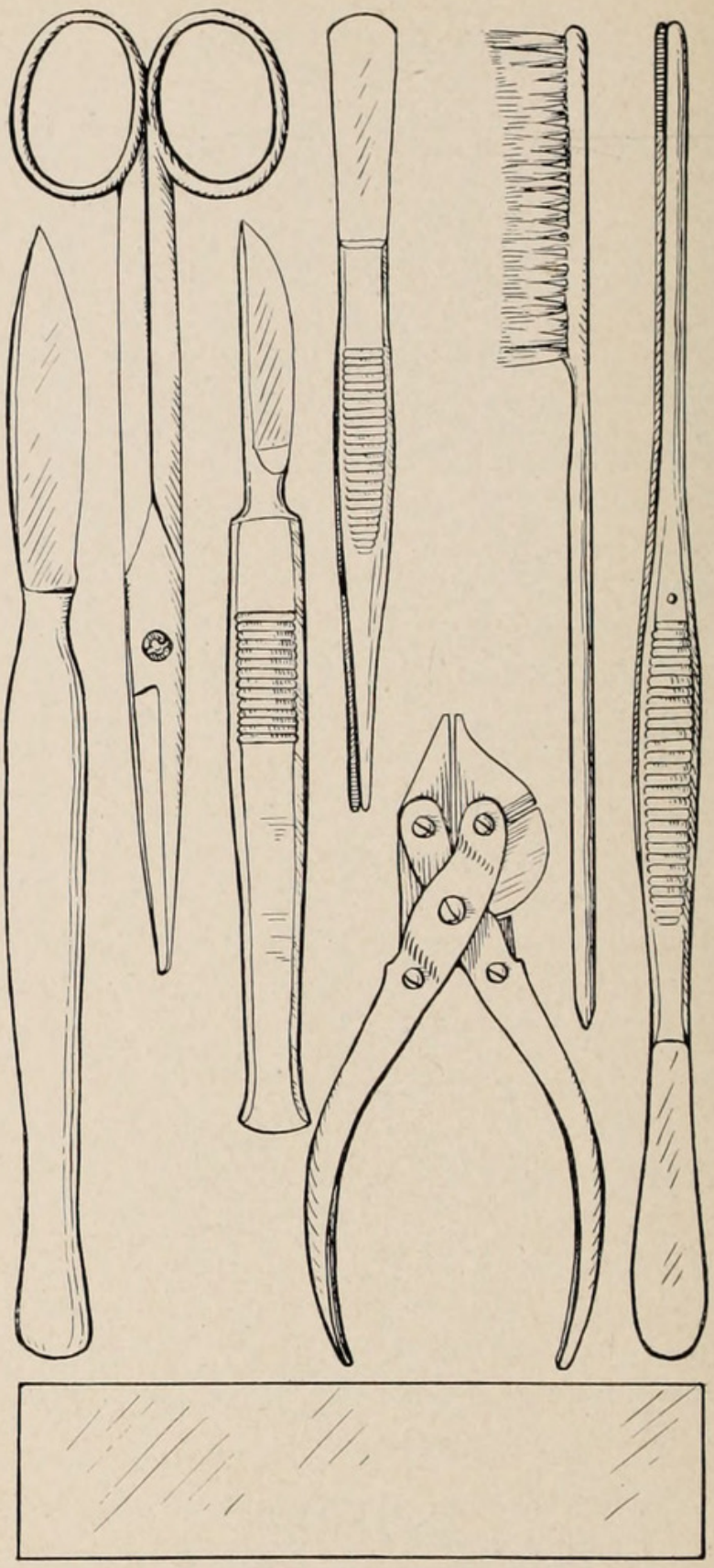

Fig. 1. Most important tools for making skins of small mammals.

The following will answer practically every purpose, but collectors develop individual methods and in time one might add several implements to this list.

1 steel tape, one or two meters long, marked in millimeters
1 steel ruler, about a foot long, marked in millimeters
1 small scalpel
1 large scalpel
1 pair of small, straight scissors
1 small pair of forceps or tweezers
1 large pair of forceps
1 tooth-brush
1 pair of pliers, with wire cutter
1 small carborundum oil stone

Additional tools that will probably be useful include extra scalpels, a larger skinning knife, a flat file, a steel comb, a larger pair of scissors, etc.

SUPPLIES NEEDED

Preservative

The skins of small mammals are best preserved by a mixture of arsenic and powdered alum (ammonium), the proportion about half and half by volume or by weight. Arsenic may be used without the alum but in a warm climate it is safer to employ alum to set the hair while the skin is drying. Do not use salt on a skin that is to be closed up, such as a chipmunk that is sewed up as a study skin. Sometimes when a collector runs out of arsenic he may make up his specimens without any preservative, and the skins will dry satisfactorily. They must be poisoned with the arsenic at the first opportunity, however, lest they be attacked by beetles (*Dermestes*) or moths, which may eat off all the hair.

A pound of arsenic mixed with a pound of alum will poison and preserve a great many small mammal skins, and five pounds of each powder will serve for quite an extensive expedition and for hundreds of small specimens.

The arsenic-alum mixture can be kept either in a flat, wide-mouthed tin (friction-top) or in a paraffin bag, made double by putting one bag into another.

Cotton and Tow

Cotton is employed as filling for small skins and may be secured in several grades. Tow, however, is the principal substance used for stuffing study skins, and if a fine, soft grade of tow can be purchased, the collector will seldom use his cotton. The tow should have long, soft fibers, and be free from lumps and dirt.

The very smallest skins need cotton, shrews, for example, being rather too tiny to fill with tow. For this purpose a fine grade of cotton, Dennison's best cotton, or jeweller's cotton, should be selected. One half-pound roll of this will last a long time for the average collecting.

The cheaper cotton is useful to pack around dried skins, since it comes in a rolled-up sheet that may be opened out to lie smooth and flat.

Five pounds of the ordinary cotton and five or ten pounds of tow will be all that is needed for several hundred small skins.

Absorbent

The best absorbent to use in skinning and cleaning skins is fine, dry cornmeal or fine sawdust. Used freely, cornmeal is such an aid to skinning that plenty of it should be kept on hand. It can be used over and over again, simply throwing away each time only the bloody portions, and is best kept in a waterproof bag, the mouth of which can be rolled down and kept open when in use.

Three to five pounds of cornmeal will last as long as the cotton and tow listed above.

Needles and Thread

A paper of assorted needles to take No. 25 and No. 50 or 60 linen thread will be needed.

A spool of each of the sizes of thread listed, preferably white, will be ample for sewing up the skins of several hundred mammals, but if thread is used for other purposes, such as on labels or wrapping up skeletons, more spools of the coarser size will be needed.

Pins

Ordinary white pins may be used for pinning out skins to dry, but experience will soon demonstrate that the black steel pins with the round glass heads are very much more satisfactory. The larger heads of the steel pins save the skin of the fingers and the hard points stick into the drying board better. At least five hundred steel pins will be needed for active collecting and a paper of the white pins will be useful for pinning paper about the dried specimens.

Labels

The American Museum of Natural History furnishes labels of standard pattern to its collectors. Such a label is shown in Figure 17. Lacking such a label, ordinary stringed tags such as Dennison makes may be used. Labels should be tied on firmly and a makeshift label that may be lost should not be used.

Wire

Wire in various sizes is needed for the tails of small mammals. A non-corrodible wire is much to be preferred and the American Museum has been using monel-metal wire with good success. The sizes needed are Nos. 16, 18, 20, 22, 24 and 26. Mammals needing wire heavier than No. 16 are seldom made up in the field. Only the smallest of mammals require a wire as small as No. 26. By far the greatest number of skins will be prepared with Nos. 18, 20 and 22.

The weights of wire needed will vary with the region where collecting is done. If many large squirrels, rabbits, etc., are wired, the larger sizes will be required and five pounds of wire will not last long. On the other hand, a pound of No. 22 wire will serve for a hundred or more of small mammals.

Insecticide

In addition to the use of arsenic on the flesh side of skins as a deterrant for insects, it may be necessary to put some insecticide in the box with the dried skins when they are shipped or to prevent ants from eating off the ears, toes and lips of skins that are drying. Various substances may be used for this purpose—Naphthalene being probably the best. California Insect Powder, Persian Insect Powder and Paradichlorbenzene (trade name, Paracide) may be used with success. The Paradichlorbenzene is especially effective but slowly evaporates if left out in the open; it is non-inflammable and non-explosive.

Alcohol and Formaldehyde

Alcohol is very useful for preserving specimens entire or for such soft parts of the anatomy as may be desired. The alcohol should be at least 85%. Avoid hardening the specimens by using the alcohol too strong, but beware of a weak solution in a hot climate.

Formaldehyde as obtained in a commercial solution generally runs about 40%. This solution may be diluted considerably. Take one part of formaldehyde by volume to from 10 to 15 parts of water, depending on the nature of the specimen, the climate, etc. Since formaldehyde hardens and contracts tissue, it is advisable to use it in a solution as dilute as will preserve from decomposition, and this may be as weak as a one to twenty solution under favorable circumstances.

Make certain that specimens are thoroughly immersed when placed in liquid; especially make sure that the fur is wet through.

Ink

India ink or water-proof carbon ink (Higgins' is an excellent brand) should be used for entering data on labels and in catalogues. Since the labels are comparatively small in size for the data that sometimes must be written on them, it will be found that a fine steel pen is best, because with it the letters may be kept small and entries legible. If the collector can print his data rather than write it, the label will be neater, but this, of course, is a refinement which adds nothing to the characters of the specimen itself.

The data on skull labels may be written in with pencil if a paper or card label is used. The writing must be heavy enough to insure its permanence.

GENERAL INSTRUCTIONS FOR THE CAPTURE OF SMALL MAMMALS

Most small mammals will be secured by trapping: a comparatively few will be shot.

Squirrels and rabbits will more often be shot than trapped. For shooting small mammals a double-barrelled shot-gun is best and a 16-gauge gun will answer all but the most unusual requirements. The right hand barrel should have a modified choke, the left should be full-choked. Auxiliary barrels, to be fitted inside of the 16-gauge bore, are very useful devices and do not add greatly to one's equipment. The auxiliary barrels now used by the American Museum are .32 caliber, using the old .32 extra long center-fire shell (to be obtained only on special order from the factory) and .410 caliber, using a paper shell which can be obtained without difficulty ready loaded. The length of the auxiliary barrels is about five to eight inches and the barrels may be carried in the pocket when not used in the gun.

For the 16-gauge shells, No. 6 shot is the best all-around size, but there will be use for No. 8 and No. 10 shot, as well as for No. 12—if bats are to be collected. Larger sizes of shot up to BB and buckshot will be required, of course, for general collecting. The small shells for the auxiliary barrels are most often loaded with No. 12 shot.

It would be impossible to give, in this handbook, complete instructions for the successful hunting of small mammals in each part of the country. Local conditions require special methods and it is presumed that any one who is seriously using this manual has probably already had at least the average hunter's experience and will know how to hunt for squirrels, rabbits and such small game. Space may be taken for a few hints, however.

The best time for hunting is early in the morning, just after sunrise, and late in the afternoon until it is too dark to

shoot. Look for the mammals where it is known that they feed. A tree of ripe fruit, a corn-field, a patch of clover, all offer a promise if visited at the right time. Some mammals may be called up by squeaking with the lips against the back of the fingers.

Often mammals may be shot by hunting with a light at night which could never be taken by ordinary methods of daylight hunting. Night hunting or "jacking," as it is sometimes called, is against the law in most of the states of the Union, but this practice may be followed in other regions where it is the most efficient method for large as well as small species.

The best light for the purpose is an electric flashlight, so constructed that the reflector with the bulb may be pinned to the hat in front and the batteries carried in the pocket. A five-cell dry battery gives a very strong light and will last for many hours of continuous use. Used for two or three hours a night, a set of batteries may last for several weeks. Carbide lights made especially for jacking are on the market but are so cumbersome and inefficient as compared to an electric light that they should be used only as a last resort if the flashlight cannot be obtained.

The light is so fastened on the hat that when the gun is thrown up to the shoulder the beams of light follow the line of sight. Mammals are seen at night by the reflection from their eyes and it is seldom that the hunter sees more of the game than the two glowing spots. The color of these spots varies with the species of mammal and may be bluish for deer, reddish for cats, etc. The color of the eyes and the distance between them serve as identifying characters. Care must be taken to avoid accidents. The eyes of cattle, horses, and other domestic stock shine beautifully under the light and it is much better to be cautious at first than sorry afterward. Night hunting will never make the collector popular with the natives if he shoots first and learns afterward. The eyes of man do not reflect light, at least under normal circumstances.

It is not unusual for a hunter to fire at a star when shooting at night. The wind moves the leaves of a branch aside and the star seems to move as would the eye of an animal. A good test under such circumstances is to watch the supposed eye when the light is on it and after the light has been turned to one side. If the "eye" remains visible when the light is removed it is a "star" but if the "star" shines only when the light is on the spot it is an "eye." The eyes of many creatures shine at night and it will require some experience before the hunter is able to identify what he sees. The eyes of spiders, moths, and insects often shine and sparkle amazingly; owls and night-birds, such as the goatsuckers, have luminous eyes that are very misleading; lizards may reflect light from the eye, and alligators and crocodiles send back the rays of light.

It is advisable when hunting at night, especially when in an unknown region, to reconnoiter first by daylight and learn the terrain and the features of the topography. This not only helps to bring the hunter back to camp the same night, but serves to prevent shooting-up a native's barnyard, and locates fruit trees where mammals are feeding, streams they may visit, etc.

Care of Mammals after Shooting

When a mammal is shot the specimen should be so cared for that no unnecessary bleeding takes place. A hunting coat with large pockets is suitable for specimens the size of a squirrel. Smaller mammals should be carried to camp and skinned there. Larger specimens, the transportation of which is troublesome, may be measured and skinned out roughly where they are shot. Details of the skinning which require time, such as skinning out the hands and feet, may be left until later. Wounds may be plugged with cotton and the bleeding checked. If the temperature is high and the specimen may spoil before it can be given the time to skin it out, the removal of the viscera is advisable. In some cases it may

be advisable to wash the body cavity with a weak solution of formaldehyde, or even to inject a specimen with this solution.

Trapping Small Mammals

Trapping of small mammals is not difficult in most temperate regions, but in some places, notably in tropical America, it is an art not easily acquired. A trap-line should contain as many traps as the collector can give his attention to, after the various duties of a day are taken into consideration. In the tropics, where traps must be visited soon after sunrise and specimens must be skinned out the same day they are caught, the trap-line should be neither too long nor too far removed from camp. Where high temperatures do not exist much greater latitude may be taken.

To get a complete representation of the small mammals of a region, a collector should run a line of traps in every definite life-association area. That is to say, traps should be set along streams and ponds for the aquatic species, at the foot of trees, on logs or on boughs for the arboreal mammals, in high grass and bushes for the meadow-loving forms, and in burrows and holes for the digging or subterranean creatures. A good plan to follow is to set out traps so that by following an arc of a circle the collector will place some of his traps in each one of the special situations the region affords. A trap-line that leads directly away in a straight line may capture just as much as one that curves back again toward camp, but the time element is more in favor of a line that can be inspected both on the way out and back into camp.

It is no easy task to set out a large number of traps and then locate them the next morning without loss of time. By following prominent features of the topography this task is simplified. Traps can be set along a trail or a stream in likely places, or along the crest of a ridge. It is a help to place small markers on the twigs or vegetation near the trap and to adopt a system which tells something of the position of the traps.

A tuft of cotton twisted about a twig or blade of grass will catch the eye and call attention to the trap. If nesting birds remove the cotton, short lengths of white string may be used. Single markers may be used on each trap except for the third, when two markers are set out. A bit of colored calico could be used on the fifth trap. When running the line, therefore, the collector knows he must find three traps for

Fig. 2. Showing trap set close to log.

each double marker and five for each colored one. This often saves time and avoids running the line back very far to find the lost trap.

If natives are troublesome and steal traps too conspicuously marked, as they often do, another method must be employed. Twigs broken and hanging down, a blaze or knife-cut on a tree trunk, an overturned stone, and many other expedients will suggest themselves.

Quite often the most suitable places for traps are obvious to the collector. Under fallen logs, in holes under rocks or at the

bases of trees, in runways through the vegetation, or at any place where it is apparent that shelter or food exists, traps may be placed with confidence.

In some regions traps placed carelessly at random can not fail of a good catch; elsewhere, under conditions that appear much more favorable, a line of 100 carefully placed traps may yield only two or three mammals. When setting out traps it is advisable to place the trap so that animals may trip it in passing if they are not interested in sampling the bait. By taking advantage of natural lines of cover this can generally be done, and the figure on page 16 shows a trap placed against a log so that any rat or mouse running along in the shelter of the log must trip the treadle in passing.

When a runway is discovered the trap may be placed directly in it, preferably across the runway, because there is less chance of the mammal being thrown clear by the spring. It may be necessary to remove some of the floor of the runway in order to bring the trap flush with the surface. Burrowing mammals may be difficult to catch because they fill the trap with earth. Pocket-gophers and moles are especially troublesome in this respect, but the collector learns by the failures and evolves a technique to avoid this. Traps of special types are made for gophers and for moles and are more effective than steel traps.

Some aquatic mammals seldom run on the land and are not easily caught in the water. By searching for places where these mammals must take to land, at a waterfall for example, traps may be placed in the paths they must follow and specimens are secured. Under normal circumstances, mammals may be counted on to do the obvious thing, and this should be taken into consideration in the placing of traps. If a mammal standing on the ground is unable to reach a bait, it is quite apt to climb up on the nearest object which allows it to reach the morsel. If a low obstacle is in its path, it steps over it, and a trap may be set where the foot

comes down. The trappers of furs have many such methods, and while most small mammals apparently are not suspicious of traps, there are occasions when the resourcefulness of the collector is taxed.

The small traps for rats and mice should always be tied down to prevent a captured animal from dragging the trap away. Steel traps always have a chain fastened to them for this purpose but it will be necessary to put a cord or a small wire on the wooden traps. About two feet of strong, hard cord can be tied into the staple which holds down the trigger.

The bait for the small traps should either be sprinkled sparingly over the treadle and in front of the trap in the case of a loose bait, such as rolled oats, or else be placed directly in the bait hole in the treadle if the combination bait is used.

Small steel traps are often set, unbaited, in a runway or burrow. If a bait is employed it may be dropped here and there about the trap and then a few leaves scattered on top, or it may be suspended over the leaf-covered trap so that the animal steps into the trap while reaching for the bait.

Traps

The traps required for the capture of small mammals are of two main types. The traps for rats and mice may be of the common spring and board pattern, such as the Out-O-Sight; and the traps for the larger mammals are preferably a selection of different sizes of steel traps, the Newhouse and the so-called "jump" trap. These traps are standard and can be obtained almost anywhere.

The small traps on the market come in two sizes, a mouse size and a rat size. The American Museum has found it necessary to use a small trap intermediate in size between these, but such a trap must be made to order. Secure the best-made trap to be found; a cheap trap will warp and break after a hard rain. The Out-O-Sight trap has given the best satisfaction of any used by the American Museum. These

traps with wooden bases may be placed in hot paraffine for a minute or two and then placed in a warm spot to drain. This makes them water-proof and adds nothing that is distasteful to the animals which will visit them.

For active trapping at least 100 of the mouse traps would be carried and 50 of the rat size. Since traps occasionally break or are lost, a greater number will be needed for collecting extending over a long period. An average trap-line will mean about 100 traps out a night, more if mammals are difficult to secure, less if they are abundant. In some regions the proportion of rat to mouse size should be increased, or vice versa.

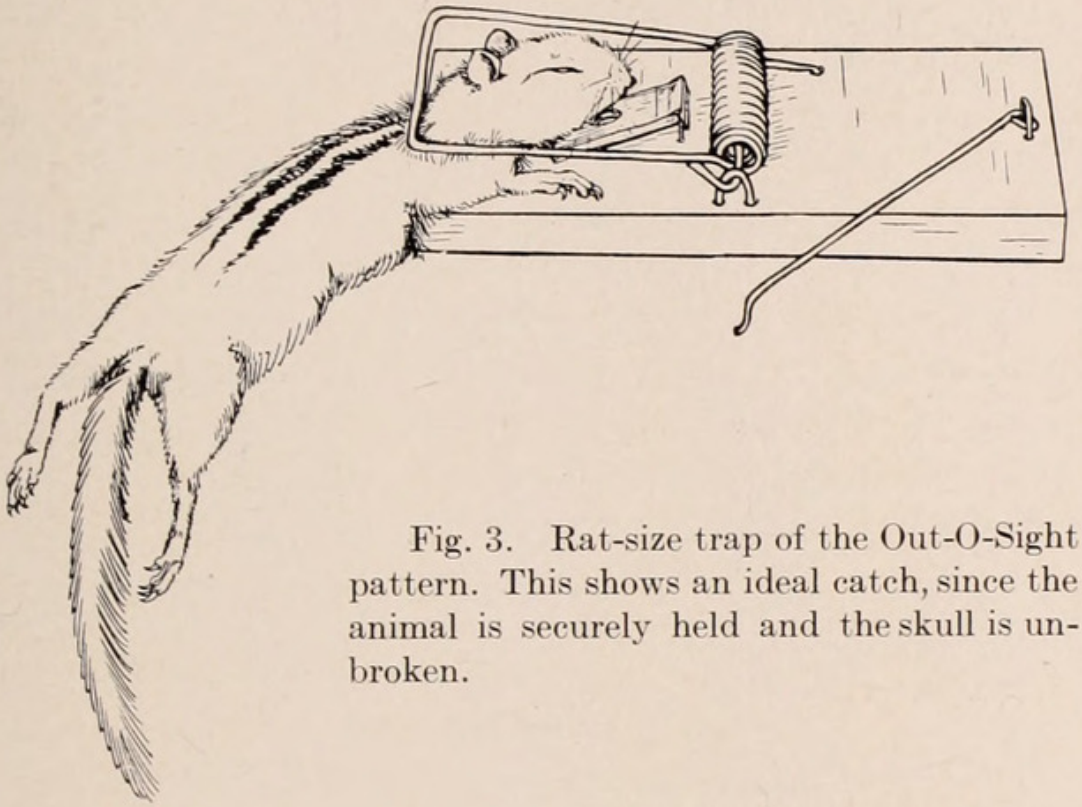

Fig. 3. Rat-size trap of the Out-O-Sight pattern. This shows an ideal catch, since the animal is securely held and the skull is unbroken.

Baits

There are many baits which may be used successfully in trapping small mammals. Rolled oats is a standard bait for rodents. Bits of bacon, dried fruit, peanut-butter, cut-up vegetables or fresh fruit serve for rodents; and for the small

carnivores, scraps of fresh meat, bird bodies or carcasses from the skinning table may be attractive.

The most generally successful bait used by the American Museum collectors is a mixture or combination bait which I have worked out on the basis of field work in Ecuador. It is made as follows:

> One part of bacon, cut up into small pieces; one part of cluster raisins, also cut up small; two parts of oily peanut-butter; rolled oats sufficient to make the mixture of putty-like consistency.

The bacon and raisins may be run through a food chopper if much of the bait is to be prepared. All of the ingredients should be thoroughly mixed and the final product will keep for months or years if stored in a tight jar or tin.

This combination bait is attractive not only to rodents but to shrews, opossums, and other small mammals. Unless carried away by ants, the bait lasts for several nights and is unaffected by light rains because of its oily nature.

No very signal success has been obtained by the use of special scents, such as asafœtida, fish-oil, etc., in trapping for smaller mammals.

Poisons

The use of poisons is not generally recommended for taking small mammals. The circumstances seldom arise to justify the use of poison and because of the uncertainty of finding the mammal after it has left the bait, it is a wasteful process. On open, exposed areas, poison is sometimes the best means of securing foxes and small carnivores.

MEASURING AND LABELING OF SPECIMENS

Each specimen should have tied to it a label with the following data:

1. The number given to the specimen by the collector.
2. Locality or place of capture.
3. Date.
4. Sex.
5. Measurements.
6. Name of Collector.

1. A catalogue of the specimens collected should be kept from day to day and a number assigned to each animal as it is skinned. This number is written not only in the catalogue but on the label which is tied to the skin and on the label which is fastened to the skull.

2. The locality where a specimen has been taken may be shown in various ways. If the place is well known and to be found on the map, the designation may be by two or three words, as, for example, Hastings, New York. If, however, the locality is at a distance from any well-known spot on the map, a designation as above is hardly sufficient and an explanatory clause should be added, as, for example, Santa Rosa, Chillo Valley, east of Quito, Ecuador, altitude 8000 feet.

3. The date is best written out, May 7, 1925, not 5-7-1925, which might be construed either as the seventh day of the fifth month or the fifth day of the seventh month.

4. The sex is ordinarily determined by inspection of the external sex organs or genitalia and only rarely is it necessary to make an internal dissection to ascertain whether the specimen be male or female. The sex is best indicated on the label by sign, ♂ for male, ♀ for female.

4. The measurements are of considerable importance and should be taken in millimeters whenever possible. The measurements ordinarily taken are the total length, the

length of the tail vertebræ, and the length of the hind foot. European collectors and workers prefer to take the length of the head and body and the length of the tail, arriving at the total length, if they wish it later, by addition. The American method will give the length of head and body, if it is desired, by the process of subtraction.

The total length is the distance in a straight line from the tip of the nose to the tip of the tail, exclusive of the hair. The animal is straightened out so that there are no curves in

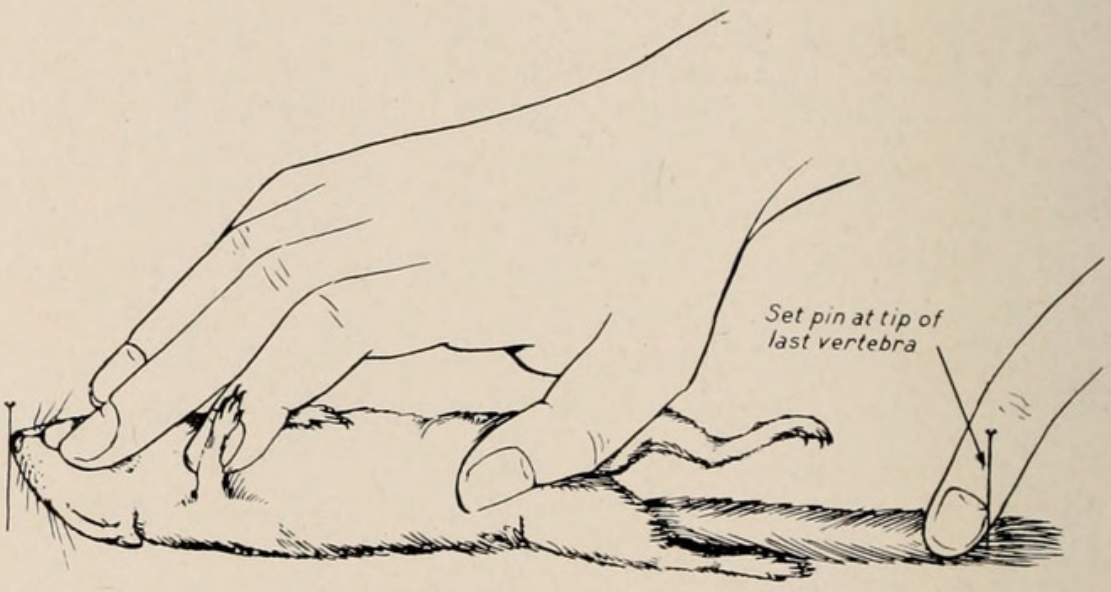

Fig. 4. Showing method of securing total length.

the vertebral column and, if *rigor mortis* has set in and the animal is stiff, the carcass must be stretched and manipulated to bring it into a natural position. Place the specimen on a board or table, as shown in the sketch, and set a pin at the tip of the nose and at the end of the last vertebra of the tail. It is possible to take the total length by holding a small mammal directly on a ruler, with the end of the ruler at the tip of the nose, and locating the tip of the vertebra with the thumb or fingernail, taking a reading from the ruler without recourse to pins. For one who is learning, the measurement will be more accurate if pins are used and the ruler applied to them.

The length of the tail vertebræ is taken as shown, from the base of the tail to the skin of the last vertebra. The tail is bent at right angles to the body to facilitate the taking of this measurement.

The length of the hind foot is taken from the heel to the end of the claw on the longest toe. The toes should be straightened out and the easiest way to keep the foot straight

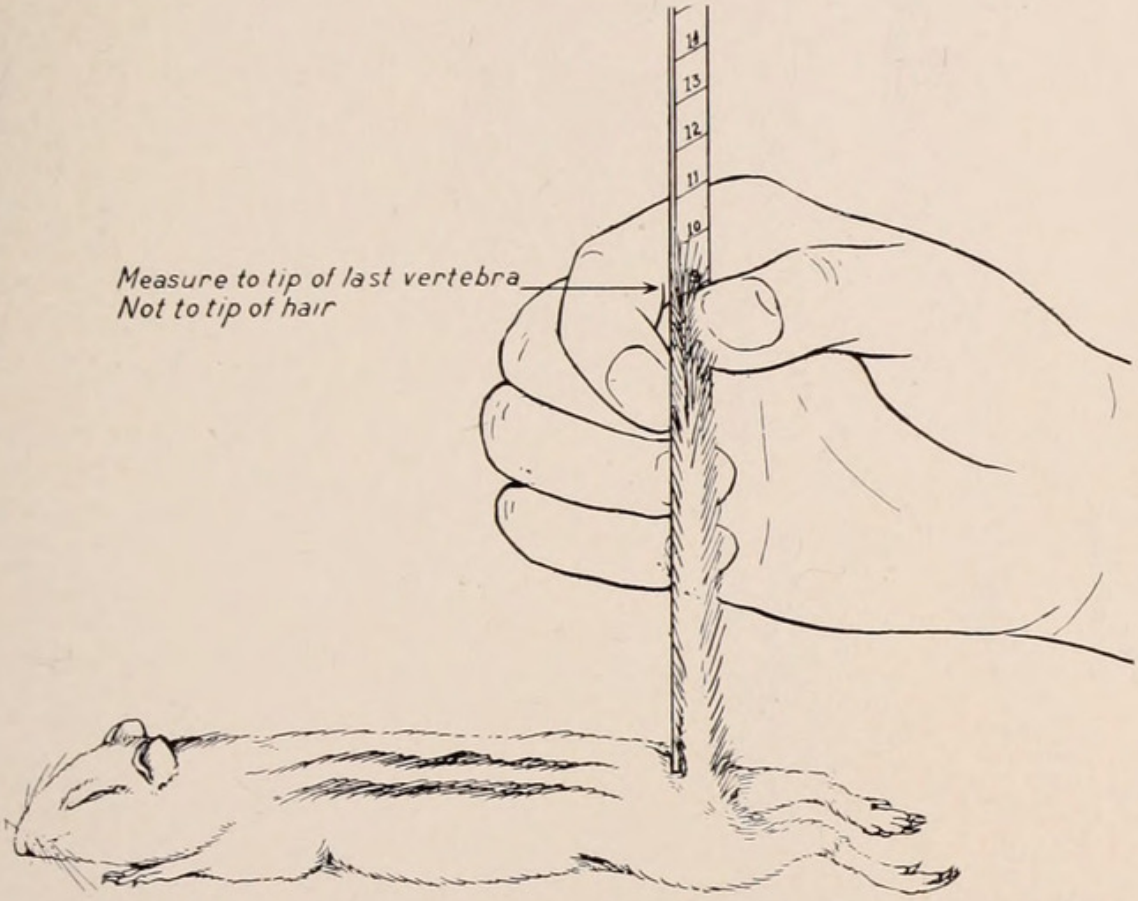

Fig. 5. Method of taking length of tail vertebrae.

is to press it against the flat side of the ruler, as in the figure. This way of taking the hind foot measurement to include the claw, often written as "length of hind foot, *cum unguis*," or simply "length of hind foot, c.u.," differs from the method employed by Europeans who measure only to the fleshy tip of the longest toe. This measurement without the claw is known as "length of hind foot, *sine unguis*," or "length of hind foot, s.u." Specimens collected for the American Mu-

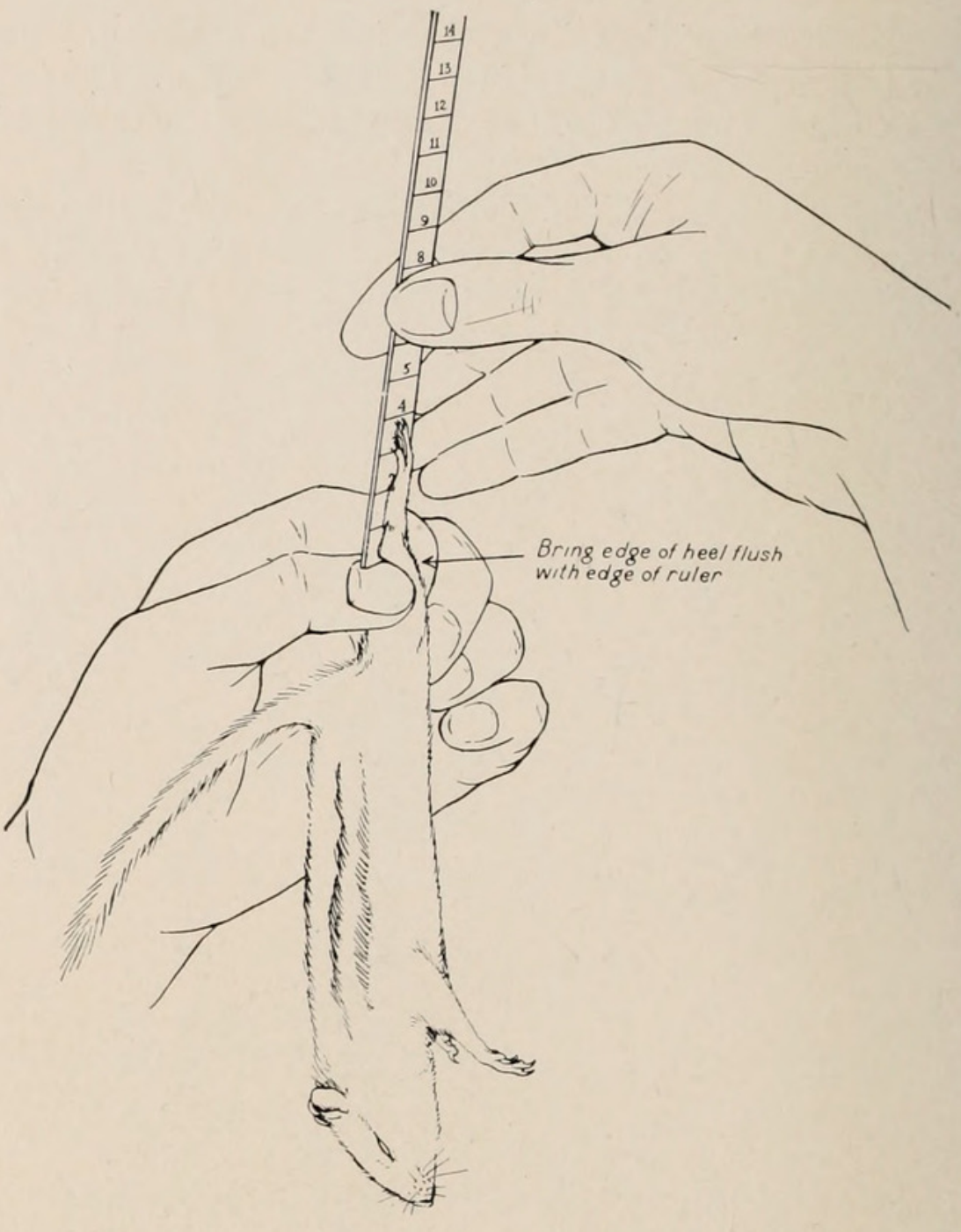

Fig. 6. Method of measuring the length of the hind foot.

seum of Natural History are always measured to include the claw in the length of the hind foot.

Sometimes the height of the ear above the crown of the head affords a valuable measurement. This is written on the label, "height of ear above crown," and may be taken by

placing the end of the ruler on the crown of the head at the base of the ear and then reading to the tip of the ear, exclusive of the hair.

Field Catalogue

It is important to keep a field catalogue of the mammals collected and to record in it all the data that is written on the label and such additional notes as seem worth while (see page 51). This catalogue may be any convenient size. The catalogues used by the American Museum give a line to a specimen, but the line runs across two pages and the data is entered in this order: collector's number, name of mammal (in the field this may be only "rat," "mouse," "squirrel," etc.), sex, locality, date, measurements, remarks. By writing remarks at the right-hand margin of the page there will be ample space, since extensive remarks will not be given for each specimen and if the part of a line regularly allotted to a particular specimen is not adequate, the note can be run over a line or two without crowding the page.

TO SKIN A SMALL MAMMAL

A chipmunk is selected as a typical small mammal, and mammals up to a raccoon in size are skinned in this fashion. The very first things to be done are the taking of measurements, the writing of the label, and the recording of data in the field catalogue.

With the chipmunk laid on its back, part the fur along the mid-line of the abdomen and make the opening cut from

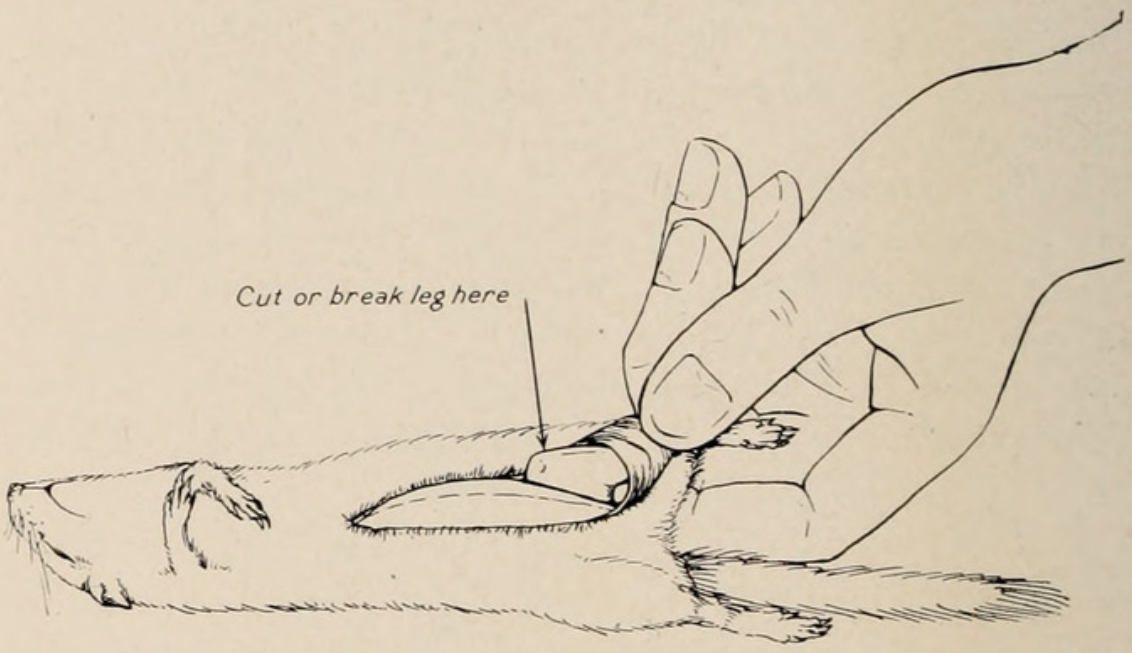

Fig. 7. Showing the opening cut and one leg freed from the skin at the knee

about the breast bone to the base of the tail. Figure 7 shows the extent of this cut, which should be through the skin only and not into the abdominal cavity.

Loosen the skin from the flesh along the sides of the cut, using the fingers or the flat end of the scalpel handle. A pinch of dry cornmeal dropped into the cut will be of considerable help in manipulating the skin.

Keep a container with cornmeal on the skinning table and do not be sparing in its use. Cornmeal not only absorbs the body juices, keeping the fur and skin clean, but the

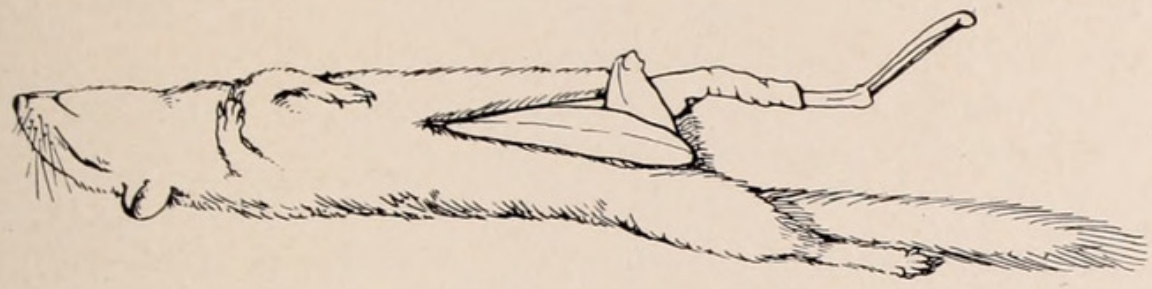

Fig. 8. The leg has been unjointed at the knee and the flesh has been stript from the tibia.

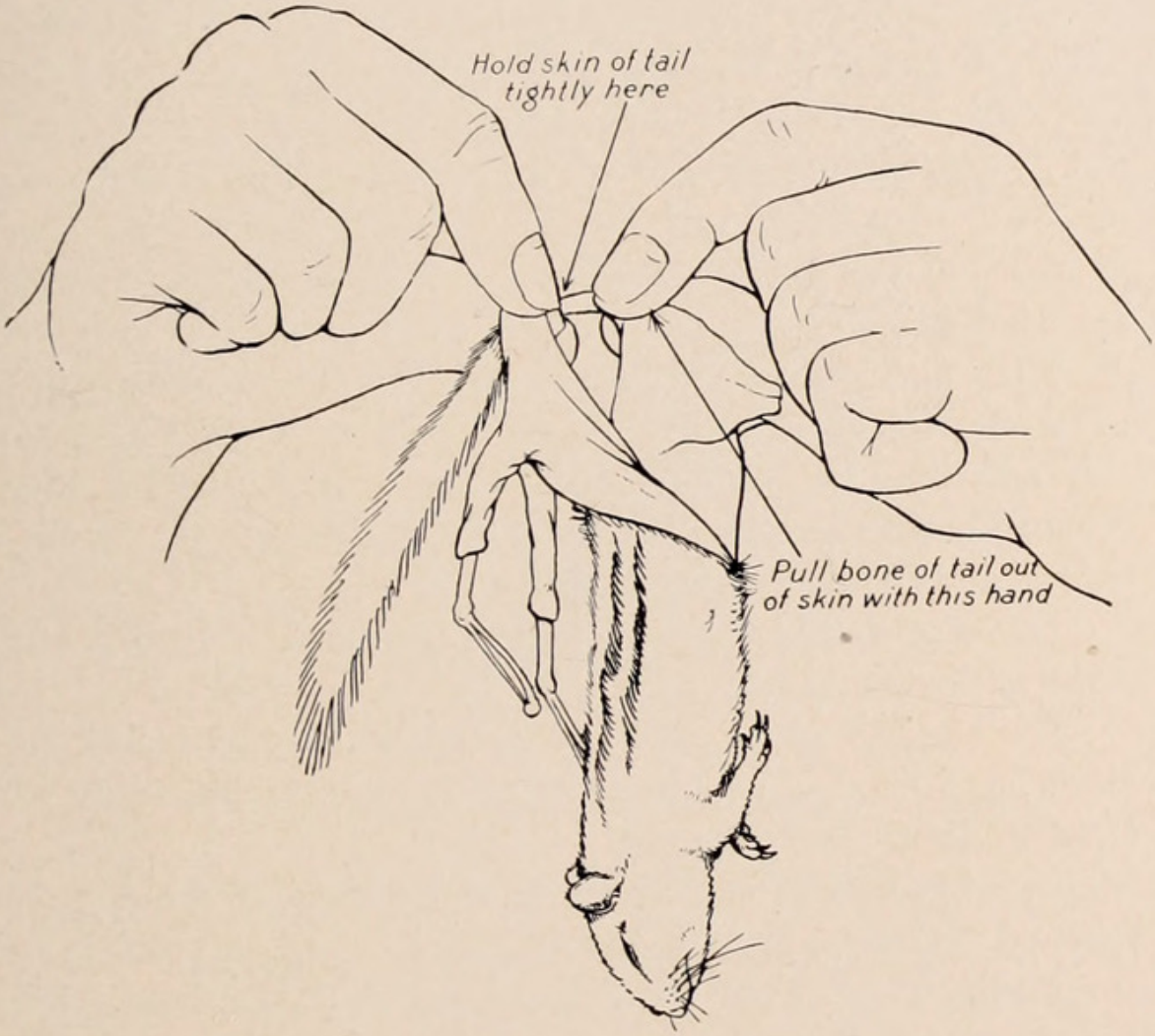

Fig. 9. Removing the tail vertebrae.

presence of the sharp grains on the fleshy side of the skin is a great aid in working and handling an otherwise slippery surface.

Work the skin loose from the knee and upper leg so that the knee-joint may be thrust upward, as in Figure 7, unjoint the leg at the knee and work the skin back as far as it will go. Clean the flesh from the lower part of the leg. See Figure 8.

Skin out the other leg in the same manner.

Cut away with the knife or scissors any tissue at the base of the tail and work the skin of the tail loose until it may be grasped as in Figure 9. The skin may be grasped between thumb and forefinger with the fingernails serving to strip the skin from the bone. Forceps may also be used to do this stripping. A steady pull on the base of the tail should bring the vertebræ out entire. Occasionally a mammal is found, the tail of which must receive special treatment, or a shot may have cut a vertebra. In that event the skin of the tail may be split for a short distance along the under side and sewed up afterward.

With both legs and the tail free, the skin is rolled back until the forelegs are reached. This parting of the skin from the body may be accomplished partly by manipulation with cornmeal and the blunt handle of the scalpel, partly by cutting strands of tissue here and there.

The skin should never be pulled until it stretches, at any stage of the skinning.

The forelegs are worked free of the skin, unjointed at the elbow, and cleaned in much the same manner employed for the hind legs. See Figure 11.

The skin is then rolled back until the bases of the ears are reached. Cut these with the scalpel as close as possible to the skull. Do not cut the bone of the skull, however. See Figure 10.

As the skin is worked over the head, the eyes will be exposed. Cut the eyelids free with the point of the scalpel,

working carefully to avoid cutting the lid. This means that the point of the knife must work deep. Probably the novice will learn just how deep only by passing through the experi-

Fig. 10. Skinning about the ears.

ence of cutting off a few eyelids. The skin is cut free at the nose by slicing through the cartilage; take care not to cut the delicate bones of the nose.

The skin finally parts from the body at the lips and is now turned inside out, as shown in Figure 11. Clean off any bits of fat or meat on the skin. It is especially important that

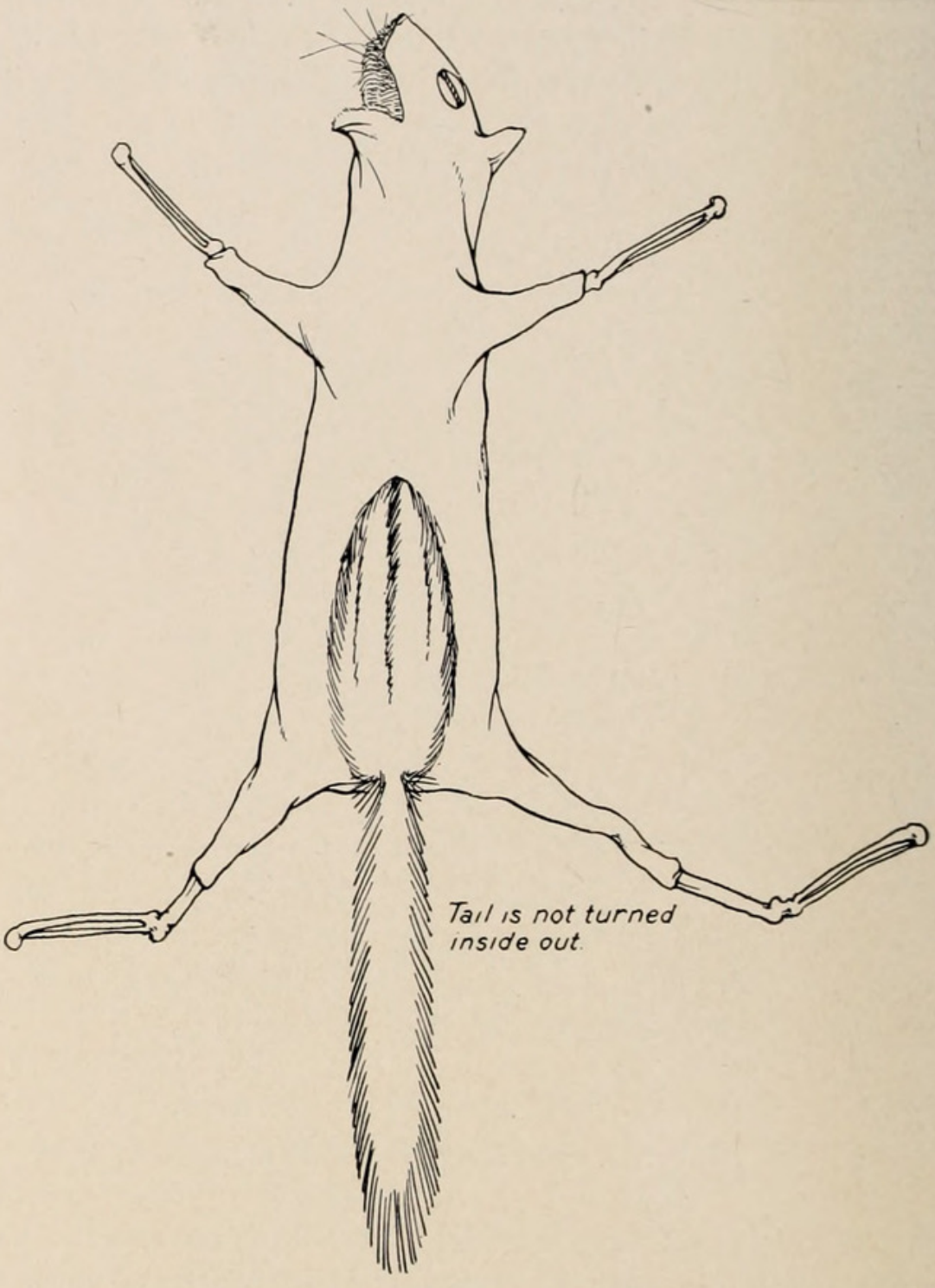

Fig. 11. The skin removed from the body.

all fat be removed from the skin. Take three stitches to close the lips. See Figure 12. Do not take these stitches too deep into the lips.

If the skin is especially greasy or bloody it may now be washed thoroughly inside and out with soap and water or in benzine. Avoid stretching the skin while it is thus wet and lax but otherwise it may be handled like a piece of cloth. Squeeze out the surplus moisture; do not wring out the skin lest it stretch; and dry the fur by a liberal use of dry corn meal or sawdust. As fast as the cornmeal absorbs moisture and becomes damp, replace by fresh, dry cornmeal and very shortly the fur will be dry and fluffy. The skin may then be turned inside out again to be poisoned.

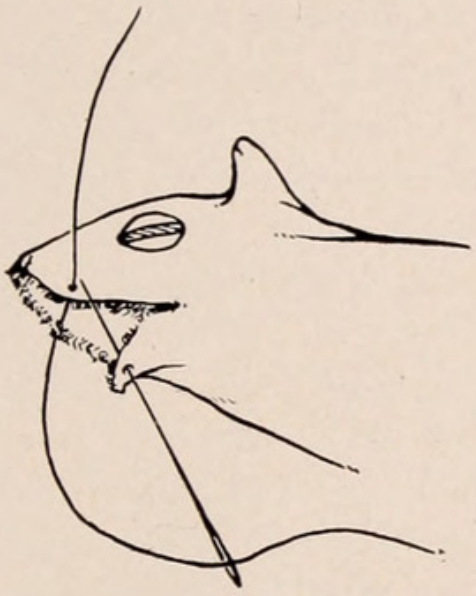

Fig. 12. Stitching the lips.

Now dust over the skin thoroughly with the arsenic and alum mixture, using a small brush, a rabbit's foot, or a tuft of cotton on a stick. See that the powder comes in contact with every part of the flesh surface. Work some of it into the tail, using a wire to dust it down past the base of the tail.

It should be needless to caution the worker that the arsenic mixture is poisonous if taken into the stomach. It is also a powerful irritant if it gets under the fingernails. The use of cornmeal in skinning generally protects the fingers, because the cornmeal gets under the nails first and prevents the accumulation of arsenic there. Do not dip the fingers into the arsenic if it can be avoided.

Shake off any surface arsenic and alum; turn the skin right side out.

If the mammal is of fairly good size, and the climate is

such that skins do not dry quickly, it will be advisable to slit the soles of the feet in order to get arsenic in at the base of the toes and about the phalanges. Perhaps it will be possible to remove some of the fleshy tissue from the soles of the feet through this opening, which can be made either at the extreme edge of the palm or sole, or down its median line. The opening may be closed by a stitch or two after the preservative has been sifted in.

TO FILL OUT THE SKIN OF A SMALL MAMMAL

Prepare a body of tow for the chipmunk, pulling out the fibers until all point the long way of the body. Do not make the body too large: judge the size somewhat by the size of the carcass you have just removed but remember that the tow will compress.

Bend over the tow at the extreme end of the body so that the short ends of the long fibers are directed back along the body and the head end of the tow form is bluntly rounded. Grasp this end with the forceps and insert the tow into the skin, working it into the head and nose, as shown in Figure 13. Fill out the nose and shape the head, drawing the skin of neck and body smoothly over the form. Cut off the tow so that the new body just fits at the base of the tail.

Twist up a wisp of tow over the points of the forceps by twirling the forceps in the tow, slip the tow into the leg between the bone and the skin as far as it will go, grasp the point with the fingers of the free hand and the forceps may be withdrawn, leaving the tow in the leg. The leg should be drawn out straight as this is being done. See Figure 14. One wisp of tow is sufficient for the foreleg but two will make a better hind leg.

The next step is to wire the tail. Straighten out a piece of wire by pulling on it until it gives a trifle. Cut off a length equal to the length of the tail plus the length of the opening cut in the skin. The size of the wire should be such that it will go to the end of the tail and yet be stiff enough that it will not bend easily. In the case of species where the tail is long and tapers to a fine point, it may be necessary to dress down the terminal inch or two of wire with a file.

Twist a little cotton or tow tightly about the wire to fill out the tail. At first it may prove difficult to get a thin, even layer of cotton on the wire; the knack comes with practice and consists principally in adding the cotton, a thin wisp at a

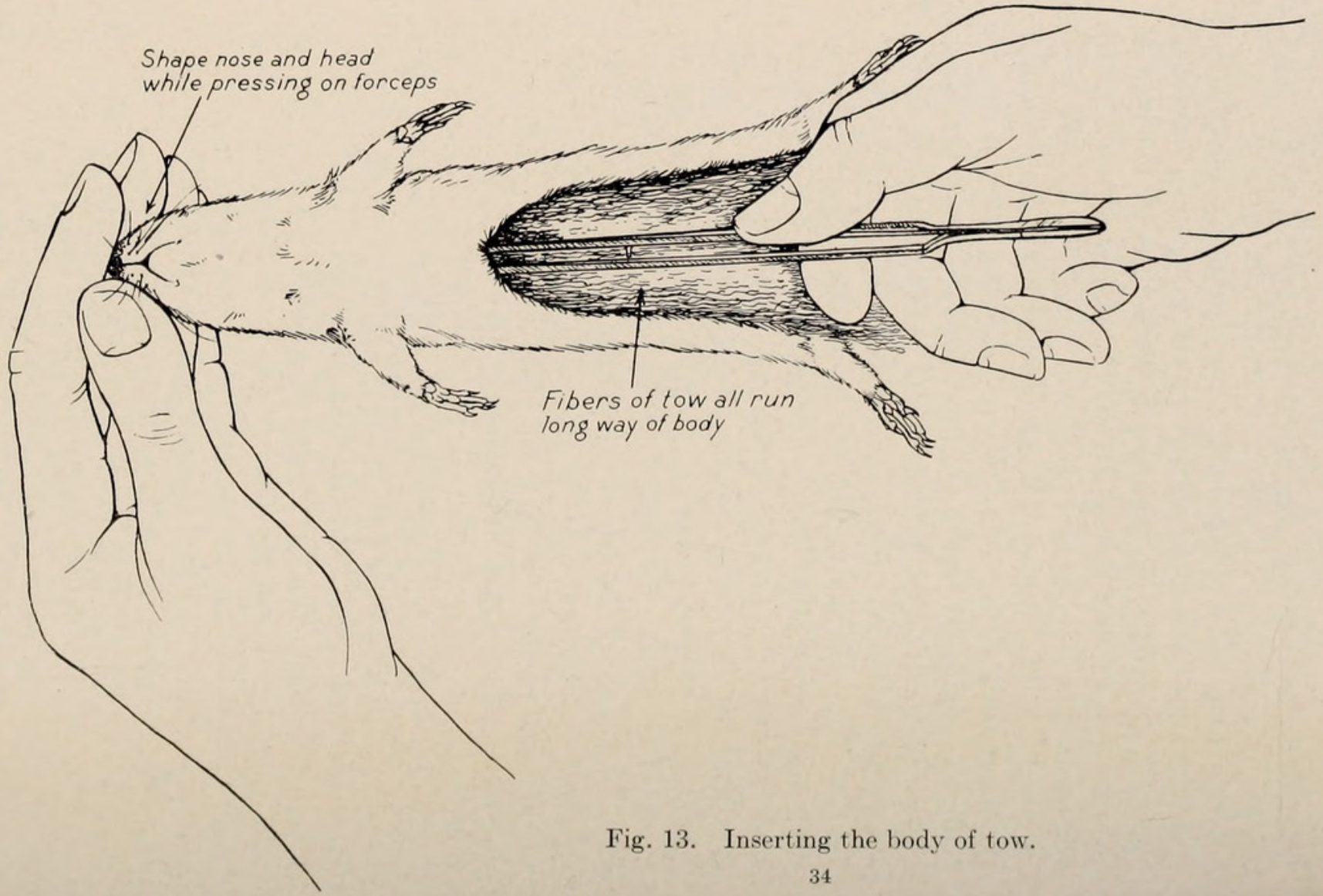

Fig. 13. Inserting the body of tow.

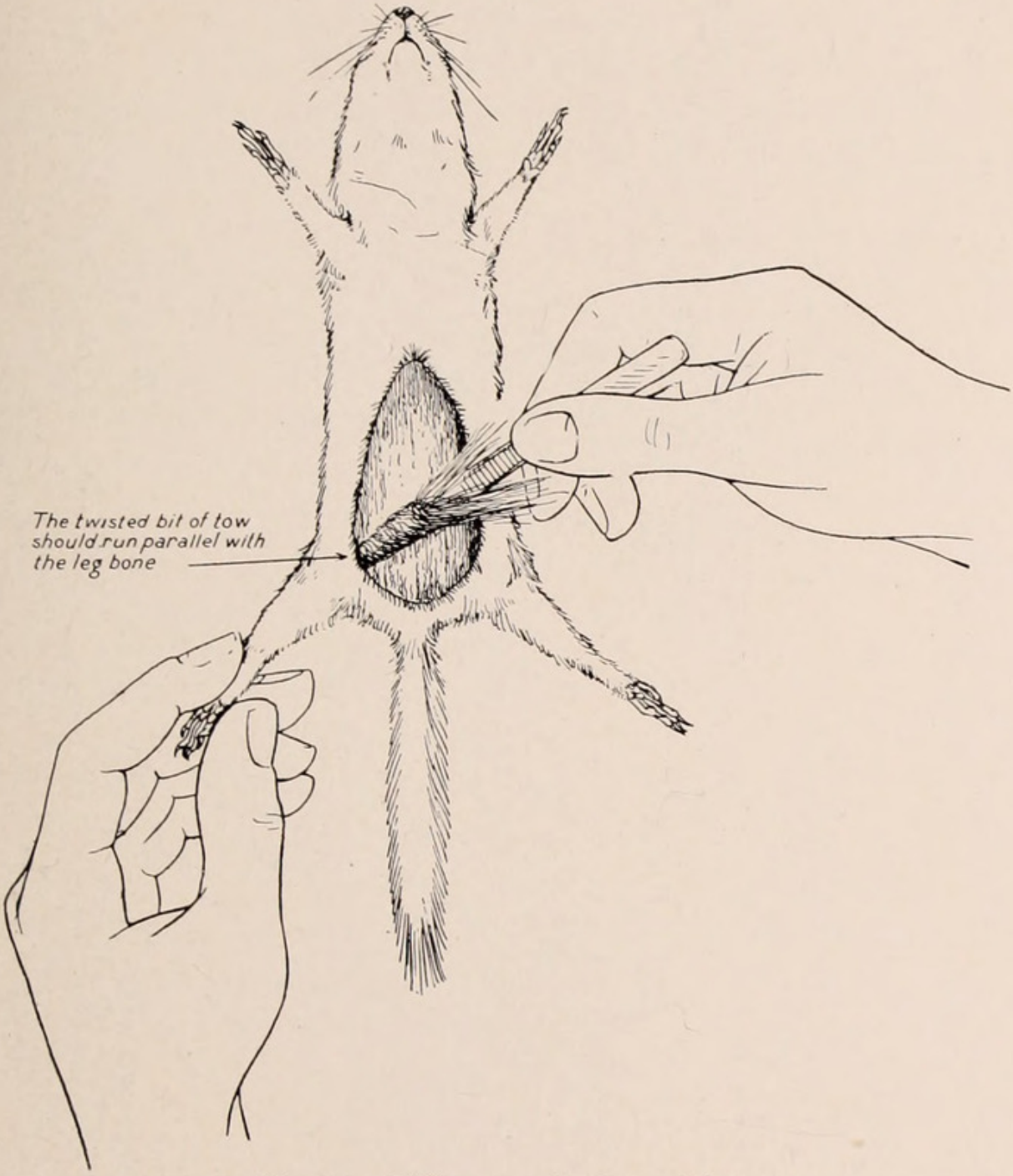

Fig. 14. Filling out the legs with tow.

time, and twirling the wire to make it lie flat. Be careful to not put on too much or you may push the tail off trying to get the wire in. By carefully working the wire down the tail it will go the full length and the part of the wire outside will slip into the cut along the abdomen. See Figure 15.

Lay the chipmunk on its belly and try a preliminary shap-

ing-up of the skin. See if it will look about as in Figure 17. It may be necessary to slip in a little more tow about the rump.

If the filling seems satisfactory the skin is then sewed up as in Figure 16. The thread will hold best if it is tied into

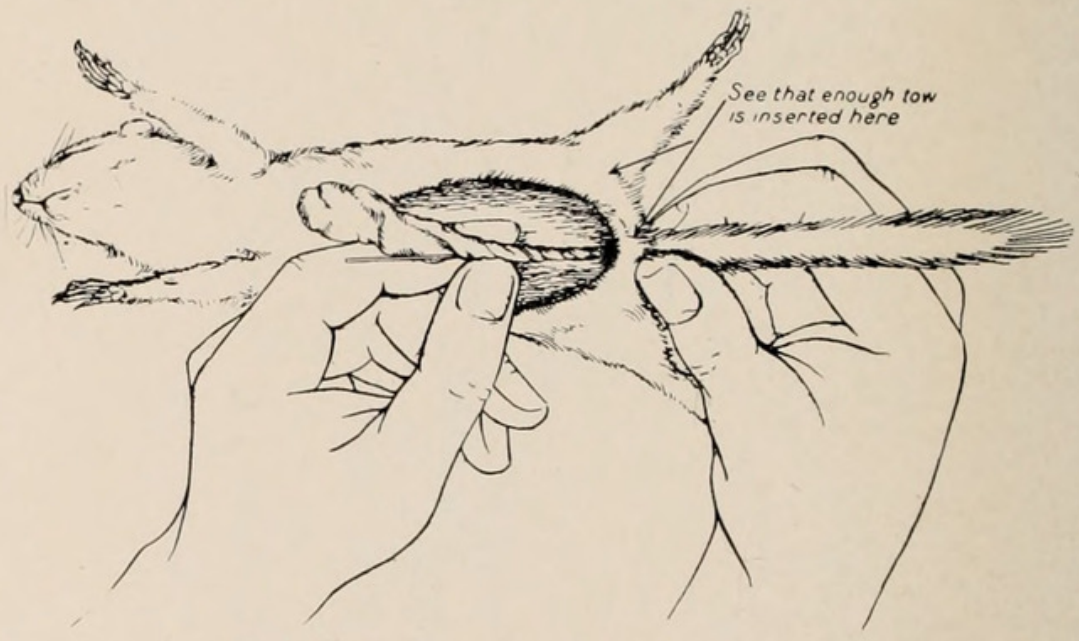

Fig. 15 Filling the tail with a covered wire

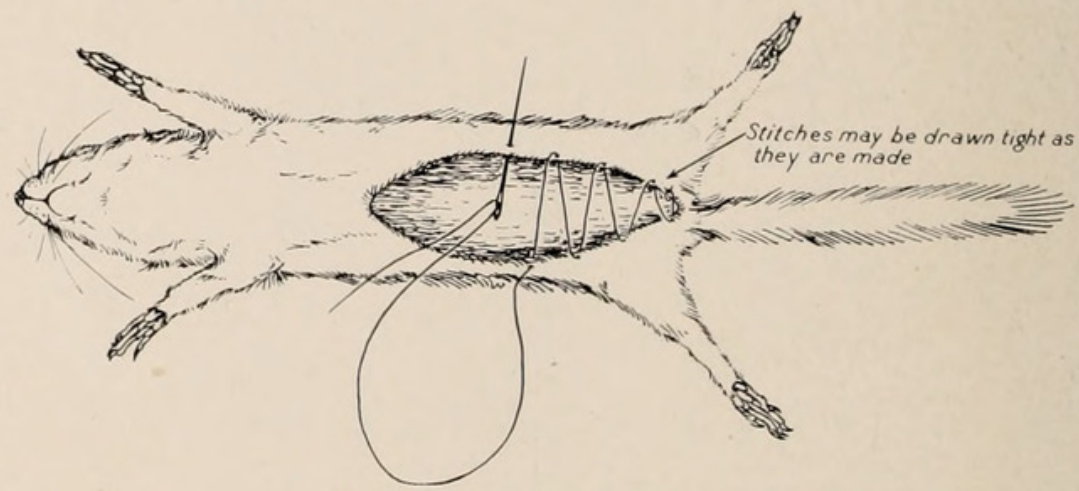

Fig. 16. Sewing up the skin.

the skin at the base of the tail. A knot at the end of the thread often pulls through. The thread should be caught with a single loop-knot where the sewing finishes off.

Take the tooth-brush and brush off any blood or dirt on the finished skin.

Fig. 17. The finished skin, pinned out.

Fig. 18. The finished skin, from the underside.

Tie the label, with the complete data, on the right hind leg, making a secure knot just above the heel so that the thread can not slip off.

Pin out the skin on a board, running the legs close to and parallel with the body and arranged as shown in Figures 17 and 18. The position of the pins may be seen in the figures, one in each hand and foot, one at the side of each hind leg to keep the feet in close, and two pins crossed over the tail.

Fig. 19. A skull properly labelled.

Remove the skull from the carcass by unjointing carefully at the neck. Cut off from the skull only the largest of the muscle masses in the case of medium-sized species but remove nothing from skulls of the small species. A certain amount of tissue dried onto the skull will protect it until it can be properly cleaned. Remove part of the brain with a wire, but it is not advisable to clean out delicate skulls too thoroughly in the field if they may be adequately dried. The thin vault of the cranium is very apt to be crushed unless special provision is made for its protection.

Remove the tongue and fasten on a skull label which has the same number on it as is on the skin. It is well for the collector to add his initials to the label also. If paper labels are used the number should be on each side of the label. No tragedy in a collector's experience is keener than the inability to match skulls with skins after they have been brought in from the field.

Do not allow skull labels to become stained with blood. Dip skulls into cornmeal; it hastens the drying and keeps the labels from adhering to the flesh. Do not dip the skulls into the arsenic-alum mixture. Do not allow blow-flies to have their own way with your skulls. The skulls may be kept on a wire and hung up out of the way of dogs or animals

to dry. Run the wire through the loop of wire or string on the label, not through any part of the skull. Skulls may also be dried out in a small box, one or more sides of which are screened. Above all, do not allow your skulls to get wet and remain wet; they macerate or decay when wet and the resultant discolored mass may be of little use to any one, if the decomposition goes so far that the jaws drop away from the skulls and the numbers cannot be associated with the skulls.

Very satisfactory skull labels may be made from strips of block tin or monel-metal; the number may be stamped on or scratched on with a sharp tool, and if the monel-metal wire is used to fasten the label to the skull, there is little chance for the label to become illegible or to drop off.

Small skins will require about a week or ten days to dry out under normal conditions. Keep them out of the direct sunshine, but where there is a good circulation of air. In the tropics it may be necessary to dry the skins by artificial heat. If this is done, keep the specimens as far from the fire as is possible and still dry them. Too much heat will hurt them and the smoke will stain them. When thoroughly dry they may be removed from the boards, wrapped in paper, and carefully packed in some suitable container.

Collecting Chest

Sketches are shown of the type of collecting chest which I have found most useful. A regulation army locker-trunk is the foundation. This trunk comes equipped with a tray (Figure 20) which lifts out and generally rests across two transverse cleats at the ends of the trunk.

Remove these transverse cleats and fit four upright cleats at the corners, as shown in Figure 21. These cleats should be high enough to support the large tray where it belongs, at the top of the trunk. The cleats should be about five-eighths or

Fig. 20. The tray which rests in the top of the collecting chest.

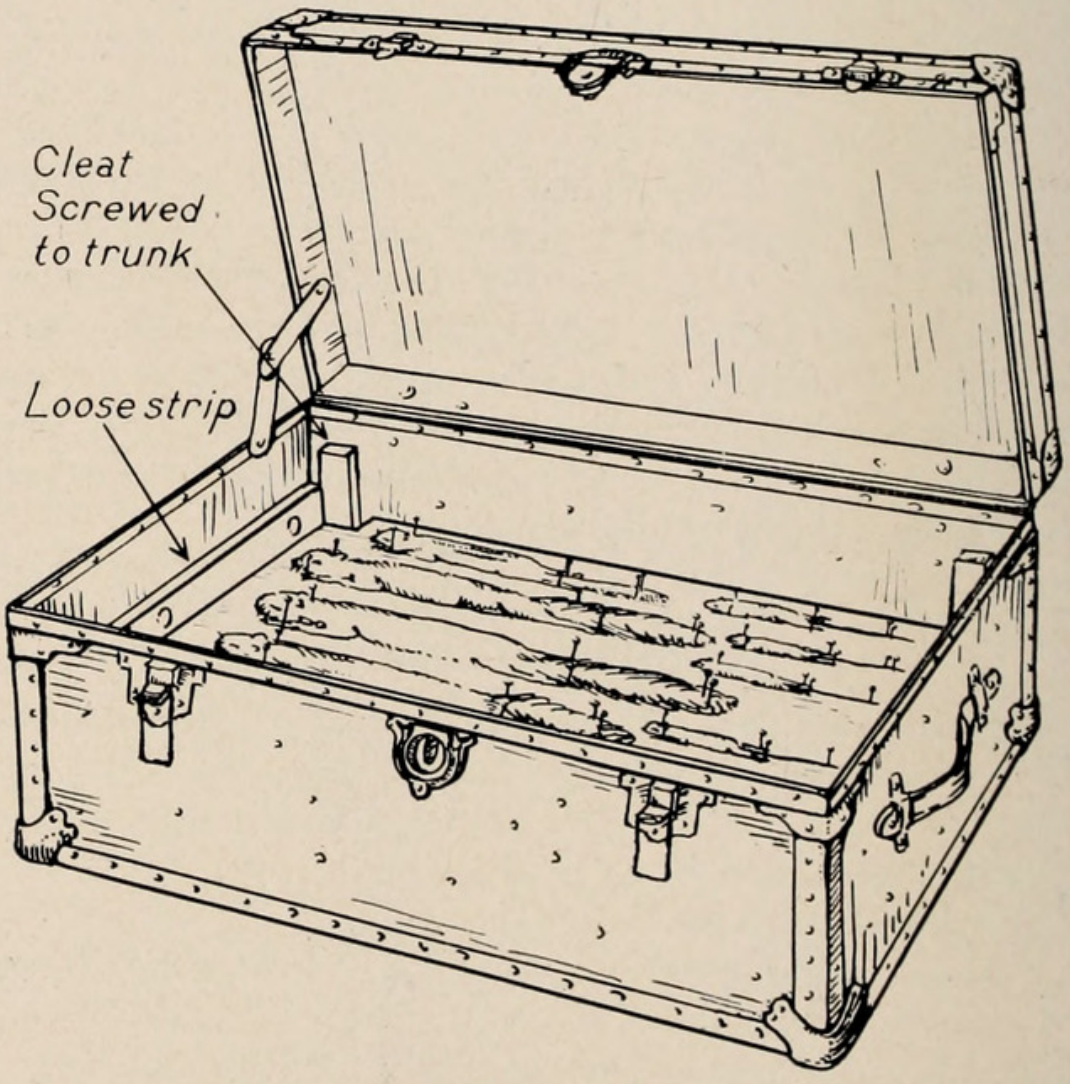

Fig. 21. A convenient collecting chest.

three-quarters of an inch in from the ends of the trunk to allow narrow strips to pass between them and the ends.

Five or six boards of thin material—I have found "compo-board" most satisfactory—are cut as shown in Figure 22 so that they will just drop easily to the bottom of the trunk. Two strips, the width of the board, are cut for each board but are not fastened to the board in any way. The width of these strips will govern the depth of the tray desired and should be

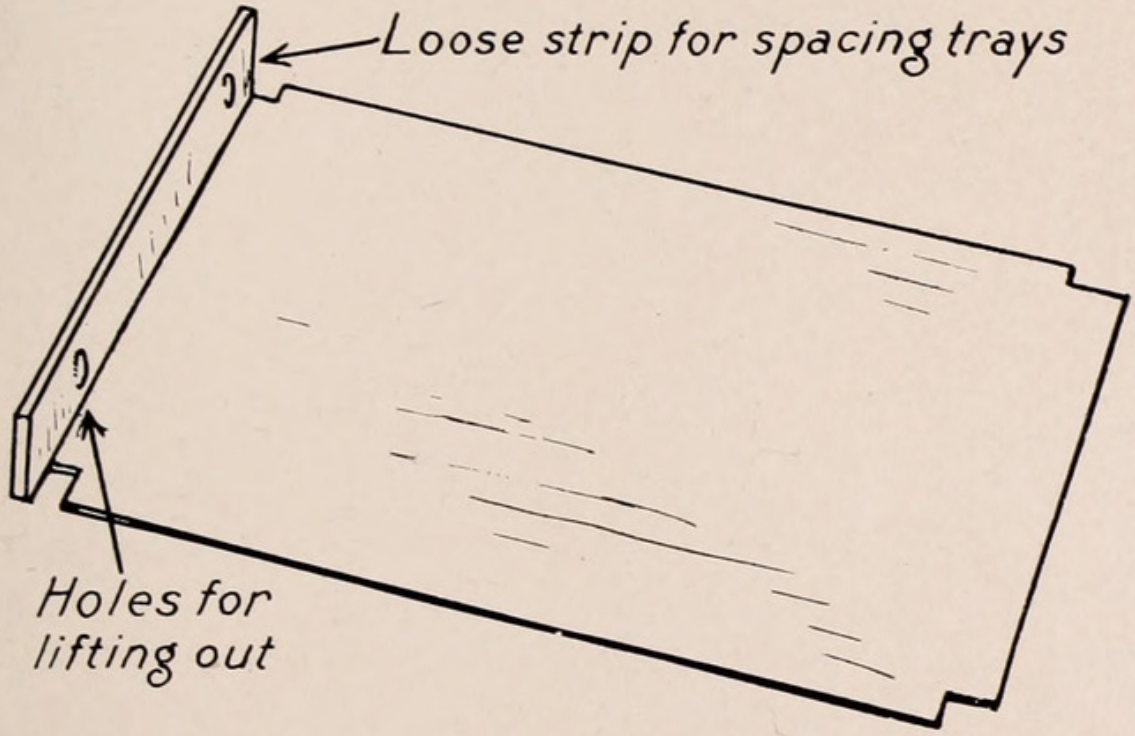

Fig. 22. A drying board with one of its two spacing cleats.

so figured that when the requisite number of boards and strips are assembled, as shown by Figure 21, the last board comes up to the level of the large tray. A useful width of strip will be one and a half inches for the average small mammal, but some may be only one inch and at least one pair will need to be three or three and a half inches wide.

The method of using these boards and strips should be obvious from the figures. The boards, when not in use, lie flat in the trunk and leave most of the trunk space available for packing. When skins are pinned out on the boards, the

boards are spaced one from another by dropping strips across the end. Holes at the ends of the strips allow the fingers to be inserted to lift the strips out.

If the skins are securely pinned into the soft wood, they will not shift during transportation. Skins should be pinned rather closer to one another than is shown in Figure 21. In placing mammals, allow for the space taken up at the end by the strip which will be inserted later. A thin layer of cotton laid upon the skins will make them still more secure when pressed down by the board of the succeeding tray.

Handy containers for dried skins are made by cardboard suit boxes. These are obtainable in flat, unassembled shape, and fit into the bottom of a locker trunk after they have been bent over at the side or end. This bending is along a line later used for the assembled box, so that no harm is done. The suit boxes filled with dry skins are later packed in whatever containers are available for shipment, and, because they may be securely packed as units, the skins come through in better shape than if they were packed directly into the large container.

When dried skins are permanently packed up they should be laid out flat and close to one another, so they can not shift about. Each skin should be wrapped carefully in a piece of paper before it is finally packed. It is advisable to separate each layer of skins by a thin sheet of cotton and to fill in any cavities with wads of cotton or tow. If the layers are very uneven, a sheet of cardboard might be employed to even up the pressure on the skins. Scatter naphthalene flakes in among the skins as they are packed.

Do not pack skulls with the skins if it is reasonably possible to avoid it. Insect life that has been feeding on the skulls may attack the skins. If skulls must be packed with skins, kill any insect life in the skulls by dipping them in a solution of arsenic and water, in weak alcohol, or even in weak formaldehyde. A short immersion kills all insects and does

not injure the skulls. Needless to say the skulls are thoroughly dried again before packing.

THE PRESERVATION OF SMALL MAMMALS ENTIRE

It is often well worth while to save entire specimens of small mammals for future dissection and anatomical study at the museum.

For this purpose either alcohol or formaldehyde may be used. For strength of solution, see page 11.

The specimen is opened up along the belly, the cut penetrating into the abdominal cavity so the solution may reach the viscera. Take care that the knife does not cut any of the organs. For bats and other small mammals this cut is the only preparation required and they may be dropped into the jar or can of preservative solution. Labels with full data should be tied to each specimen, of course.

In the case of larger species, it may be necessary to inject some of the solution into the mammal because immersion alone will not be sufficient. A large, injecting, hypodermic needle must be carried for this purpose. When the animal is of such a size that the body fluids may so dilute the preserving solution that decomposition sets in, the weakened solution must be replaced by fresh liquid at the end of several days.

When many small specimens are placed in one container they should be wrapped individually in a little cheese-cloth or muslin; otherwise rubbing may take the hair off.

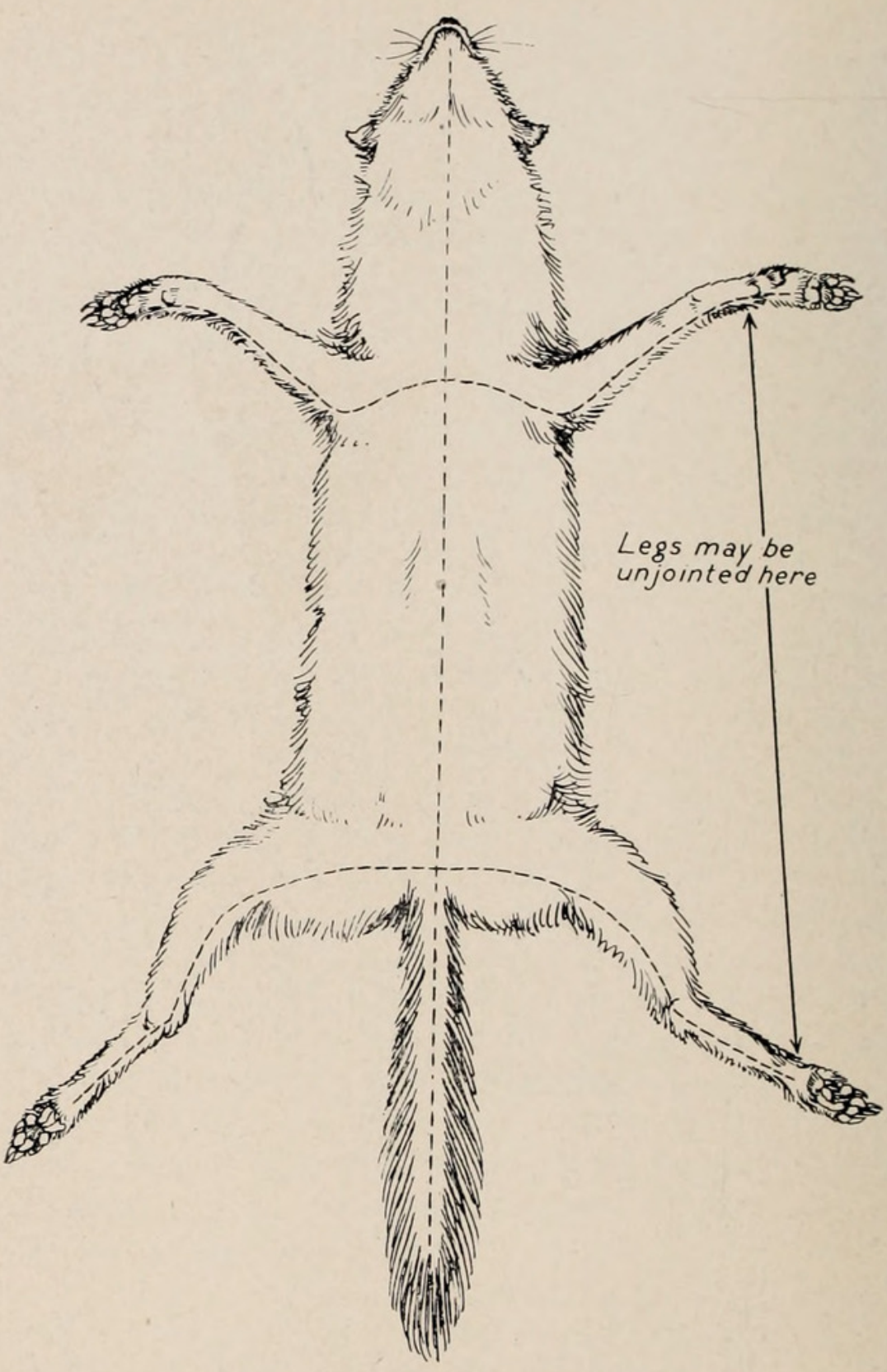

Fig. 23. Opening cuts for larger mammals.

TO SKIN A LARGE MAMMAL

If packing space is limited it may be advisable to fill out in the field nothing larger than a small squirrel. The skinning of these smaller mammals which are to be stuffed later is best done as described for the chipmunk.

Mammals larger than woodchuck, opossum or raccoon are seldom stuffed in the field. They are skinned in somewhat a different manner than that described for the chipmunk; the skin is poisoned and dried flat and is made up later at the museum.

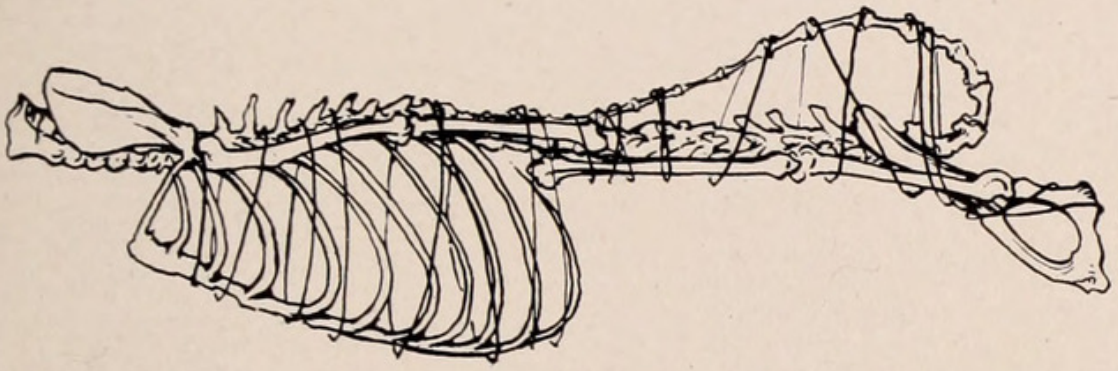

Fig. 24. Skeleton tied up for packing. This skeleton is rather better cleansed than will be necessary for the smaller mammals and a thin layer of flesh and muscles should be left to dry over the ribs and the processes of the vertebrae.

Measurements are taken as for the chipmunk. The opening cuts are shown in Figure 23. The skin is thoroughly poisoned and dried out over a cord or rope. Care should be taken that the skin does not wrinkle so that folds are closed off from the drying influence of the air. The dried skin is rolled up in a compact bundle.

Instructions for preparing the largest mammals, and the procedure to be followed in securing material to be mounted, are given in a separate publication.

Skeletons

The collecting of material for skeletons is also given in a separate publication by the American Museum of Natural History entitled, "The Preparation of Rough Skeletons," by Dr. Frederic A. Lucas. See Figure 24, showing a small skeleton prepared in the field.

In the case of very rare specimens it is often desirable to make as complete a skin as possible and to save as much of the skeleton as remains in the carcass. In this case the skin is taken off as usual, care is exercised to unjoint rather than break the limb bones, and the skeleton is prepared as described in the handbook just listed.

SAVING ODD MAMMAL SKULLS

In the majority of cases the skull is fully as valuable as the skin, and often constitutes the more valuable part of the specimen. For this reason the collector should save odd skulls without skins. For example, a specimen may be secured in such condition that the skin is valueless and the skeleton as a whole badly broken. The skull of such a specimen might show all of the essential characters of the species and be well worth saving. Odd skulls should have a record made in the field catalogue, and preferably on the skull label as well, that the specimen is "skull only." This saves trouble later on when one looks for a skin to match.

A valuable source of odd skulls is owl pellets. Many of the owls live largely on small mammals and, in the regurgitated pellets of these birds may be found skulls of practically all of the small mammal fauna of the region. From an inspection of these pellets, the collector can get a very good idea as to what he may trap for. The owl is a better collector than man can hope to be, and not a few species new to science have been based upon odd skulls obtained from owl pellets. Save all skulls found thus; they are valuable.

A good place to look for these pellets is near the entrance to caves, at the bottom of hollows in dead trees, or sometimes under limbs or cliffs where the owls have a habit of perching.

Collecting Bats

The collecting of bats presents problems quite different from those encountered in the pursuit of flightless mammals. Not only are bats difficult to secure, but they are also more troublesome for the novice to prepare as skins. Bats are exceedingly important, however, and offer more possibilities to the collector, probably, than any other order of mammals.

Only rarely may bats be trapped. Some of the fruit-eating species may be caught in traps set about ripe bananas, plan-

tains and other tropical fruits, but most of the specimens the collector secures must be shot while flying, or knocked down by sticks. Because bats ordinarily do not take wing until dusk, some of them much later, shooting must be done in uncertain light and with the added disadvantage that specimens actually hit are lost as they tumble out of the sky-line. The flight of bats is so irregular and erratic that they are extremely difficult targets and the collector must be a very good shot to get many with the gun. The best size of shot for shooting bats is No. 12, or No. 10 if they are flying high; and both the small auxiliary charge and the full size 16-gauge shell will be useful.

When bats are found in caves they are much more easily secured. Here a shot may be fired into a colony of them as they are at rest, and often one shell brings down all the specimens required. Perhaps the passages in a cave are low and will allow a collector to reach bats with sticks or switches, and specimens may be knocked down. Bats have the habit, often, of segregating themselves in caves by sex and species. That is to say, all the individuals of a cluster or colony will be one species and one sex. This means that a few specimens should be taken in each part of a large cave in order to be sure that a complete representation has been secured. After a shot or two has been fired in a cave the bats may take wing, and such a state of confusion reigns that the collector will have no way of telling what he is collecting until the specimen is in his hand.

A net may be stretched across the entrance to a cave and the bats driven out into it. Mosquito-bar or cheese-cloth may be used for this purpose. An insect-collecting net or butterfly-net occasionally comes in handy in cave collecting.

Some species like to fly back and forth over the water and are thus more easily found when shot because they fall into the water. If the water is still or slow-moving, and one is able to retrieve what he shoots, such a collecting site will

prove very valuable. Little clearings in the forest or open meadows will also be good places to watch for bats.

Bats may frequent dwellings or old buildings and are secured by much the same methods as are employed in caves, namely, shooting, knocking down by switches, or netting. Hollow trees in the forest may be the home of desirable species which can be smoked out by a fire and shot or netted as they emerge.

Some of the rarest species of bats are forest dwellers and spend the day hanging in thick clusters of leaves or where two or three leaves hang together to make a shady nook. Such dark spots are made when a banana or plantain leaf is broken across the mid-rib by the wind and hangs down, in shape like an inverted V. At the apex of the V there may be a bat or two and a shot may be fired at a venture with a fair chance of specimens, if the collector is in a good bat country.

Bats are skinned just as the chipmunk was skinned, page 26, but may be more troublesome at first because of their somewhat different body shape and the presence of wings. Be sure to break the wing at the humerus so that the elbow joint is left in the specimen, and when making up the skin remember to leave the elbow in a position to afford the measurement of the forearm, to be taken from the dried skin later.

No difficulties will be encountered in stuffing the skins of bats, but the collector may be troubled when he attempts to pin the specimens out to dry. Pin the bat out with the back up, belly to the board, just as with the chipmunk. Set the wings close to the body by a pin through the wrist, drawing the wrist close up to the neck and body. Bring the thumb with its sharp, tiny claw, back against the wing, so that it does not stick out to catch on things. The long finger joints or phalanges will tend to arrange themselves in a natural order, running backward from the wrist close together and parallel. A pin or two at the tips of the wings helps to hold the wings in place.

The hind legs are generally pinned farther apart than would

be the legs of a rodent, for example. This is to allow for a better display and arrangement of the interfemoral membrane which extends from leg to leg and may include the tail.

Instructions are given elsewhere for preserving bats as alcoholic specimens.

Miscellaneous Hints

After one has prepared a few small mammals, various short cuts in procedure may suggest themselves. Individual deviations from the practice described in this handbook may be worked out without detracting in any way from the satisfactory nature of the final result.

I find it easier to break the legs of small mammals with my fingers, thrust the broken end of the limb bone through the flesh, and strip the meat off, rather than to unjoint the legs.

Short wires may be cut for the legs. These wires are twisted into the filling for the leg, thrust into place and left there. This makes a very strong leg and is excellent practice.

In making up skins of rabbits and hares it will be necessary to use a long wire running from the toes of the forefoot to the toes of the hind foot. The skin of these animals is so delicate that the legs will break off unless such a wire is used. If one end of the wire is sharpened, it may be thrust clear through the forefoot far enough to allow the other end to be inserted into the hind leg.

It may be more convenient to remove the skin and clean the meat from the legs as a final process, cutting the legs free from the body with scissors at the moment of skinning.

If pressed for time, with many specimens to save, I often skin everything before beginning to stuff the specimens. This practice may save mammals on the verge of decomposition. The poisoned skins turned right side out are kept in a box or placed where they can not dry out too fast before they are stuffed.

The tails of some species will not strip readily from the vertebræ and must be split along the underside their entire length. This is true of the skunk and the porcupine.

MISCELLANEOUS DATA FOR LABELS OR NOTEBOOKS

All data of a nature not already well known, such as notes on food, life-histories, or details of soft structures which are not discernible in a dried skin, should be set down on the label, or in the field note-book if too voluminous for the small space available on the label. Facts that are known to be well established do not call for special notes, but it is well worth while to have some sort of record of even seemingly trivial data because we know so little of the life-histories of most of our small mammals.

Unless one is a specialist in such matters, it is difficult to identify stomach contents of small mammals while in the field. A specimen or two in alcohol, or simply the stomachs themselves in preserving fluid, may be saved for a later examination in the laboratory. However, it is often possible to discover what the mammals have been feeding on by an examination of food in mouth or cheek-pouches before it has been chewed into fine particles. Perhaps the food of a species can be discovered in its runways or burrows.

The condition of the sexual organs is worth noting, as this has a bearing on the breeding season. The number and stage of development of any fœtuses found should be noted on the label. If the mammary glands of a female show the animal is nursing, record it so on the back of the label.

Often the arrangement and number of the pads on the feet are different in closely allied forms, and it is of importance to know the condition of the plantar and palmar surfaces. In a dried specimen it may be impossible to make out from the shrunken foot whether the mammal had five or six plantar pads, for example. This is readily apparent if the animal is examined in the flesh and should be noted on the label if the specimen is suspected to be a rare or unknown species.

Many of the external characters of bats are either lost or so distorted in a dried specimen as to be of little value. Struc-

tures on the nose and ear especially should be examined and any peculiarities noted on the label or in the note-book. So important are these structures in identifying bats that it is highly desirable to save some of each species in alcohol or formaldehyde. A good rule is to save the first specimen of each distinct bat collected, as an alcoholic. Then if no more are secured the maximum amount of data can be obtained from the one specimen.

GUARDING AGAINST ANTS

Often in the tropics ants will prove decidedly troublesome and no very satisfactory methods have been evolved to escape them. Skins may be protected by naphthalene, paradichlorbenzene, or insect-powder, as has already been pointed out, but there is no way to keep ants from attacking the bait in the traps or the specimens caught by the traps.

Any substance placed upon the bait to render it unattractive to ants has an undesirable effect upon the appetites of the mammals one wishes to catch. If a trap-line can be run only once a day the ants may carry off all the bait before a mammal has the opportunity to visit the trap. If it is possible to rebait the traps late in the afternoon it is well worth while to do so.

The greatest damage done by the ants is upon the trapped mammal, which is sometimes injured beyond all hopes by the time the traps may be run in the morning. If the collector can visit part or all of his trap-lines about 9 or 10 o'clock in the evening, he can prevent the ravages of the ants from assuming such disastrous proportions. If the mammals could be trapped alive probably many of them would be able to fight the ants off, but it should be remembered that ants have been already attracted to the spot by the bait and are apt to devour a small creature in confinement. In any event, it is out of the question for the collector who is working

in out-of-the-way places to carry an extensive line of the bulky live-traps.

When doing the first collecting in a locality it is important to save the first specimen of each species taken, regardless of its condition. It may be the only one taken during the entire stay. Later, when damaged specimens of a species demonstrated to be common are taken, they may be discarded or made into skeletons. If the ants have attacked only the soft parts the specimen may still be perfectly satisfactory as a skeleton. It may be best to preserve an ant-damaged specimen in formaldehyde or alcohol, if a series of holes have been eaten in the skin.

A more extensive account of some of the points taken up in this handbook is given in "The Art of Taxidermy" by John Rowley, published by Appleton & Co., of New York City. A more recent and enlarged edition of this work is now on the press and will be published shortly. These books by Mr. Rowley are recommended without reservation.

MATERIAL TO BE SENT TO THE AMERICAN MUSEUM

Mammal skins to be sent to the American Museum should be well dried, carefully packed in strong, tight boxes, with some substance like naphthalene to keep insects out, and shipped in such a manner that the specimens can not be damaged by heat or water. Sometimes boxes may be packed near to boilers on the steamer or left out on the deck. Either practice will be injurious to skins. Address the box plainly to

American Museum of Natural History,
New York City,
U. S. A.

Any questions of customs duties or entry into the United States will be taken up and arranged for by the American Museum.