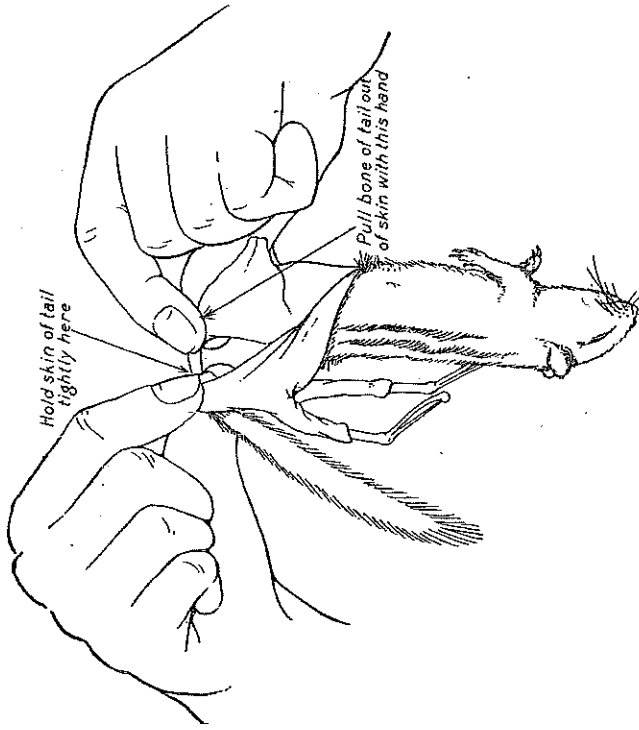


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THE AMERICAN MUSEUM OF NATURAL HISTORY

The Capture and Preservation of Small Mammals for Study



By H. E. ANTHONY

GUIDE LEAFLET No. 61

CONTENTS

	PAGE
Absorbent.....	9
Alcohol.....	11
Ammunition.....	12
Ants, Guarding Against.....	53
Aquatic Mammals, Capture of.....	17
Auxiliary Barrels.....	12
Baits.....	20
Bait, Combination.....	20
Bats, Collecting.....	47
Bats, External Characters of.....	53
Bats in Caves.....	48
Bats, Shooting.....	48
Bats, How to Skin.....	49
Care of Mammals after Shooting.....	14
Catalogue of Specimens.....	21
Collecting Chest.....	39
Containers for Dried Skins.....	42
Cornmeal.....	26
Cotton.....	8
Customs, Duties.....	54
Date.....	21
Field Catalogue.....	25
Filling Out the Skin of a Small Mammal.....	33
Formaldehyde.....	11
General Instructions for Capture of Small Mammals.....	12
Guns, Caliber of.....	12
Height of Ear.....	24
Hunting, Best Time for.....	12
Ink.....	11
Insecticide.....	10
Jacking.....	13
Labeling of Specimens.....	21
Labels.....	10
Length of Hind Foot.....	23
Length of Tail Vertebrae.....	23
Length, Total.....	22
Life-histories.....	52
Locality Where a Specimen Has Been Taken.....	21
Mammals Larger Than Woodchuck.....	45
Material to be Sent to American Museum of Natural History.....	54
Measuring of Specimens.....	21
Miscellaneous Data for Labels or Note-books.....	52
Miscellaneous Hints.....	50
Needles.....	9
Night Hunting.....	13
Odd Mammal Skulls.....	47
Owl Pellets.....	47
Packing.....	42
Pads on the Feet.....	52
Pinning Out the Skin.....	38



Pins.....	9
Poisons.....	20
Preservation of Small Mammals Entire.....	43
Preservative.....	8
Runways.....	16
Scents.....	20
Sex.....	21
Short Cuts in Preparing Skins.....	50
Shot.....	12
Shot-gun.....	12
Skeletons.....	46
Skin, Greasy or Bloody.....	31
Skimming a Large Mammal.....	45
Skimming a Small Mammal.....	26
Skins Permanently Packed.....	42
Skull.....	33
Skull Labels.....	39
Skulls, Packing of.....	42
Small Skins, to Dry Out.....	39
Stomach Contents.....	52
Study Skin, What is a.....	5
Supplies Needed.....	8
Thread.....	9
Trap-lines.....	15
Trapping Small Mammals.....	15
Traps.....	18
Traps, Most Suitable Places for.....	16
Tools Needed.....	5
Tow.....	8
Wire.....	10

THE CAPTURE AND PRESERVATION OF SMALL MAMMALS FOR STUDY

BY H. E. ANTHONY

The small mammals of any region with certain exceptions are apt, 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 hunter to shoot a species of large game new to science. On the other hand, there are very excellent opportunities for him to collect small species 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 individual 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.

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.

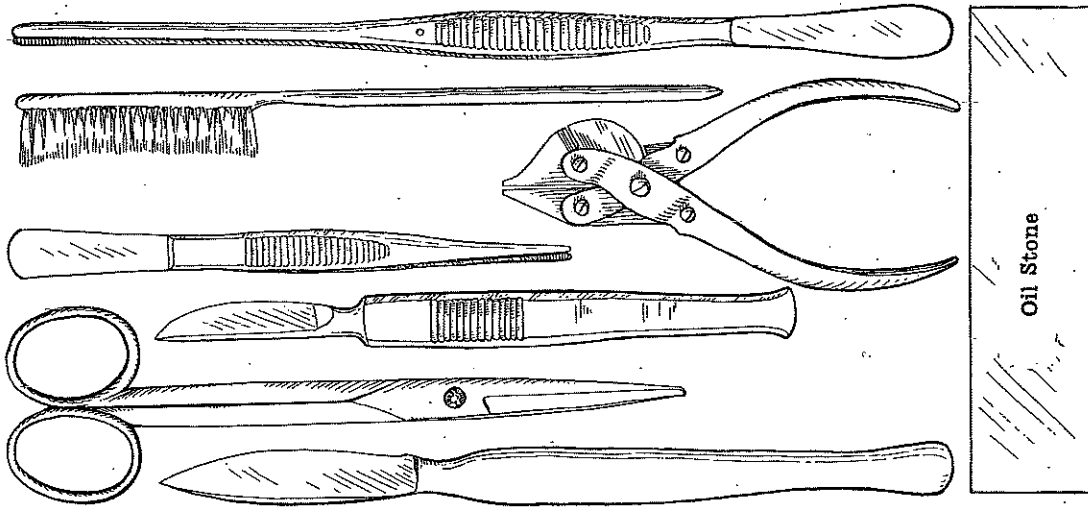


Fig. 1. Most important tools for making skins of small mammals.

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. 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 an equal volume of alum will poison and preserve a great many small mammal skins, and ten pounds of the mixture 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.

Some collectors use powdered borax which will preserve the skin but does not guard against moths and beetles. If mixed with arsenic, borax may be used instead of alum.

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. Wire of monel-metal is made in several degrees of hardness. The most useful grade is the one with sufficient stiffness to keep the wire straight but not so hard that the wire will be spring-like. 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 deterrent 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 away 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 Paradichlorobenzene (trade name, Paracide) may be used with success. The Paradichlorobenzene 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.

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 vertebrae, 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

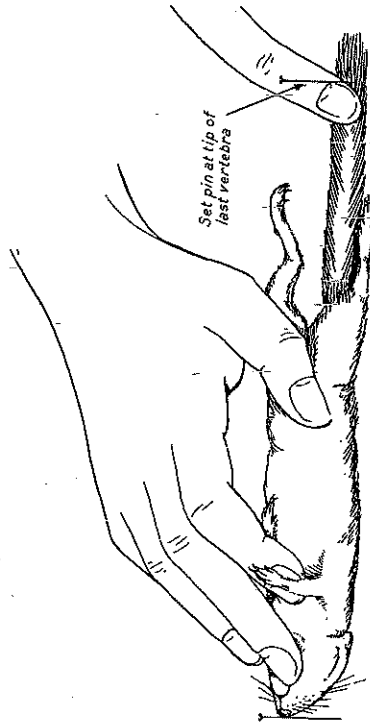


Fig. 4. Showing method of securing total length.

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 vertebrae 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

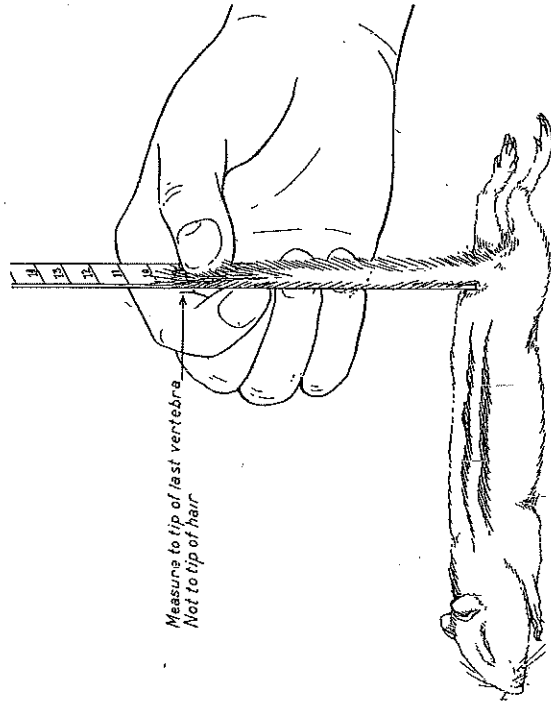


Fig. 5. Method of taking length of tail vertebrae.

is to press it against the flat side of the ruler, as in the figure. Some collectors prefer to take this measurement with a pair of dividers. 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

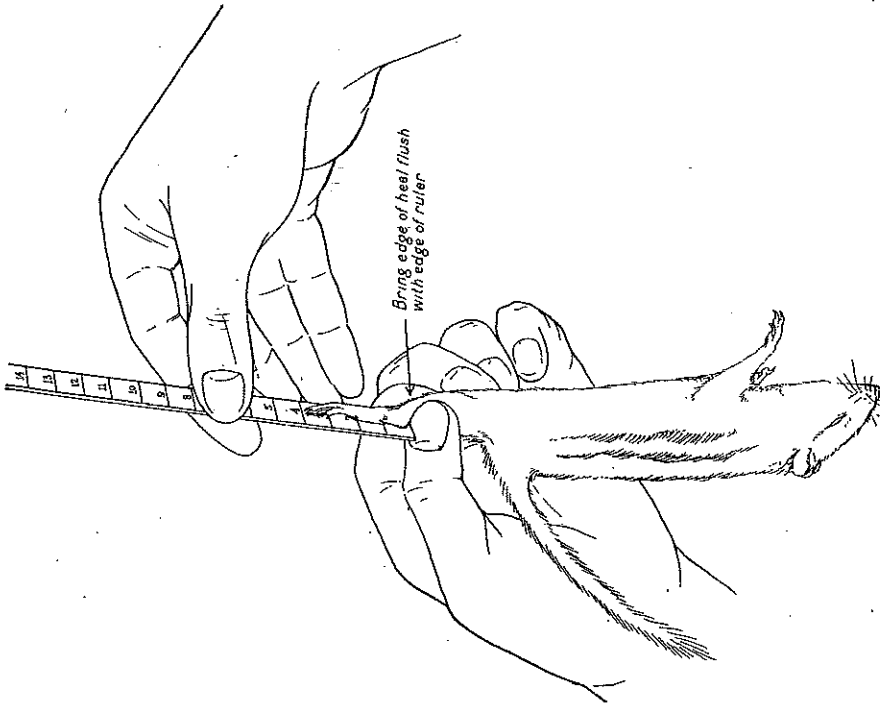


Fig. 6. Method of measuring the length of the hind foot.

of hind foot, s.u." Specimens collected for the American Museum 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.

The weights of many mammals are known from only a few records or perhaps are merely estimated. If one has the means of weighing the mammals taken, these figures should be recorded on the label.

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 52). 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

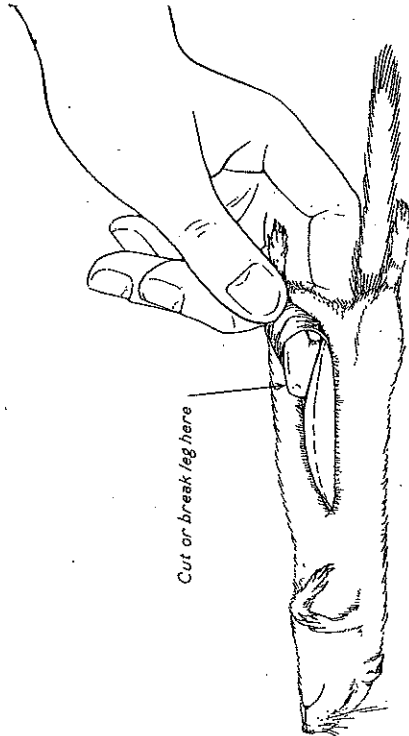


Fig. 7. Showing the opening cut and one leg freed from the skin at the knee

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 corneal dropped into the cut will be of considerable help in manipulating the skin.

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



Fig. 8. The leg has been disjunct at the knee and the flesh has been stripped from the tibia.

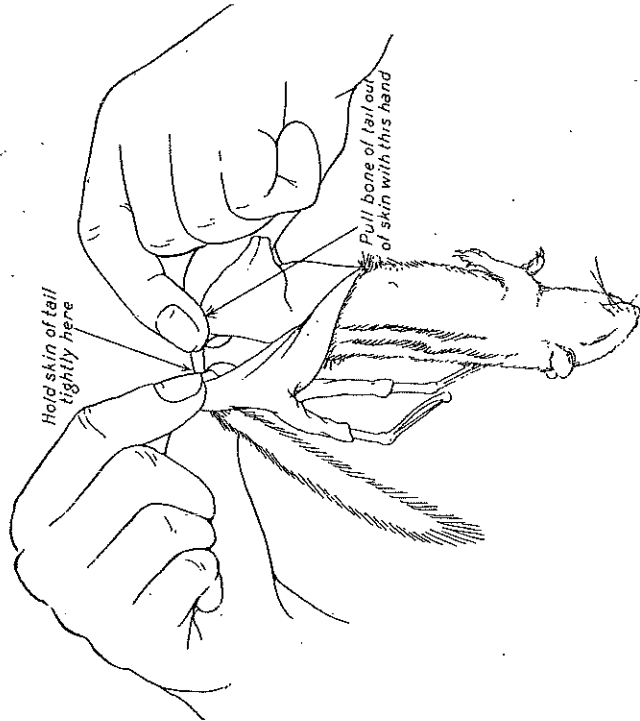


Fig. 9. Removing the tail vertebrae.

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, dis-joint 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 vertebrae 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, disjointed 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-

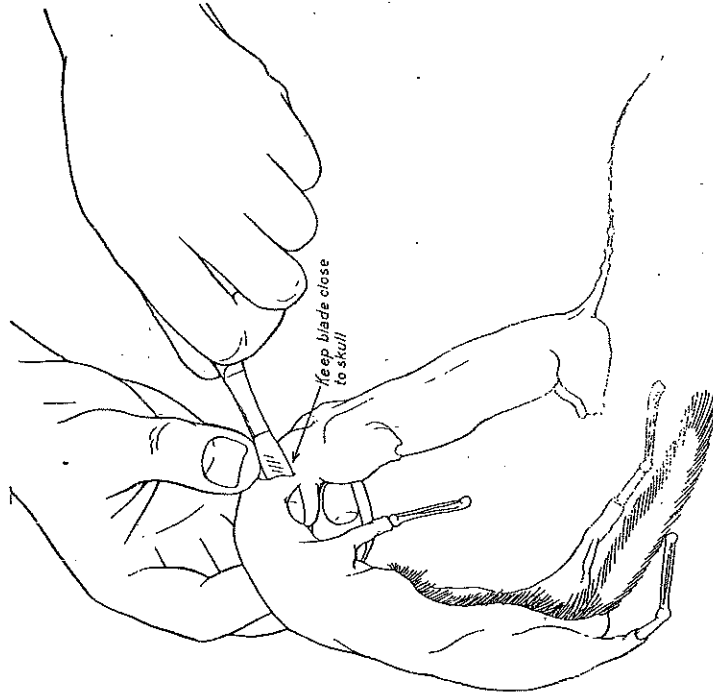


Fig. 10. Skinning about the ears.

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

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 cornmeal 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.

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 excess arsenic and alum; turn the skin right side out.

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

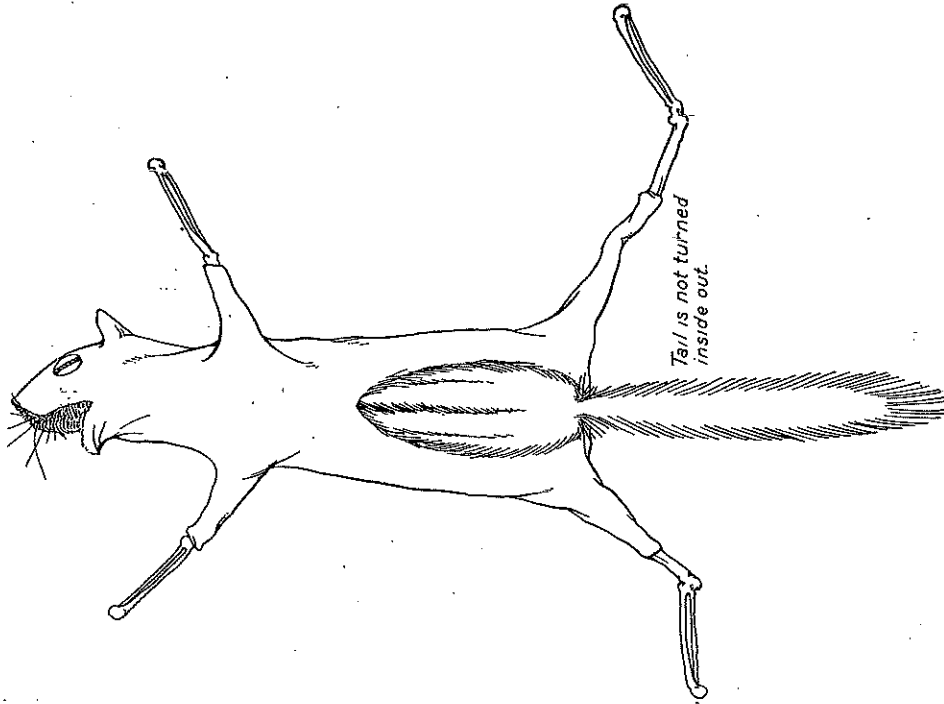


Fig. 11. The skin removed from the body.

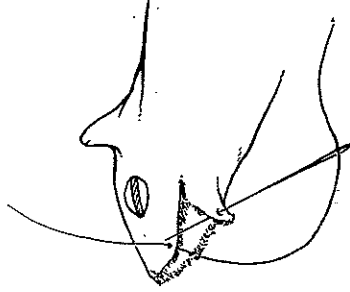


Fig. 12. Stitching the lips.

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 still 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

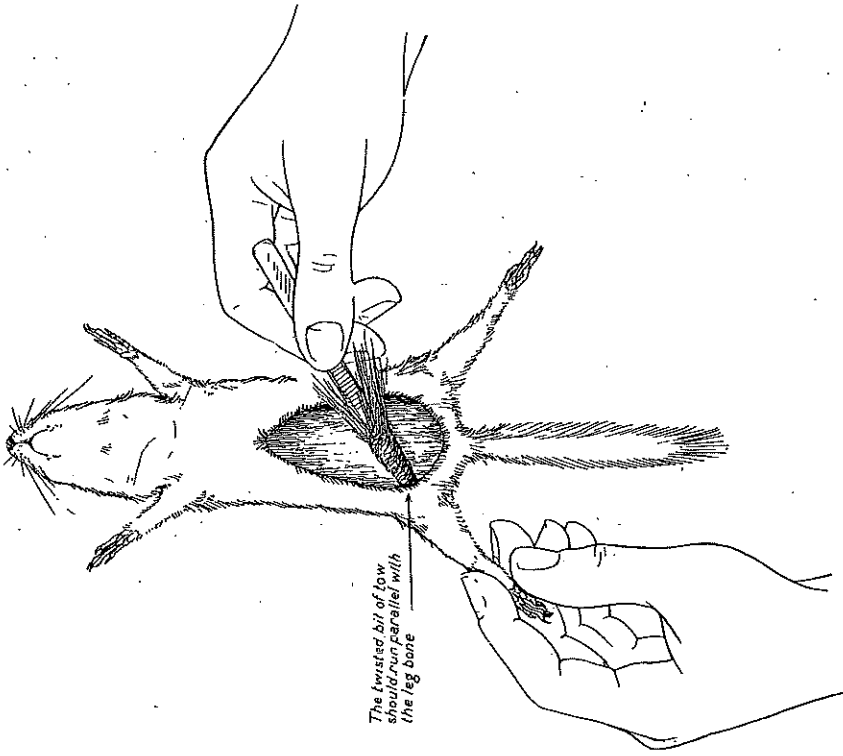


Fig. 14. Filling out the legs with tow.

time, and twirling the wire to make it lie flat. Be careful not to 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-

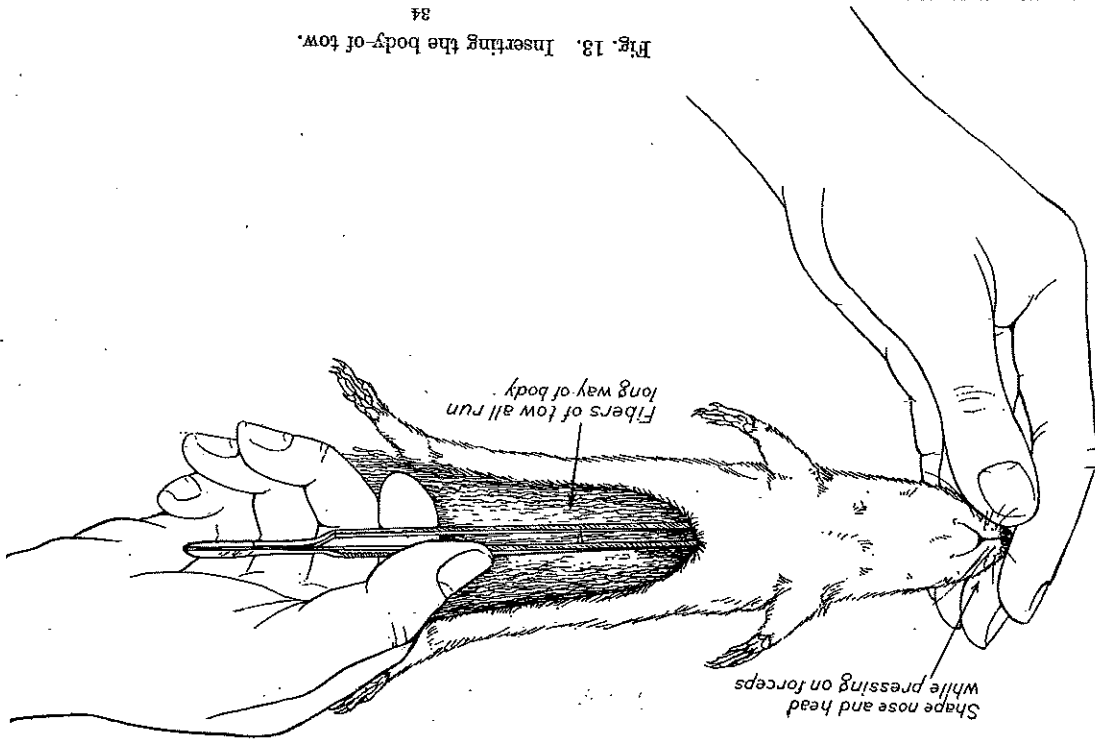


Fig. 13. Inserting the body of tow.

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

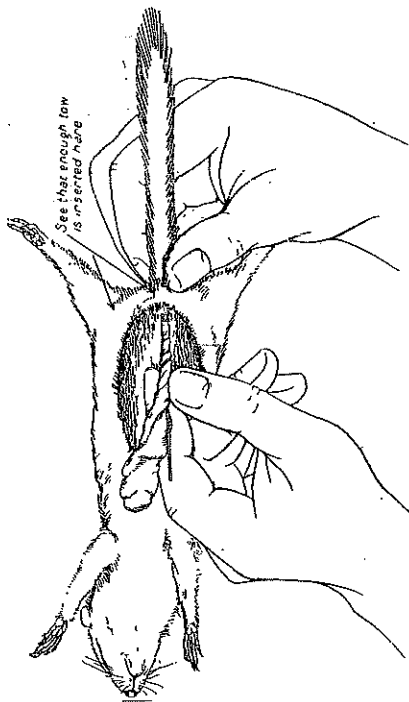


Fig. 15 Filling the tail with a covered wire

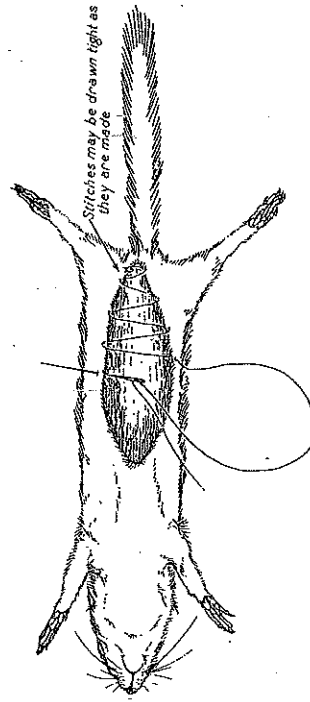


Fig. 16. Sewing up the skin.

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.

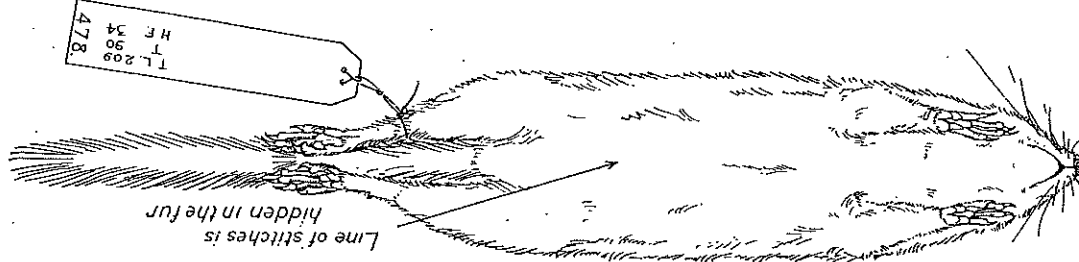


Fig. 18. The finished skin, from the underside.

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.

Remove the skull from the carcass by disjuncting 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 to the skull a 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 to dry, out of the way of dogs or

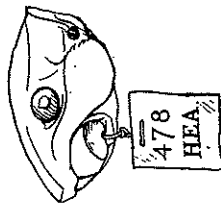


Fig. 19. A skull properly labelled.

animals. 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