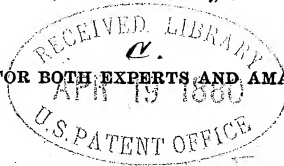


THE
TAXIDERMIST'S MANUAL;

A COMPLETE PRACTICAL GUIDE TO
COLLECTING, PREPARING, AND PRESERVING

ALL KINDS OF
ANIMALS, BIRDS, REPTILES, INSECTS, ETC.

DESIGNED FOR BOTH EXPERTS AND AMATEURS.



LIBERALLY ILLUSTRATED.

W. A. Brown

AMERICAN REVISED EDITION, FROM TWENTIETH ENGLISH EDITION.

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PUBLISHERS' PREFACE

TO THE

AMERICAN REVISED EDITION.

THE TAXIDERMIST'S MANUAL has, for years past, been a standard authority, not only in Great Britain, but also in this country where imported copies have been in constant demand. The author, Captain Thomas Brown, F. L. S., from his position as President of the Royal Physical Society, and his connection with eminent naturalists and collectors at home and abroad, was enabled to combine in his book the results of much experience by many experts; among these was Mons. Dufresne, chief of the Preserving Department of the Jardin des Plantés, Paris. Under these favorable circumstances his Manual has been heretofore unrivaled as a guide to the collection, preparation and preservation of animals, birds, fishes, reptiles, insects, &c., and for the English public it will probably long retain its position.

American readers, however, have found in its pages much matter of little or no interest to them, while much which would be useful and interesting in this country, not being equally so to English readers, was not to be found in the original work. To supply the demand for a guide prepared with special reference to the wants of American collectors, is the aim of the present edition.

With the large amount of valuable material of the English book as a foundation—and omitting only such as was of purely local interest, and processes that have been supplanted by better ones since that work was issued—we have introduced much new matter, and have carefully revised the whole book, to bring it down to the latest advances in the science. The fine engravings of the English edition have been carefully copied, and numerous additional illustrations introduced.

Every care has been taken to make the present edition meet every requirement of American collectors, and to be, in short, a complete and practical guide.

A feature which we consider particularly noteworthy in this edition is the attention paid to simple processes for the special accommodation of inexperienced persons; while its instructions include sufficiently elaborate directions to make it a valuable assistant to even the most expert. Many interesting and valuable specimens are lost, which, by aid of this work might have been preserved. Any boy or girl could preserve deceased pets. Even specimens of little scientific value readily bring remunerative prices for parlor ornaments, affording instructive, interesting and profitable employment for leisure hours.

For a portion of the new matter appearing in this edition, we are under obligations to the officers of the Smithsonian Institute, at Washington.



TAXIDERMIST'S MANUAL.

PART FIRST.

Of Skinning, Preparing and Mounting the Mammalia, or Quadrupeds.

OF SKINNING.

WHEN a quadruped is killed, and its skin intended for stuffing, the preparatory steps are to lay the animal on its back, and plug up its nostrils, mouth, and any wounds it may have received, with cotton or tow, to prevent the blood from disfiguring the skin. A longitudinal incision is then made in the lower part of the belly, in front of the pubis, and extended from thence to the stomach, or higher if necessary, keeping in as straight a line as possible, and taking care not to penetrate so deep as to cut into the abdominal muscles. In some instances, the incision is made as high as the collar bone. In this operation the hairs must be carefully separated to the right and left, and none of them cut, if possible. The skin is also turned back to the right and left, putting pads of cotton or tow between it and the muscles, as the skinning is proceeded with. If any fatty or oily substance should be noticed, it must be carefully wiped away. The skin being removed as far in every direction as the extent of the incision will admit of, each of the thighs must be separated at its junction with the pelvis, that is, by the head or ball of the *Os femoris*,* or thigh bone. The intestinal canal is then cut across, a little way above the anus, and then the tail is separated, as close to the animal as possible. After this the pelvis is pulled out of the skin, and the skin separated from the back by inserting the handle of the scalpel cutting knife between it and the carcase. It is pulled gradually upward until the operator reaches the shoulders. The whole hinder parts and trunk of the body being thus out of the skin, the next operation is to remove the fore-legs, by separating them from the body at the shoulder-joint, or the base of the *Os humeri*. When the joint of one shoulder has been separated from the body, the leg is again put into the skin, and the animal then turned

* Those who are unacquainted with the names of the different bones of the skeleton, will find a full detail of those of both quadrupeds and birds, in our description of fig. 1. [See pages 8 and 9.]

in order to repeat the same with the other side, the limb of which is also returned. The skin is then removed from the neck. The next thing is to separate the skin from the head by the assistance of the scalpel. It is taken off as far as the point of the nose; while great care must be taken not to injure the eyelids, and to cut the ears as close to the skull as possible; and also to avoid cutting the lips too close.

All this having been performed, the head and trunk of the animal are completely separated from the skin. The next operation is to remove the head of the animal from the trunk, at the upper bone of the vertebrae. The external muscles of the head and face are then carefully cut off with a scalpel, and the bones left as free from flesh as possible. The occipital bones are next enlarged by means of a strong knife, or other instrument; and the brain all carefully removed. The fore legs are now pulled out of the skin, by drawing the legs one way and the skin another, as far as the claws of the foot. All the muscles are then cut off the bones, while care is taken not to injure the ligaments and tendons. They should be left adhering to the knee. They are then returned into the skin again. The hind legs are treated in the same manner. The tail is the last part which is skinned, and this is a more difficult task than the other parts of the body. Two or three of the

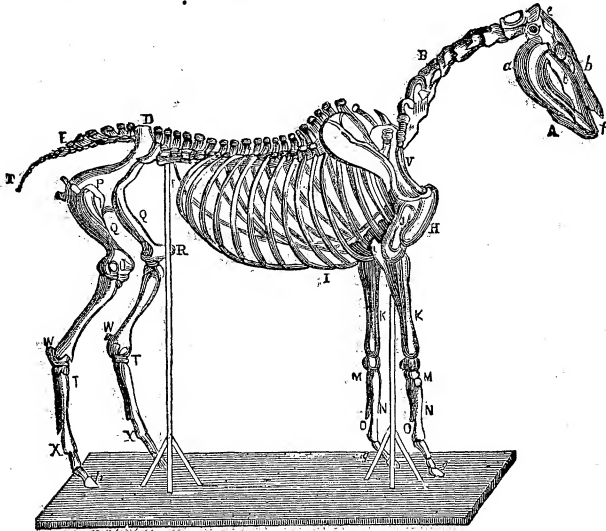


Fig. 1.—Skeleton of the Horse.

first joints or vertebræ are first laid bare by pulling the skin back; they are then tied firmly with a strong cord, which must be attached to a strong nail or hook on the wall. A cleft stick is introduced between the vertebræ and the skin, the stick is then forced to the extremity, and the tail bones come out of their enveloping skin or sheath.

The skeleton head, having been divested of all its fleshy matter, tongue, palate, external muscle and brain is now returned to its place in the skin, which is in a condition for commencing the operation of stuffing.

OF STUFFING QUADRUPEDS, &c.

Let us suppose the animal which we intend to stuff to be a cat. Wire of such a thickness is chosen as will support the animal by being introduced under the soles of the feet, and running it through each of the four legs. A piece of smaller dimensions is then taken, measuring about two feet, for the purpose of forming, what is termed by stuffers, a tail bearer. This piece of wire is bent at nearly a third of its length, into an oval of about six inches in length; the two ends are twisted together, so as to leave one of them somewhat longer than the other; the tail is then correctly measured, and the wire is cut to the length of it, besides the oval. The wire is then wrapped round with flax in a spiral form, which must be increased in thickness as it approaches the oval, so as to be nearly equal to the dimensions of the largest vertebræ, or root of the tail. The thickness can be very nearly imitated from

EXPLANATION OF FIG. 1.—A, the head; a, the Posterior Maxillary or jaw bone; b, the Superior Maxillary, or upper jaw; c, the orbit of the eye; d, the nasal bones, or bones of the nose; e, the Suture, dividing the parietal bones below from the occipital bones above; f, the Inferior Maxillary bone, containing the upper incisors, or cutting teeth; B, the seven Cervical Vertebræ, or bones of the neck; C, the eighteen Dorsal Vertebræ, or bones of the back; D, the six Lumbar Vertebræ, or bones of the loins; E the five Sacral Vertebræ, or bones of the haunch; F, the Caudal Vertebræ, or bones of the tail, the usual number being fifteen; sometimes, however, they vary; G, the Scapula, or shoulder blade; H, the Sternum, fore part of the chest or breast-bone; I, the Costæ, or ribs, seven or eight of which articulating with the Sternum, are called the *true ribs*, and the remaining ten, or eleven, which are united together by cartilage, are called the *false ribs*; J, the Humerus, or bone of the arm; K, the Radius, or bone of the fore arm; L, the Ulna, or elbow; with its process, the Olecranon; M, M, the Carpus, or knee, consisting of seven bones; N, N, the Metacarpal, or shank bones. The large Metacarpal, or cannon, or shank in front; and the smaller Metacarpal, or splent bone behind; g, the fore pastern and foot, consisting of the Os Suffraginis, or the upper and longer pastern bone, with the sesamoid bones behind, articulating with the cannon and greater pastern; the Os Coronæ, or lesser pastern; the Os Pedis, or coffin bone; and the Os Naviculæ, or navicular shuttle bone, not seen, and articulating with the smaller pastern and coffin bones; h, the corresponding bones of the hind feet; O, O, the small Metacarpal, or splent bones; P, the Pelvis, or haunch, consisting of three portions,—the Ilium, the Ischium, and the Pubis; Q, the Os Femoris, or thigh-bone; R, R, the Patella placed on the stifle joint; S S, the Tibia and Fibula; the latter is a small bone behind. These are also called the ham bones; T, T, the bones of the Tarsus, or hock, six in number; U, U, the Metatarsals of the hind leg, called shank, or cannon bones W, W, the Os Calcis, or point of the hock; X, X, X, X, the Sesamoid, or fetlock bones.

measuring the bones of the tail which have just been removed and for this purpose a pair of calipers should be used. When finished it should be rubbed thinly over with flour paste, to preserve its smooth form, which must be allowed to dry thoroughly, and then the surface should receive a coating of the preservative. The sheath of the tail must now be rubbed inside with the preservative. This is applied with a small quantity of lint, attached to the end of a wire, long enough to reach the point of the tail sheath. The tail bearer is then inserted into the sheath, and the oval part of the wire placed within the skin of the belly, and attached to the longitudinal wire, which is substituted for the vertebræ or back bone.

Four pieces of wire, about the thickness of a crow quill, are then taken, which must be the length of the legs, and another piece a foot or fifteen inches longer than the body. One end of each of these is sharpened with a file in a triangular shape, so that it may the more easily penetrate the parts. At the blunt end of the longest piece a ring is formed, large enough to admit of the point of a finger entering it; this is done by bending the wire back on itself a turn and a half, by the assistance of the round pincers. On the same wire another ring is formed in a similar manner, consisting of one entire turn, and so situated as to reach just between the animal's shoulders. The measurement should be carefully made from the animal itself. The remaining part of this wire should be perfectly straight, and triangularly pointed at the extremity.

Another method of forming the supporting wires, as practiced by M. Nicholas, is to take a central wire, which must be the length of the head, neck, body and tail of the cat, as in fig. 2; that is, from *a* to *b*; two other pieces are then taken and twisted round the center piece in the manner represented in fig. 2, *c*, *d*, *e*, *f*; these extremities being left for

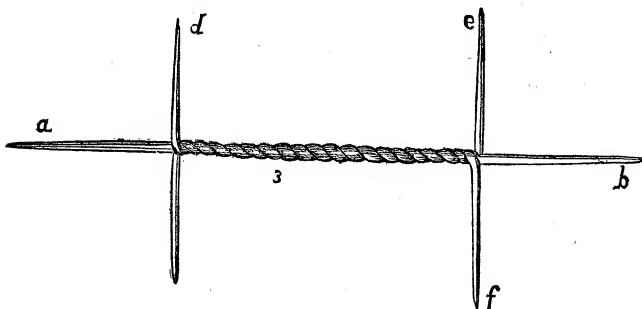


Fig. 2.—The Wires Prepared for Insertion.

the leg wires. After the wires are thus twisted together, the central one is pulled out; and the feet wires of one side are pushed through the legs of one side from the inside of the skin, and the other two leg pieces are bent and also forced through the legs, and afterward made straight by a pair of pincers; the center piece, having been previously sharpened at one end with a file, is now forced through the forehead and down the neck till it enters the center of the twisted leg wires which it formerly occupied, and pushed forward to the extremity of the tail, leaving a small piece projecting out of the forehead, as represented in the cat, fig. 3. After which the completion of the stuffing is proceeded with.

We think this mode unnecessary for the smaller animals, and that it should only be adopted for quadrupeds the size of deer, &c. These wires are besides much more difficult to insert by this than by the other method.

All the wires being adjusted, the operation of stuffing is next proceeded with. The skin of the cat is now extended on a table, and the end of the nose seized with the left hand,

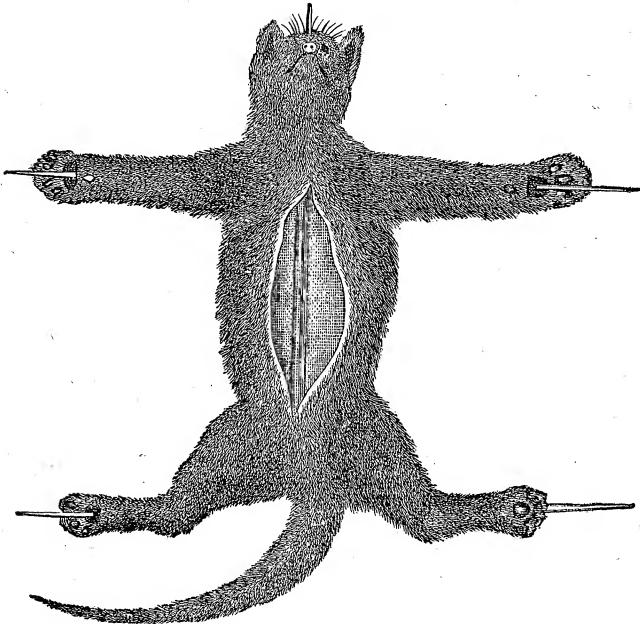


Fig. 3.—The Wires Inserted in the Cat.

and pushed again into the skin, till it reaches the neck, when we receive the bones of the head into the right hand. The skull is now well rubbed over with the arsenical soap, and all the cavities which the muscles before occupied are filled with chopped tow, flax or cotton, well mixed with preserving powder. The long piece of wire is now passed into the middle of the skull, and after it is well rubbed over with the preservative, it is returned into the skin. The inner surface of the neck skin is now anointed, and stuffed with chopped flax, taking care not to distend it too much. Nothing like pressure should be applied, as the fresh skin is susceptible of much expansion.

Observe that it is always the inner surface which is anointed with the arsenical soap.

Take care that the first ring of the wire, which passes into the head, is in the direction of the shoulders, and the second corresponding with the pelvis, or somewhat toward the posterior part. One of the fore-leg wires is then inserted along the back of the bone; and the point passed out under the highest ball of the paw. When this is accomplished, the bones of the leg are drawn up within the skin of the body, and the wire fastened to the bones of the arm and fore-arm with strong thread or small twine. Brass wire, used for piano-forte strings, makes it more secure, and is not liable to rot. These are well anointed, and flax or tow slivers wrapped round them, so as to supply the place of the muscles which have been removed. The common stuffing employed by the French taxidermists, at the Jardin des Plantes, is chopped flax; but it must be quite evident that for such parts as the legs of animals or birds, that flax or tow slivers are far preferable; and can be wound on with more nicety. Whereas, chopped flax or tow is apt to make inequalities. To give the natural rise to the larger muscles, a piece of sliver should be cut of the length of the protuberance required, and placed in the part, and the sliver wrapped over it. This gives it a very natural appearance.

The mode of fixing the legs, is by passing one of their pieces of wire into the small ring of the horizontal or middle supporting wire. Pursue the same plan with the other leg, and then twist the two ends firmly together, by the aid of a pair of flat pincers. For an animal of the size of a cat, the pieces left for twisting must be from five to six inches in length. After being twisted, they are bound on the under side of the body wire, with strong thread; the two legs are then replaced and put in the form in which we intend to fix them. The skin of the belly and top of the shoulders is then anointed; and a thick layer of flax placed under the middle wire. The snape is now given to the scapulæ on both sides, and all the muscles of the shoulders imitated. These will be elevated or de-

pressed, according to the action intended to be expressed. The anterior part of the opening is now sewed up, to retain the stuffing, and to enable us to complete the formation of the shoulders and junction of the neck. This part of the animal is of great importance, as regards the perfection of its form; and much of its beauty will depend upon this being well executed.

If the animal has been recently skinned, the best plan possible is to imitate, as nearly as possible, the muscles of the carcass; by which many parts will be noticed which might otherwise have been neglected. Even to the comparative anatomist, I address this recommendation: copy nature whenever you have it in your power.

It must be observed as a general rule, that the wires for the hind legs of quadrupeds should always be longer than those of the fore legs.

The next thing is to form the hind legs and thighs, which must be done, as above described for the fore legs; but with this difference, that they must be wound round with thread, drawn through the stuffing at intervals, to prevent it slipping up when returned into the skin of the leg. They are then fixed by passing the leg-wires into the second ring of the center body-wire, which is situated at or near the pelvis; the two ends are then bent, twisting them to the right and left around the ring; and to make them still more secure, they should be wound round with small brass wire or packthread; the tail-bearer is then attached in the manner formerly described.

Having completed this part of the iron work, the skin of the thigh is coated inside with the preservative, and the stuffing completed with chopped flax or tow. The whole inner parts of the skin which can be reached are again anointed, and the body stuffing completed with chopped flax. Care must be also paid not to stuff the belly too much, as the skin very easily dilates. The incision of the belly is now closed by bringing the skin together, and then sewed within and without; while attention is paid to divide the hairs, and not to take any of them in along with the thread; but should any of them be inadvertently fixed, they can be picked out easily with the point, fig. 20. When this is completed, the hair will resume its natural order, and completely conceal the same.

The seam should now be well primed on both sides with the solution of corrosive sublimate, to prevent the entrance of moths.

The articulations of the legs are then bent, and the animal placed on its feet; and pressure used at the natural flat places, so as to make the other parts rise where the muscles are visible.

I cannot take leave of this part without mentioning a plan which I invented, for giving full effect to the muscles of the

shoulders. Having skinned a dog, immediately on removing the carcass, I took a plaster-of-paris cast from each of the shoulders; and from these molds I cast a pair of shoulders. After having completed the internal stuffing, I applied these casts to the top of the tow, and on the skin being brought over them, they had the best effect imaginable; and gave the complete appearance of the shoulder in the living animal. This method may be extended to the other visible muscles of the body with great effect; and it is very easily and speedily accomplished. In short, every legitimate means of this kind should be thought of and adopted, at whatever expense and trouble it may be, to obtain the end in view; namely, as close an imitation of the living subject as possible; for one well mounted specimen is worth fifty indifferently executed.

A board is now prepared, on which to place the cat. But before fixing it permanently, the animal should be set in the attitude in which it is intended to be preserved, and the operator having satisfied himself, then pierces four holes for the admission of the feet wires, which must be drawn through with a pair of pincers till the paws rest firmly on the board. Small grooves are then made for the reception of the pieces of wires which have been drawn through, so that they may be folded back and pressed down in them, and not be beyond the level of the back of the board; wire nails are now driven half in, and their heads bent down on the wires to prevent them from getting loose, or becoming movable.

The stuffer next directs his attention to the position and final stuffing of the head and neck. The muscles of the face must be imitated as correctly as possible, by stuffing in cotton at the opening of the eyes, as also at the mouth, ears, and nostrils. To aid in this also, the inner materials may be drawn forward by the assistance of instruments, such as are represented in figs 19 and 20, and also small pieces of wood formed like small knitting meshes.

Our next care is in the insertion of the eyes, which must be done while the eyelids are yet fresh. Some dexterity and skill are required in this operation; and on it will depend most of the beauty and character of the head. The seats of the eyes are supplied with a little cement, the eyes put in their place, and the eyelids properly drawn over the eyeballs; but if rage or fear are to be expressed, a considerable portion of the eyeballs must be exposed. The lips are afterward disposed in their natural state, and fastened with pins. If the mouth is intended to be open, it will be necessary to support the lips with cotton, which can be removed when they are dry. Two small balls of cotton, firmly pressed together, and well tinctured with the arsenical soap, must be thrust into the nostrils, so as to completely plug them up, to prevent the air from penetrating, as also the intrusion of moths; and besides it has the

effect of preserving the natural shape of the nose after it has dried. The same precaution should be adopted with the ears, which, in the cat, require but little attention in setting.

We must again recommend the stuffer to see that he has sufficiently applied the preservative soap ; and the nose, lips, ears, and paws, being very liable to decay, must be well imbued with spirits of turpentine. This is applied with a brush, and must be repeated six or eight times, at intervals of some days, until we are certain of the parts being well primed with it ; and, after all, it will be advisable to give it a single coating of the solution of corrosive sublimate.

The methods of stuffing, which we have pointed out in the preceding pages, are applicable to all animals, from a lion down to the smallest mouse. Animals of a large description, require a frame-work suited to their dimensions ; these we will point out in their systematic order. There are also some animals, whose peculiarity of structure requires treatment differing a little from the ordinary course.

APES AND MONKEYS.

One of the chief difficulties to contend with, in setting up monkeys and apes, is the preservation of their hands, and hind hands, or what are commonly called their feet ; because we must not attempt to deprive these limbs of their flesh, as we never could again supply its place, anything like what it is in nature. The hand must therefore be dried, and then well imbued with turpentine, and the solution of corrosive sublimate, repeated eight or ten times at least, at intervals of four or five days. The other parts of the stuffing should be exactly similar to that recommended for quadrupeds generally. The paws of several will require to be colored with the different varnishes, and, when dry, slightly polished with fine sand paper to remove the gloss. The callosities, on the hinder parts of many of them, will also require to be colored and treated in the same way as the face.

BATS.

The wing membranes of this varied and numerous tribe do not require either wire or parchment to set them. They are very easily dried by distention. They are laid on a board of soft wood, the wings extended and pinned equally at the articulations, and when dry they are removed from the board.

THE FLYING LEMUR

Has a large flexible membrane, which envelopes the feet and extremities, and even the fingers and tail. This membrane should be laid open from within, and the preservative plentifully supplied to it, and then dried. Wires are afterward

introduced to keep the different parts distended, but we have found that by introducing buckram or stiff parchment, they are much more natural and pliable. They are to be stuffed and mounted as other quadrupeds.

HEDGEHOGS.

When it is wished to preserve hedgehogs rolled into a ball, which is a very common position with them in a state of nature, there should be much less stuffing put into them than is usual with quadrupeds, so that they may the more easily bend. No wires are required in this case. The head and feet are drawn close together under the belly; then place the animal on its back in the middle of a large cloth, and tie the four ends firmly together; suspend it in the air till thoroughly dry, which finishes the operation.

If hedgehogs are wished, with the head and limbs exposed, the usual method of mounting is adopted. The skins of mice, moles, &c., having a very offensive smell, it will be necessary to add a considerable portion of the tincture of musk, to the solution of the corrosive sublimate, with which the skins are imbued. The same applies to badgers, foxes, wolves, wolverines, polecats and skunks, all of which are strong smelling animals.

BEARS.

The structure of the wires requires to be different in these larger animals from any we have before described.

Procure a bar of wood one inch thick, two inches broad, and as long as to reach from the shoulders to the connection of the thighs, or *Os pubis*. A hole is bored four inches distant from one of its ends, from which a connecting groove must be formed, extending on both sides to the end of the plank next the hole; this groove must be cut out with a hollow chisel, deep enough to receive the wire. The wire is then passed through it, one end of which is just left long enough to be twisted with the other at the end of the plank. The wire on both sides is now pressed down into the groove, and twisted firmly together by the aid of a pair of strong pincers. Pierce some holes obliquely into the groove, and insert some wire nails into them, which must be firmly driven home, and then bent over the wires to keep them firm. The longest end of the wire should be at least eighteen inches beyond the bar, so as to pass through the skull of the animal.

The use of this bar, it will be observed, is as a substitute for the central or supporting wires of the body. Two other holes are now bored into it, the one two, and the other three inches from the end which we first pierced; these are for the reception of the wires of the fore-legs, and two similar holes must

be made at the other extremity of the bar for receiving the wires of the hind legs.

Bears always support themselves on the full expansion of their dilated paws, so that it is necessary to bring the leg wires out at the claws. The leg wires are bent at right angles, for a length of five inches from the upper end. These are put through the holes in the bar, and when they have passed through they are curved again. Two small gimlet holes are then made for the reception of smaller wire, by which the leg wires must be bound together close to the bar. The fore-leg wires are fixed in the same manner, which completes the framework.

This seems to be the most simple manner which could be devised, for obtaining the end in view, and is that practiced at the Laboratory of the Jardin des Plantes at Paris. No other means are used for middle sized animals, such as the lion, tiger, leopard, &c. The stuffing is completed as in other quadrupeds.

The walrus, seals, and other amphibious animals of this order, are treated in the manner of quadrupeds generally, only that leg wires are unnecessary, except in the fore feet; the tail, which represents the hind feet, has merely to be dried and kept properly stretched during this process, which precaution also applies to the fore feet. They are the easiest stuffed of all animals, only the skins are very oily, they should be well rubbed with the arsenical soap, and also with the preserving powder.

The stuffing of the walrus, the sea elephant and other large animals of this family, should consist of well dried hay for the interior parts and tow for the surface next the skin.

OPOSSUM, &c.

The females of the kangaroo, opossum, &c., have abdominal pouches in which they carry their young, and others have membranes which project from their sides. In drying the pouches, they require to be well primed with the preservative, and attention must be paid to show them properly in the stuffed animal. The membranes should be kept out by buckram or strong parchment as before recommended in the flying lemur.

BEAVER, &c.

The beaver, muskrat, common rat and other animals whose skins have a strong smell, require to be plentifully supplied with the preservative. The tail of the beaver should be cut underneath, and all the flesh removed, then stuffed with tow or chopped flax, and afterward thoroughly dried and well primed with the arsenical soap to prevent putrefaction, to

which it is very liable. It should also have repeated washings with oil of turpentine. The back should be round and short.

THE PORCUPINE.

In stuffing this animal considerable and varied expression may be given, both from the attitude and disposition of the quills. Great attention is therefore required in giving these a proper set during the process of drying. They will require to be looked at several times during the first and second day after they have been stuffed, and any of them that may have fallen out of position required to be adjusted.

HARES AND RABBITS

A very pretty attitude for the hare or rabbit is to have it seated in an upright position, as if alarmed at the noise of dogs, &c. An oval is formed of wire and attached to the interior frame work, after having passed one end of it through the anus, which must be passed through a hole in the board on which the animal is to be fixed. The wires of the hind legs must be forced through the posterior part of them, and also fixed into holes formed for their reception in the board.

THE SLOTH.

Must be mounted in an upright posture, as they are seldom or never to be seen walking horizontally, except in finding their way from one tree to another. The great length of their fur makes it a comparatively easy task to mount them.

ARMADILLOES

Are also easily set up, owing to the bands preserving the ordinary shape of the animal. The French taxidermists do not use any of the preservative for the skin, but merely dry it. We are, however, of opinion, that they are wrong, as all sorts of hides are liable to the attacks of insects, unless preserved in some way. We would, therefore, recommend the use of arsenical soap as in other skins.

ANT-EATERS.

The great ant-eater has a long prehensile tail, with long flowing hairs. The tail must be supported by a much longer tail-bearer than that of other quadrupeds generally. The tongue is very long and protractile, and ought to be drawn out of the mouth as if in the act of catching ants.

THE ELEPHANT.

Various methods have been devised for the mounting and stuffing of elephants. The best plan is that which was

adopted, with the elegant specimen now in the Jardin du Roi, at Paris.

The dead elephant being extended on the ground, the dimensions were all taken, and correctly noted at the time. M. Lassaigue, cabinet-maker to the establishment, invented a large rule for that purpose, which was somewhat like a shoemaker's size-stick. The different curves of the back, belly, neck, &c., were taken by bars of lead of three-quarters of an inch in thickness. This metal is much better adapted than any other for that and similar purposes, as it has no elasticity, it retains any shape into which it is put.

M. Demoulin made a drawing of the animal from these measurements, on the wall of a workshop where the model was constructed of its natural size.

The elephant was placed upon its back by means of four-corded pulleys fastened to the platform. An incision, the form of a double cross, was then made in the lower side, the central line reaching from the mouth to the anus; the two other cuts were made from the left leg on both sides to the opposite right legs. The trunk was longitudinally opened in its under side; the soles of the feet were now taken out to within an inch of their edge, and the nails allowed to remain attached to the skin—this was effected by the aid of chisel and mallet, and was one of the most difficult operations of the whole.

Several persons worked at a time at the operation of skinning, and four days were necessary to effect it. When removed from the carcass, the skin was weighed, and found to be *five hundred and seventy-six pounds*.

It was extended on the ground, so that, the cutaneous muscles of the head and other parts might be cut away from its interior. The skin was then put into a tub, and covered six inches deep with water which had been saturated with alum.

The model which was to fill the skin was made as perfect as possible in its shape. To insure this, models were made of half the head in plaster, as also a fore and hind leg. This structure was made of linden-wood, and so ingeniously constructed by M. Lassaigue, that almost the whole parts could be separated. He opened a pannel on one side of the body, whereby he introduced himself into its interior, so that he might make its parts more perfect within. Even the head and proboscis were hollow, which rendered this stupendous model so light that it could be moved from one part to another with comparative ease.

The model being completed, the alum water in which the skin had been all the time immersed, was now taken out and made boiling hot, and in that state poured on the skin, which was then allowed to soak in the warm liquor for an hour and

a half, when it was taken out still warm and placed upon the model, which they accomplished with some difficulty. But judge of their mortification when it was found that the model was rather too large. To diminish the wood-work they foresaw would run the risk of putting its parts out of proportion. It then occurred to them, that the best thing to be done under these awkward circumstances, was to take off the skin again and reduce its thickness with knives; they removed all the internal thickenings which came in their way. In this operation five men were occupied for four days, during which time they cut out one hundred and ninety-four pounds weight off the internal surface. During this process the skin had dried, and required again to be immersed in cold soft water; after allowing it to remain twenty-four hours to soak, it was then put on the model and found now to cover it completely; the edges were brought together, and secured with wire nails deeply driven home, and large brads. Except at the edges, the nails and brads were only driven in half way to keep the skin down to the different sinuosities and hollows until dry, when they were again all pulled out.

The alum with which the water was saturated gave the skin an ugly gray appearance, in consequence of its becoming crystalized. But this was soon remedied, by first rubbing the skin with spirits of turpentine, and afterward with olive oil.

By the admirable and well executed contrivance here adopted, a specimen has been mounted with all the appearance of life, which, with a little attention, may resist for ages the influence of time's destroying hand. It is the only specimen of an elephant in Europe worth looking at, all others being great misshapen masses, completely devoid of all appearance of nature.

The rhinoceros, tapir, horse, and its congeners, should all be mounted in the same manner. At the Jardin du Roi, a fine specimen of the quagga has been mounted in this way. At the Jardin des Plantes, Paris, the giraffe is mounted in the same way as the elephant; as are also some of the larger antelopes.

DEER, ANTELOPES, GOATS, &c.

These animals should be mounted on the same principles as recommended for bears. A different mode must, however, be adopted in skinning the animals, which the horns render necessary. It is performed in the ordinary manner until the operator reaches the neck. After cutting as near the head as possible, another incision must be made, commencing under the chin, which is continued to the bottom of the neck, or from eight to ten inches in length. By this opening, the remainder of the neck is separated from the head; the tongue is cut out, and the occipital orifice enlarged, and the brain

extracted thereby. The lips are now cut as near as possible to the jaw-bones, and the operator must continue progressively ascending toward the forehead, and in this manner all the skin will be separated from the head, except at the nose, or point of the muzzle. All the muscles are next removed by the scalpel, and the skull well anointed with arsenical soap. The muscles which have been cut out are then imitated with chopped flax or cotton, which may be attached to the bones with cement. When this is done, the head must be replaced within the skin. The orifice under the neck must now be sewed up with fine stitches, so that the hair may spread over them to conceal the seam. The other parts of the mounting are completed as directed for the bear.

THE ELK

Being an animal of stupendous size, should be mounted on a model the same as the elephant.

Some of the smaller species of antelopes may be put up in the same manner as the cat, but using stronger wires.

THE URUS, BISON, BUFFALO,

And other large animals, to be mounted in the same manner as the elephant. But their skins should be deeply imbued with turpentine.

THE DOLPHIN, PORPOISE, &c.

The structure of these animals, as well as of the other species of the first family of this order, differs but little in general structure.

In skinning these, an incision is made under the chin, and continued to the extremity of the tail; the skin is then detached right and left with the scalpel, or a sharp knife. When the skin has been cut back as far as possible, disengage the *vetebræ* at the tail, and this will enable the operator to detach the skin from the back; the *vetebræ* are now cut close to the head, and the whole carcass removed.

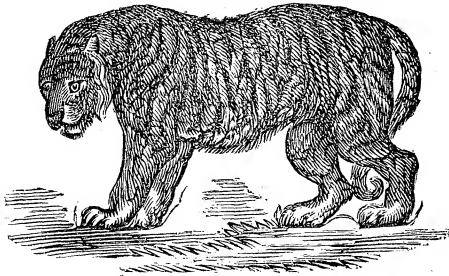
All this tribe have a thick layer of fat under their skin. In the operation of skinning it requires considerable dexterity to leave this fat, or blubber, adhering to the carcass. Practice alone will give this skill. When this has not been properly managed in the skinning, the only thing to be done afterward is to scrape it thoroughly with a knife. The oil which flows from it during the operation, must be soaked up with bran, or plaster-of-paris.

There being no muscular projections in the skin of the porpoise, there is no use for wires in mounting it. A narrow piece of wood the length of the body is quite sufficient to keep the skin stretched, and stuffed either with tow or hay. Some

months are necessary to render it perfectly dry and stiff, from its greasy nature. The grease almost always leaves some disagreeable looking spots on the skin. To remove these, and prevent a recurrence of them, powdered pumice-stone steeped in olive oil, is rubbed thickly on the skin with a hand-brush. It is then gone over a second time with emery and oil. It is rubbed in this way till the skin has a glossy appearance, when it may be rubbed dry with a woolen cloth; and to complete the polish, a clean woolen cloth may be applied with some force to complete the gloss, which is natural to the skin in a living state.

Where a very glossy appearance is wished, varnishes become necessary, but some difficulty has been experienced in getting these to remain attached to the skin in all weathers, because the humidity of rainy seasons melts gum-arabic when it is used as a varnish, and when white varnish is applied, both it and the gum Arabic fall off in pieces. To prevent the gum from falling off in this way, by its contracting, the solution should have about an eighth part of ox-gall mixed with it, and the surface of any body to be varnished should be washed with ox-gall and water before the varnish is applied, which will, almost to a certainty, prevent it from cracking and falling off. It must, however, be thoroughly dried before the varnish is applied.

We may here state, that an animal the size of a fox or a cat, may be skinned, prepared, and finally set up, in the space of four or five hours, by a person who has had a little practice in the art of Taxidermy, and that from ten to fifteen minutes are all that will be required to skin an animal of the size just mentioned.



PART SECOND.

Of the Skinning, Stuffing and Preservation of Birds.

OF SKINNING.

IMMEDIATELY after a bird is killed, the throat and nostrils should be stuffed with tow, cotton, or fine rags, and a small quantity wound round the bill, to prevent the blood from staining the plumage; but should any get on the feathers, notwithstanding this precaution, the sooner it is removed the better, which should be effected by a sponge which has been merely moistened in water. Too much dispatch cannot be used in removing the skin, if the bird is shot in a warm climate; but, in temperate regions, the bird may be allowed to cool.

In proceeding to skin the bird, it should be laid on its back, and the feathers of the breast separated to the right and left, when a broad interval will be discovered, reaching from the top to the bottom of the breast bone. (See fig. 4, for manner of separating the feathers, and using the scalpel.) A sharp pen-knife or scalpel must be inserted at the point of the bone, and cut the outer skin from thence to the vent, taking care not to penetrate so deep as the flesh, or upon the inner skin which covers the intestines. The skin will then easily be separated from the flesh in larger specimens by the

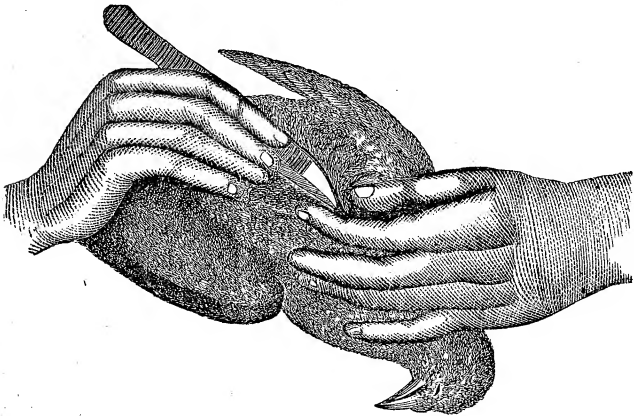


Fig. 4.—Manner of Holding the Hands while Skinning a Bird.

fingers, or in smaller ones by passing a small blunt instrument betwixt the skin and body, such as the end of the scalpel handle; with this you may reach the back. The thighs should now be pressed inward, as in the common method of skinning a rabbit, and the skin turned back so far as to enable you to separate the legs from the body at the knee joint. The skin is then pulled downward as low as the rump, which is cut close by the insertion of the tail, as shown at fig. 5, but in such a manner as not to injure its feathers. The skin is

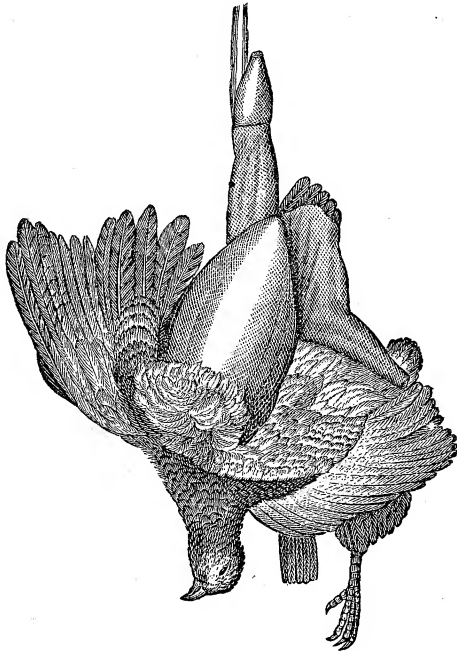


Fig. 5.—Bird Suspended by One Limb for Skinning.

now drawn upward the length of the wings, the bones of which must also be cut at the shoulder joints (*a*, fig. 6); it is then pulled up till all the back part of the skull is laid bare, when the vertebræ of the neck are separated from the head, from *b* in fig. 6; and the whole body is now separated from the skin. You next proceed to remove the brain through the opening of the skull, for which purpose it may be enlarged by a hollow chisel or other iron instrument. The eyes must then be

taken out by breaking the slender bones, which separate the orbits from the top of the mouth, in which you may be assisted by pressing the eyes gently inward so as not to break them. In skinning the neck, great care must be taken not to enlarge the opening of the ears, and not to injure the eyelids. The whole of the flesh is next to be removed from the under mandible.

Several species will not admit of the skin being thus pulled over their heads from the smallness of their necks; some woodpeckers, ducks, coots, &c., fall under this description; in which case a longitudinal incision is made under the throat, so as to admit of the head being turned out, which must be neatly sewed up before stuffing. The flesh from the head, wings, legs and rump must then be carefully removed with a knife or scalpel, and the cavities of the skull filled with cotton or tow. The whole inside of the skin, head, etc., must be well rubbed with arsenical soap or preserving powder, or

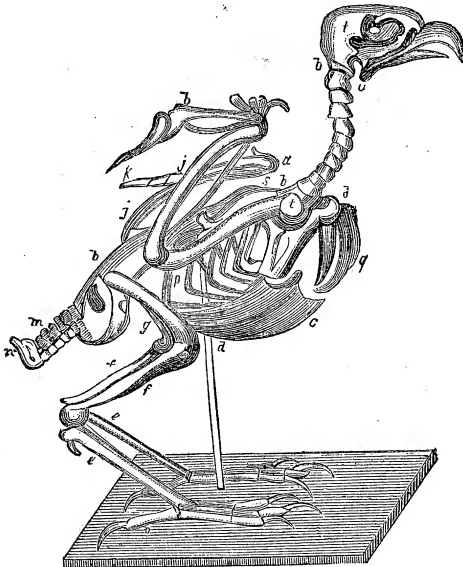


Fig. 6.—Skeleton of Goshawk, supported by a small Iron Rod.

DESCRIPTION OF BONES SHOWN IN FIG. 6.—a, ball of the Ulna; b, b, b, the vertebræ of the neck, or cervical vertebræ; c and d, the Sternum; e, e, the Tarsus; f, f, the Fibula; g, the Tibia; h, h, the metacarpul bones; i, j, the Ulna; m, the Pelvis; n, the Os Coccygis; q, the Clavicle; s, Vertebræ of the back; t, the Os Humeri.

spirits of turpentine, or the solution of corrosive sublimate. When it is wished to stuff the bird, it may now be immediately done, as it will easily dry if in a warm climate ; but in low damp countries it will require artificial heat to do it effectually.

When the skins are merely wished preserved, the bones of the legs and wings should be wrapped round with cotton or tow, so as to supply the place of the flesh ; the skin is then inverted and hung up to dry after using the arsenical soap, as above directed ; before doing which, in larger birds, a thread or small string may be drawn through the rump and passed up the inside of the neck, and drawn through the bill, to prevent the head stretching too much by its own weight. In larger specimens, where cotton or tow is not easily to be met with, well dried hay may be used.

The incision for removing the skin is frequently made under the wings. This may be done with marine birds to advantage. The penguins and divers may be skinned by making the incision in the back.

The tongue should either be kept in the mouth or sent home separately with the birds.

The greatest care must be taken to prevent the fat and oily matter, so common to sea birds from getting on the feathers ; pounded chalk will be found an excellent absorbent for applying to these birds.

In sending home specimens of birds, they should be each wrapped in paper, and closely packed in a box, and camphor, preserving powder, and strong aromatics, strewed among them to prevent them from being attacked by insects ; and they ought to be kept in a very dry part of the vessel.

It is of the utmost consequence to know the color of the eyes and legs of birds, and these things should be carefully noted the moment they are killed ; and it should also be mentioned whether they are male or female ; such a memorandum ought to be attached to the birds by a ticket. The season of the year in which the bird is killed must also be mentioned. It is also of much consequence to have good skeletons, and for this purpose the carcass may be sent home in a barrel, either in spirits or a strong solution of salt and water.

MANNER OF SKINNING BIRDS AS PRACTICED AT THE JARDIN DES PLANTES, PARIS.

First, a needle full of thread is passed across the nostrils, and tied under the lower mandible. A little cotton is introduced into the mouth, and every care taken that neither blood nor oily matter is allowed to soil the feathers of the head, as it is no easy matter to remove it from that part.

The bird is laid on a table on its back, and the feet from you, with the head placed toward your left hand. The fea-

thers of the breast and belly are then divided right and left with a pair of forceps, and the down which covers the belly is pulled off. An incision is then made in the skin with the scalpel from the upper edge of the sternum, or breast bone (fig. 6, *c*), until you reach the middle of the belly (fig. 6, *d*). The skin of one side is then lifted with the forceps, and separated from the muscles of the breast by the point and end of the scalpel, used alternately until you reach as near as possible the wings. Having accomplished this, a small quantity of cotton, dusted over with flour or powdered whitening, is placed on the flesh to prevent the skin from adhering to it. The thighs are then forced forward, and cut through between the femur and tibia (fig. 6, *e* and *f*); the femur is then returned to its place in the skin. You then separate the skin from the rump by the use of the scalpel and the fingers, this part being left to support the feathers of the tail. The part of the carcass which is now denuded of its skin is taken into the left hand, and the skin separated from the sides, in which operation small scissors are used for cutting any of the tendons which may be met with. The wings are now separated from the trunk by the end of the *Os humeri* (fig. 6, *g*), and again pushed back into their place. The neck and head are skinned as we have described at page 24, and the same method formerly pointed out is employed in removing the brain, while cotton and flax are applied and any moisture absorbed by means of plaster-of-paris or dry earth, which prevent the feathers from adhering.

The wings are now removed, properly cleaned of their flesh, and restored to their place, after being rubbed with arsenical soap and dusted with the preserving powder. The flesh is removed from the thighs, the bones being carefully preserved and restored to their proper places, after being treated in the same manner as the thighs.

In the larger species of birds all the muscles and fatty matter which adhere to the skin are carefully cut off. Any gun shot holes in the skin are next sewed up from within; a piece of thread is then attached to the first joint of both wings, and they are by means of it drawn together to such a distance as they may be supposed to have been apart when the muscles were on the body. This gives the wings a set, so that when the bird is stuffed they naturally fall into the proper place and position, if the bird is in a quiescent posture.

When birds are of a large size, take a piece of cord a yard long, one end of which should be made fast to a large hook or nail in the wall, from which the bird should be suspended, then with a running noose fastened round one of the thighs, as represented in fig. 5, the bird is suspended in such a manner as enables it to be turned in any direction without injury. The resistance afforded assists greatly in the operation of skinning.

The insides of the wings should have an incision made in them, and as much flesh taken away as possible, and some preserving powder introduced; a little tow or oakum should be put lightly in to fill the skin, but not to extend it. If the bird is large, hay may be substituted for the above. The feathers must now be placed smooth, the wings laid in their natural position closed, and the subject put in a clean dry place, and exposed to the air for a few days till all moisture has evaporated from it; after which the stuffing may be withdrawn, and many skins may be packed flat on each other.

If the feet are large and fleshy, as in some of the gulls, geese, eagles, &c., an incision should be made along the sole of each foot, so as to expose the muscles to the action of the air, and also a quantity of preserving powder applied to it, otherwise they run every risk of becoming putrid and rotten. This latter precaution is not required in small birds, in which the small quantity of cotton, that is put into them while drying, may be retained, unless the travel is restricted for want of room, in which case they may be packed quite flat.

Mr. Salt, while in Abyssinia, packed his bird-skins between sheets of paper, in the same manner as a herbarium, and they reached this country in perfect safety, and made excellent specimens when set up. In warm climates, the boxes should be well closed, and the seams filled with warm pitch, on the outside, to prevent the intrusion of insects; and the inside should be supplied with camphor, musk, or tobacco-dust, which will prevent the attacks of the smaller insects.

Till practice has given facility to the operator, it will assist in keeping the feathers clean, if, as he opens the skin of the breast, he pins pieces of paper or linen cloth on the outside; but, after a few trials, this will be unnecessary.

Some of the marine fowls are so fat, that there is much trouble in separating it from the skin, and, in warm weather, great attention will be required to prevent it from running on the feathers. As much as possible should be scraped off, in the first place, with a blunt table-knife or pallet-knife, and a quantity of powdered chalk applied to absorb what remains, which, when saturated with the oily matter, should be scraped off, and a fresh supply used; after which, a much larger proportion of the preserving powder should be applied than in other birds which are not fat.

When shooting on the seacoast, if the ornithologist is not provided with these requisites for absorbing the oil, which flows quickly from any wounds of the skin, he will find dry sand a tolerable substitute.

If, however, after every precaution, the oily matter should get on the feathers, the sooner it is removed the better, as in birds where the plumage is white, if it is allowed to become hardened, it will produce a very disagreeable appearance;

and, besides, render that part particularly liable to the attack of insects. There are several effectual methods of removing the greasy stains ; the first, safest, and best, is, by taking a quantity of diluted ox-gall—or where it cannot be commanded, sheep's gall, or that of any other animal—mix it with about double the quantity of water, and apply it with a sponge to the place which the fatty matter has touched, when it will immediately remove it. The next is by using a solution of salt of tartar, or potash, or soda. This must be made very weak, not exceeding half a tea-spoonful to a cup of water ; which will have the same effect as the gall. Whichever of these are used, the place must be immediately afterward washed with pure water, so as to leave none of the gall or alkaline substance remaining. The gall has a gummy tendency, and will glue together the fibers of the feathers ; and besides it has a great attraction for moisture, and in humid weather will become damp, and therefore produce mold ; the other alkaline substances must also be used with much caution and quickness, because they have the power of changing the colors of the plumage, so that they are most useful in white plumage, and therefore should only be used on colored feathers, where gall cannot be procured.

One general observation applies to the preservation of all animal skins, which is, they must be made perfectly dry, so that the sooner they are exposed to a free current of air the better ; and unless they are speedily and thoroughly dried, the skin will become putrid and rotten, and the hair or feathers will consequently fall off. If a skin is properly dried soon after it is killed, it will keep a considerable time without any preservative whatever, only it will be the more liable to be attacked by insects afterward.

The following excellent general directions for skinning, are given by Mr. Waterton : “ While dissecting, it will be of use to keep in mind that in taking off the skin from the body by means of your fingers and little knife, you must try to shove it in lieu of pulling it, lest you stretch it.

“ That you must press as lightly as possible on the bird, and every now and then take a view of it, to see that the feathers, &c., are all right.

“ That when you come to the head, you must take care that the body of the skin rest on your knee ; for if you allow it to dangle from your hand, its own weight will stretch it too much.

“ That throughout the whole operation, as fast as you detach the skin from the body, you must put cotton immediately betwixt the body and it, and this will effectually prevent any fat, blood, or moisture, from coming in contact with the plumage.

“ As you can seldom get a bird without shooting it, a line

or two on this head will be necessary. If the bird be still alive, press it hard with your finger and thumb just behind the wings, and it will soon expire. Carry it by the legs, and then the body being reversed, the blood cannot escape down the plumage and through the shot holes. As blood will have often issued out before you have laid hold of the bird, find out the shot-holes by dividing the feathers with your fingers, and blowing on them; and then, with your pen-knife or the leaf of a tree, carefully remove the clotted blood, and put a little cotton on the hole. If, after all, the plumage has not escaped the marks of blood, or if it has imbibed slime from the ground, wash the part in water without soap, and keep gently agitating the feathers with your fingers till they are quite dry. Were you to wash them, and leave them to dry by themselves, they would have a very mean and shriveled appearance.

"In the act of skinning a bird, you must either have it upon a table or upon your knee, probably you will prefer your knee, because, when you cross one knee over the other and have the bird upon the uppermost, you can raise it to your eye or lower it at pleasure by means of the foot on the ground; and then your knee will always move in unison with your body, by which much stooping will be avoided and fatigue prevented."

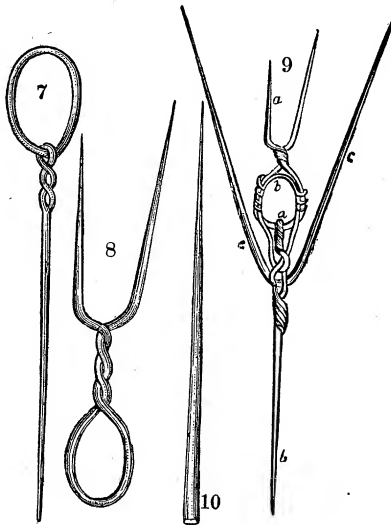
ON STUFFING BIRDS.

The first thing to be done in stuffing is to replace the skull, after it has been well anointed with the arsenical soap, and washed with the solution of corrosive sublimate inside. The thread with which the beak is tied, is taken hold of by the left hand, and the head is repassed into the neck with the forefinger of the right hand, while the thread is pulled on the opposite side; and we are careful that the feathers, at the margin of the opening, do not enter with the edges of the skin. The bird is now laid on the table, with the head turned toward the left hand; and the legs and wings adjusted to their proper situation. A flat piece of lead, about a pound in weight, is laid on the tail, while the feathers of the margins of the opening are raised by the forefinger and thumb of the left hand, to prevent their being soiled. The inside of the neck is now coated with the arsenical soap; flax is stuffed into it, but not too tightly. The back and rump are anointed, and the body should then be stuffed with tow, to about a third of the thickness required, so that the wire may have a sort of cushion to rest on.

Four pieces of wire are then prepared of a thickness proportionate to the size of the bird to be stuffed. The center piece should be somewhat longer than the body of the bird. At about a fourth of its length a small ring is formed, by the as-

distance of the round pincers, or pliers, fig. 14, and the other end is pointed with a file. This wire is oiled and introduced across the skull, and passed into the neck, through the center of the flax or tow with which it is stuffed, the ring being situated toward the anterior part of the skull, for the purpose of receiving the points of each of the wires that are passed through the feet and thighs.

The following is the method by which this perforation is effected. A hole is bored with a common bradawl of the caliber of the wire which it is intended to use. The wire, which is to continue in the leg, is passed across the knee, and



*Figs. 7 to 10.—Wires used for Birds.**

brought out interiorly, and placing it into the ring above mentioned; the same operation is performed on the other side. The extremities of the wires of the legs, and the end of the central wire beyond the ring, are all twisted together with flat pincers, and then bent toward the tail. The tail-bearer is next formed, which consists of the fourth piece of wire, with which an oval is formed, by twisting the two ends two or three turns, so that they may form a kind of fork, with the oval

DESCRIPTION OF FIGS. 7 TO 10. Fig. 7. The oval and head wires of a bird separated. Fig. 8. The tail-bearers separated. Fig. 9. The body-wire, the head wire, the tail-bearer and legs connected. Fig. 10. A leg-wire separated.

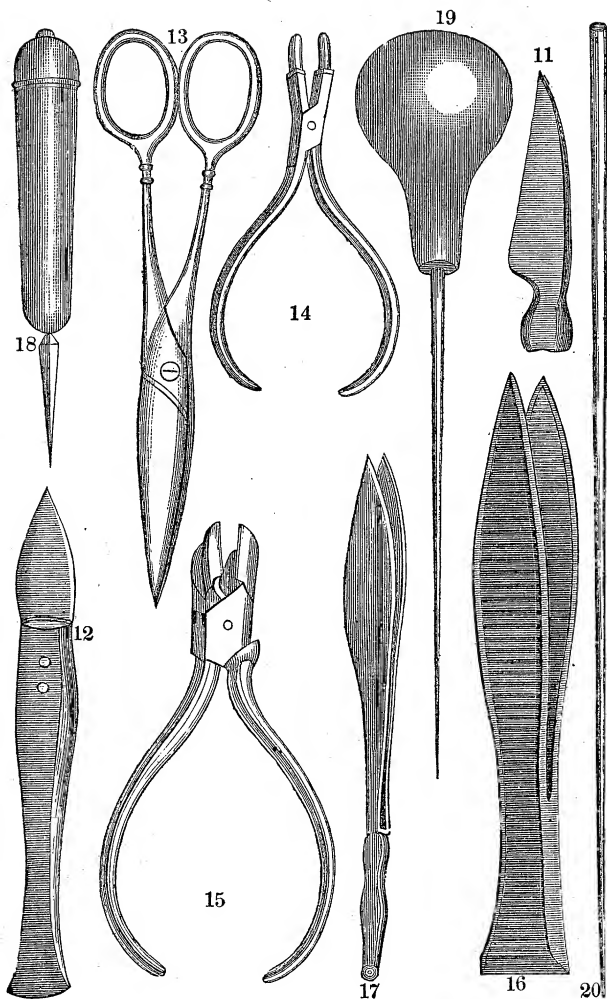
nearly the length of the body of the bird ; the two points of the fork must be sharpened with a file, and near enough to enable them to enter the rump, through which they must pass, and their points will be concealed by the rectrices, or large straight, tail-feathers, while the oval is within the body of the bird. If the bird is large, the tail-bearer must be firmly attached to the interior wires, by twisting a small wire several times round both. But unless the birds be large, it may remain quite free. The several wires are shown in figs. 7, 8, 9 and 10.

All the parts of the skin at which we can come must be thoroughly rubbed with the preserving soap, the rump in particular, which should besides be soaked with the solution of corrosive sublimate. The stuffing is now proceeded with, by inserting chopped flax or tow, till it has attained its proper dimensions. The skin is brought together and sewed up while we take the greatest care to separate the feathers at every stitch.

The orbits of the eyes are next finished, by inserting with small spring forceps and a short stuffing stick, a small quantity of chopped cotton, while attention is paid to round the eyelids properly. The glass eyes are now inserted, taking care to place them properly under the eyelids. But, before fixing the eye, a little calcareous cement must be used, to prevent them from coming out. If any part of the nictitating membrane is visible below, it must be pushed up with a steel point.

The wire frame-work, above described, is the most simple of any in its construction, and is better adapted for small than large birds. Indeed, it will hardly suit those of the larger species. The following is another method of constructing the frame-work, which may be used either in large or small birds :

Like the former it is constructed of four pieces of wire. The center piece should be double the length of the bird ; it is bent at a third of its length of an oval form, and twisted two turns, the shortest end being passed into the oval, and then raised against the longer end, so as to produce a ring at the end outside of the oval, large enough to admit the two wires which pass from the feet to the inside of the bird. It is now twisted a second time, and firmly united to the longer end, which ought to be straight, with a sharp point, effected by means of a file. As before directed, it is rubbed with oil, and forced through the stuffing of the neck. It ought to be so constructed by measurement, that the oval part of the wire shall be in the center of the body inside. The wires of the feet and legs, as before directed, ought to be straight and pointed, and passed through the soles of the feet as before. When the point has penetrated, the other end of the wire



Figs. 11 to 20.—Various Implements used by the Taxidermist.

DESCRIPTION OF FIGS. 11 TO 20.—Fig. 11. Blade of a scalpel for separating the skin of quadrupeds, birds, &c. Fig. 12. Blade and handle of a differently shaped scalpel. Fig. 13. A pair of scissors used in skinning, &c. Fig. 14. Round pincers. Fig. 15. Cutting pincers for wire. Fig. 16. Pair of large forceps. Fig. 17. Pair of small forceps. Fig. 18. A triangular bodkin or awl. Fig. 19. Circular bodkin. Fig. 20. Probing-needle.

may be bent, so that by means of it we may be able to assist in forcing up the remainder of the wire. The two internal ends of the foot-wires are twisted together, and curved within, so as to pass through the small circle or ring of the middle branch above the oval, to each side of which they are now attached with a piece of small string.

The tail-bearer is constructed on the same principle, and attached in the same manner as before described, and the latter apparatus is introduced after the neck and back are finished in the stuffing.

This practice of introducing the neck-wire, after the neck is stuffed, was first adopted at the Jardin des Plantes at Paris, and is now invariably adopted in that establishment in preference to introducing it before the neck is stuffed. The neck of a swan or other long-necked and large birds, are even done so. It is unquestionably the best plan which has hitherto been discovered, as it preserves the cylindrical shape of the neck.

MR. BULLOCK'S METHOD OF STUFFING BIRDS.

Mr. Bullock, of the London Museum, Egyptian Hall, had another method of arranging the wires, which, after what we have already said, will be easily comprehended by a reference to fig. 21, where we have given a figure of his mode. After the skin is taken off and prepared, different sized, annealed iron-wires are procured according to the size of the bird they are to support. The skin is laid on its back without stretching it; cut two pieces of wire, the one rather longer than the bird, and the other shorter, so as not to reach to the head of the bird; twist them together, sharpen the end of the longer by means of a file, and pass one end through the rump, and the other through the crown of the head, near the base of the bill. Care must be taken not to extend the neck beyond its ordinary length,—a very common fault in most preservers. Lay a little tow along the back of the skin for the wire to rest on, then take two other pieces of strong wire and file them to

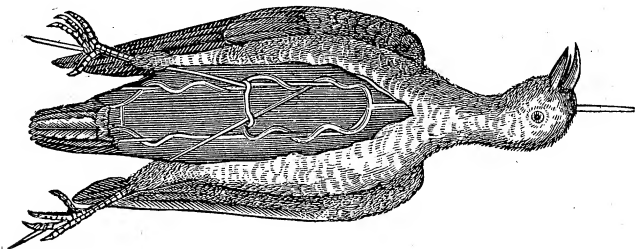


Fig. 21.—Mr. Bullock's method of inserting Wires in setting up Bird.

a point at one end ; these are passed through the soles of the feet and up the center of the leg-bone, or tarsus. When within the body, they are to be fastened to the first wires by twisting them together, which, when accomplished, may be supposed to represent the back-bone. The wire should be left two or three inches out of the soles of the feet, to fasten them in a standing position, as before directed. Two smaller wires are then passed through the wings, as in the legs, and afterward fastened to the back-wires a little higher up than the leg-wires, taking care that no part of the skin is extended beyond its natural position.

MR. BECŒUR'S METHOD OF STUFFING BIRDS.

Becœur, the best apothecary in Metz of his day, the inventor of that truly useful preservative, the arsenical soap, had a method of prepaing birds peculiar to himself, which he successfully practiced. He stuffed recent specimens in very high perfection. And in support of the fact that they were well preserved, many specimens preserved by his own hand, still enrich the cabinets of France, and these were set up sixty-five years ago.

A little attention and practice will enable any one to follow his method. He skinned his bird in the ordinary manner, extracting the body without cutting any of the extremities. The muscular parts were then cut away by a scalpel, while every endeavor was made to preserve all the ligaments. He then anointed the skin with the arsenical soap, and also the skeleton, and then returned it to its place within the skin, and carefully disposed of the feathers on either side. He formed a ring on a piece of iron wire at nearly a third of the length of the wire, and passed this wire through the head ; the smallest side passed into the rump in such a manner, that the iron ring came under the sternum ; a leg-wire was then passed through each leg, so that the ends of them united to pass into the little ring in the middle of the back-bone, where they were secured with a string. The flesh of the muscles was replaced by flax, or chopped cotton ; and when he had satisfied himself with the form, it was then sewed up, placed on a foot-board or support of wood where he gave it the attitude intended, of which he was always certain, for a bird mounted in this manner can only be placed in a natural attitude.

Becœur mounted quadrupeds in the same manner, and with equal success.

M. MAUGE'S METHOD OF STUFFING BIRDS.

This naturalist had a method of preparation and stuffing of which he was the inventor, and which he practiced with con-

siderable success. It was as follows :—(The bird is supposed to be a small one.)

He took two pieces of wire, in length and thickness required for the bird he was about to stuff. One of these was somewhat longer than the other. The longer piece he pointed at both ends with a file, and the shorter piece at one end only. One end of each wire was held under the fore-finger and thumb of the left hand ; he then twisted the other parts five or six times round, about three-quarters of an inch from the point of the other wire with the finger and thumb of the right hand, leaving an untwisted space large enough for a finger to pass through ; he now twisted it four or five times more, leaving a second space untwisted for the purpose of passing the feet-wire through, and also of producing a triangular form with the first interval he had left untwisted, the smaller opening being one turn above the triangle.

The wires for the feet were straight, and pointed at one end in the ordinary form. When the head and neck were stuffed, he introduced the long end of the center wire through the neck and skull, and the other extremity which was forked, and passed it across the rump to support the tail feathers. He then forced up one of the leg-wires, and brought the end of it through the small hole which was situated above the triangle, and then gave it an inclination toward the opposite parts, and united the two with threads ; the same method was then adopted with the other leg.

For larger birds, M. Mauge substituted the oval for the triangle.

We shall now describe the new method invented by the ingenious Mr. Waterton.

MR. WATERTON'S METHOD OF STUFFING BIRDS.

“You will observe,” says Mr. Waterton, “how beautifully the feathers of a bird are arranged, one falling over the other in the nicest order ; and that, where this charming harmony is interrupted, the defect, though not noticed by an ordinary spectator, will appear immediately to the eye of a naturalist. Thus, a bird not wounded, and in perfect feather, must be procured if possible, for the loss of the feathers can seldom be made good ; and where the deficiency is great, all the skill of the artist will avail him little in his attempt to conceal the defect, because in order to hide it, he must contract the skin, bring down the upper feathers and shove in the lower ones, which would throw all the surrounding parts into contortion.

“You will observe, that the whole skin does not produce feathers, and that it is very tender where the feathers do not grow. The bare parts are admirably formed for expansion about the throat and stomach, and they fit into the different cavities of the body at the wings, shoulders, rump and thighs,

with wonderful exactness ; so that in stuffing the bird, if you make an even rotund surface of the skin where these cavities existed, in lieu of re-forming them, all symmetry, order and proportion are lost forever.

“You must lay it down as an absolute rule, that the bird is to be entirely skinned, otherwise you can never succeed in forming a true and pleasing specimen.

“You will allow this to be just, after reflecting a moment on the nature of the fleshy parts and tendons, which are often left in : 1st, They require to be well seasoned with aromatic spices ; 2dly, They must be put into the oven to dry ; 3dly, The heat of the fire and the natural tendency all cured flesh has to shrink and become hard, render the flesh withered, distorted and too small ; 4thly, The inside then becomes like a ham or any other dried meat ; ere long the insects claim it as their own, the feathers begin to drop off, and you have the hideous spectacle of death in ragged plumage.

“Wire is of no manner of use, but on the contrary a great nuisance, for where it is introduced a disagreeable stiffness and derangement of symmetry follow.

“The head and neck can be placed in any attitude, the body supported, the wings closed, extended or elevated, the tail depressed, raised or expanded, the thighs set horizontal or oblique, without any aid from wire. Cotton will effect all this.

“A very small proportion of the skull bone, say, from the forepart of the eyes to the bill, is to be left in, though even this is not absolutely necessary. Part of the wing-bones, the jaw-bones, and half of the thigh-bones remain ; everything else, flesh, fat, eyes, bones, brains and tendons, are all to be taken away.

“Introduce the cotton for an artificial body by means of a little stick like a knitting needle, and without any other aid or substance than that of this little stick and cotton, your own genius must produce those swellings and cavities, that just proportion, that elegance and harmony of the whole so much admired in animated nature, so little attended to in preserved specimens. After you have introduced the cotton, sew up the orifice you originally made in the belly, beginning at the vent. And from time to time, till you arrive at the last stitch, keep adding a little cotton, in order that there may be no deficiency there. Lastly, dip your stick into the solution, and put it down the throat three or four times, in order that every part may receive it.

“When the head and neck are filled with cotton quite to your liking, close the bill as in nature. A little bit of bees wax at the point of it will keep the mandibles in their proper place. A needle must be stuck into the lower mandible perpendicularly ; you will shortly see the use of it. Bring also

the feet together by a pin, and then run a thread through the knees, by which you may draw them to each other as near as you judge proper. Nothing now remains but to add the eyes ; with your little stick make a hollow in the cotton within the orbit and introduce the glass eyes into it. Adjust the orbit to them as in nature, and that requires no other fastener."

Great attention must be paid to the size of the orbit, which will receive within it an object much larger than the eye, so that it must be drawn together with a very small delicate needle and thread, at the part farthest from the beak.

A small quantity of the solution is now applied to the bill, orbits, and feet.

Take any ordinary box large enough for holding the bird, and fill with cotton three-fourths of it from the top at one end, and the other end forming an inclined plane ; make a hollow in it sufficient for the reception of the bird, place it in the box with its legs in a sitting posture ; take a piece of cork into which three pins have been stuck for legs, like a three-footed stool ; place it under the bill of the bird, and the needle which was formerly run through the bill is stuck into the cork, which will act as a support to the bird's head. If the neck is wished to be lengthened put more cotton under the cork, or *vice versa* ; and if the head is wished to be projecting forward, it has only to be brought nearer the front of the box, humoring the cork, so as to place it in the position require.

As the back part of the neck shrinks more in drying than the fore part, a thread must be tied to the end of the box, and fastened to the beak, to prevent the face from looking too much upward. If the wings are wished elevated, support them with cotton ; and if to be very high, place a piece of stick under them.

Should you desire to expand the wings, the order of the feathers must be reversed, commencing with the two middle ones. When perfectly dry, place them in the natural order, and they will ever afterward continue as you wish them. If the crest is wished to be erect, the feathers must be moved in a contrary direction for a day or two, when they will soon take the position wished for.

The box must now be placed out of the reach of the sun, air, or fire, so that the skin may dry slowly. The corrosive sublimate is of much service in this respect, for it renders the skin moist and flexible for many days. The bird should be lifted every day, so that any faults may be corrected which take place while drying.

The small wing-coverts are apt to rise, owing to the skin coming in contact with the wing-bones. The part which rises should be gently pulled with the finger and thumb for a day or two, and the feathers pressed down.

The feathers should be frequently adjusted so as to render them distinct and visible.

The legs begin to stiffen in three or four days, when it will be time to place them in the desired position ; and the toes either arranged or curved, so as to hold a branch, in which two spikes must be placed for the reception of the feet, whereon they are to be stuck, and can afterward be removed at pleasure. All the threads which kept the different parts in their places may now be removed.

Mr. Waterton touches the whole feathers with the solution of corrosive sublimate, so as to preserve them from the attack of moths. He says, "The surest way of proceeding is to immerse the bird in the solution of corrosive sublimate, and then dry it before you begin to dissect it."

THE SIMPLEST METHOD OF BIRD SKINNING AND STUFFING.

A fair specimen being obtained, take common cotton wadding, and with an ordinary paint-brush stick plug the throat, nostrils, and in large birds the ears with it, so that when the skin is turned no juices may flow and spoil the feathers ; you must then provide yourself with the following articles : A common pen-knife ; a pair of cutting pleyers ; a pair of strong scissors, of a moderate size ; a button hook ; a narrow spoon ; and a hand vice. With these, a needle and thread, and a sharpener of some kind, to give your knife an occasional touch, you are prepared so far as implements go. Then provide yourself with annealed iron wire of various sizes ; some you may buy ready for use, some not ; but you can anneal it yourself by making it red hot in the fire, and letting it cool in the air. Common hemp is the next article, cotton wadding, pounded chalk or whitening, and pounded alum or chloride of lime ; as to the poisons which are used, they will be spoken of by and by. You should also have a common bradawl or two, and some pieces of quarter inch pine, wheron to stand the specimens when preserved, if to be placed as walking on a plane ; if not, small pieces of twigs or small branches of trees should be kept ready for use, of various sizes according to the size of the bird ; something of the form seen in fig. 22. Cedar, or common laurel, cut in December, will serve best, but this must be regulated by fancy and

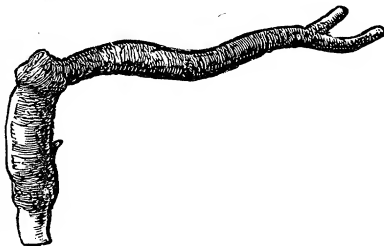


Fig. 22.—Branch for Mounting a Bird.

the requirements of the case ; oak boughs are sometimes of a good shape. Detailed instructions for mounting birds will be further on in this book.

The best time for preserving specimens is in spring, because then the cock birds are in the best feather, and the weather is not too warm. In mild weather three days is a good time to keep a bird, as then the skin will part from the flesh easily. If a specimen has bled much over the feathers, so as to damage them, wash them carefully but thoroughly with warm water and a sponge, and immediately cover them with powdered whitening, which will adhere to them. Dry it as it hangs upon them slowly before the fire, and then tritulating the hardened lumps gently between the fingers, the feathers will come out almost as clean as ever. To test whether the specimen is too decomposed to skin, try the feathers about the auriculars, and just above the tail, and if they do not move you may safely proceed.

Lay the bird on his back, and parting the feathers from the insertion of the neck to the tail, you will find in most birds a bare space. Cut the skin the whole length of this, and passing the finger under it on either side, by laying hold of one leg and bending it forward, you will be able to bring the bare knee through the opening you have made ; with your scissors cut it through at the joint ; pull the shank still adhering to the leg till the skin is turned back as far as it will go ; denude the bone of flesh and sinew, wrap a piece of hemp round it, steeped in a strong solution of the pounded alum, and then pull the leg by the claw, by which means the skin will be brought again to its place.

After having served both legs alike, skin carefully round the back, cutting off and leaving in the tail with that into which the feathers grow, that is, the "Pope's nose." Serve the wing bones the same as the leg, cutting them off close to the body, and turn the skin inside out down to the head. The back of the skull will then appear, and you will now find it of advantage, as soon as you have got the legs and tail free, to tie a piece of string round the body, and hang it up as a butcher skins a sheep. Make in the back of the skull a cut

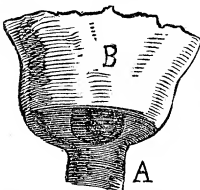


Fig. 23.—Cut in Head.

back like a trap-door, and with the marrow spoon entirely clear out the brains ; A representing the neck, and B the skin turned back. Having done this, wash the interior of the skull thoroughly with the alum, and fill it with cotton wadding. The next operation requires care and practice—namely, get out the eyes. This is done by cutting cautiously until the lids appear, being careful not to cut

the eye itself, and you can then with a forceps, which you will likewise find useful, pull each from its socket; wipe the orifice carefully, wash it with the alum solution, and fill it with cotton wadding. Cut off the neck close to the skull, wash the stump, and the whole of the interior of the skin with the alum, and the skinning is done. Now comes the stuffing. The ordinary mode used by bird-preservers is a simple one, and answers very well; there is a French method, however, which has its advantages, and will be adverted to hereafter. Take a piece of wire suitable to the size of the bird—that is as large as the legs will carry—and bend it into shape shown in fig. 24, *a* representing the neck, *b*, the body, and *c*, the junction of the tail, allowing sufficient length of neck for the wire to pass through and beyond the head, and being sharpened at each end, which may be done by obliquely cutting it with the plyers. Wind hemp on this wire to the size of the bird's body, which you should have lying by you to judge from, and it will appear somewhat as shown in fig. 25. You can shape it with the hand but be careful

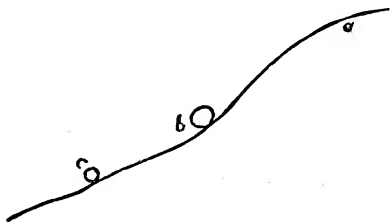


Fig. 24.—The Wire Bent for Inserting.

not to make it the least too large; and after you have finished it to your satisfaction, you may singe it as a poulterer would singe a fowl, which will make all neat; but be particular to wind the hemp very tight.

Then take the skin, lay it on the table on its back, and pass the wire at the head into the marrow where the neck

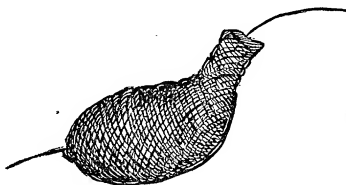


Fig. 25.—The Hemp wound on the Wire.

is cut off, through above the roof of the mouth, and out at one nostril, and draw it up close to the skull; turn the skin back, and draw it down over the hemp body, and pass the wire spike protruding through the other end through the flesh upon

which the tail grows, about the center, and rather below than above. The skin may now be adjusted to the hemp body, and sewn up, beginning from the top of the breast, being particularly careful always to take the stitch from inside, otherwise you will draw in the feathers at every pull. At first sew it very loose, and then, with the button-hook, draw it together by degrees.

With the plyers cut two lengths of wire long enough to pass up the legs and into the neck, and leave something over to fasten the bird by to the board or spray upon which it is to be placed. The next operation requires some address and great practice, namely, the passing the wire up the legs. This is done by forcing it into the center of the foot, and up the back of the legs into the hemp body, through it obliquely, and into the neck until it is pretty firm. In doing this, you must remember the ordinary position of a bird when alive, and, therefore, instead of passing the wire the whole way within the skin of the leg, when you get to the part where you have cut off the bone, that is, the knee-joint, pass it through the skin to the outside, and in again through the skin from the outside where the knee would come naturally in the attitude of standing or perching—it makes little difference which. This is essential, because if the wire be passed the whole way inside the skin, it produces a wrong position of the legs. The accompanying cut will illustrate the direction of the line in which the wire should run. The bird is now stuffed, and you may at once place it upon a spray, or board, as the case may be. In placing a bird upon a spray the first joint should be bent almost on a level with the foot; and, in placing a bird on a board, one foot should be placed somewhat behind the other. If the wings are to be closed, as is usual, you may readily bring them into their place

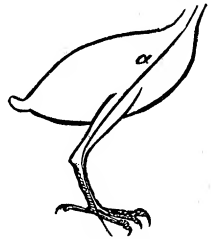
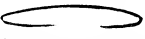


Fig. 26.—Correct Way.

by putting the fingers under them, and pressing them together over the back; you may then pass a needle, or large pin, of which you should have a good supply by you, through the thick part of the upper wing into the body, and so by the lower wing, and if you allow these to protrude, you may fasten to one of them a piece of thread, and wind it carefully and lightly round the body, which will keep the feathers in their places, and this thread should be kept on for a fortnight or three weeks, until the bird is dry. The tail should be kept in its place also for the same time, by a piece of thin wire bent over it thus :  The only thing now to do is to put in the eyes. The color of course depends on the bird, and these you may buy at any fishing-tackle shop.

If you do not use eyes too large, you will find little difficulty; the juice of the lids will act as a sufficient cement. As to the mounting, I shall say nothing about that now, but shall only advert shortly to a French method of pre-



Fig. 27.—Wire used in the French Method.

paring, which is more difficult, but has the advantage of superior firmness. It is this: Measuring from the insertion of the neck to the tail, make a wire frame as in fig. 27, the measure taken being from A to B. Upon this wind taw for the neck only, and place in the skin in the same way as before directed, only that instead of one wire being passed through that in which the tail grows, it is a fork that is passed through it. Having formed this frame, fit on to it two legs

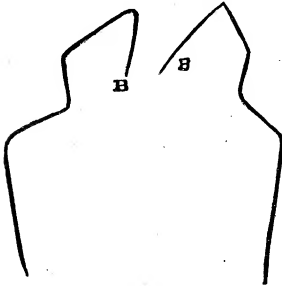


Fig. 28.—The Wire Legs.

as shown in fig. 25; and after the frame itself is in the skin, pass these from the *inside* down each leg, instead of from the outside, and fasten them on to the frame with the plyers by twisting the ends, B B, round the frame, c, shown in fig. 27. This will make all firm, and you can then fill the body with cut hemp and then sew up. One word as to the other preparations used by bird-preservers. These are either corrosive sublimate or regulus of arsenic, which is yellow

and of a consistence like butter. As before said, in cold season, when no flies are about, alum will do perfectly; in warm weather either of the two others may be used. I should prefer the former—corrosive sublimate—as the other is “messy,” and the chief object is to dry up anything which can be attacked by flesh-seeking insects. When you have finished your bird, you can lay the feathers with a large needle—it is as well to have one fixed in a handle and kept for this purpose—and, tying the two mandibles of the bill together with a piece of thread until the whole specimen has hardened and dried, the work is done.



PART THIRD.

Instructions for Mounting Birds, Dried Skins, Feathers, &c.

MOUNTING IN GENERAL.

THE stuffing of the bird being completed, the next thing is to place it either on a branch, or if a bird which does not sit on trees, on a piece of plank ; whichever of these it is, two holes are bored for the reception of the wires, which have been allowed to protrude from the soles of the feet, for fixing the bird. (Fig. 11.) These of course are pierced in such situations as are necessary for the attitude or position of the legs. The wires are put through these holes, and twisted so as to secure the bird in its position. The attitude of the bird will of course depend upon the fancy and taste of the operator, and ought to be in conformity with the manners of the bird in a living state.

A general notion will be gathered of the position of birds' legs by studying the skeleton which we have represented in fig. 6. It will be noticed that the three bones which compose the legs are articulated somewhat in the form of the letter Z, varying of course in the inclination of the various bones, according to the species of bird. A fault in most stuffed birds is the great and unnatural length of leg seen under the feathers, from the circumstance that the bones are too straight. Even in the division of birds called Waders, such as cranes, storks, herons, &c., where the legs are straighter than in most other orders, the upper joint of the thigh is subject to a considerable inclination. This natural position of the bones of the legs must never be lost sight of in setting up birds after stuffing.

The bird being now placed on its support, and the legs ready to receive their final position, the first thing to be done is to press the two thumbs on the lower limbs or tarsi, (fig 6, e,) to give them a backward inclination from twenty to sixty degrees, according to the manner of sitting, natural to the bird. The tibia, or second bone, (fig. 6, f,) is next bent forward, by which these bones will now have a position similar to those of fig. 6. The head, neck and wings are then bent, and fixed according to the expression intended to be given to the bird. On the disposition of these, much of the beauty and character depend. The habits of the bird require to be well known, to enable the operator to perform this important part with life and spirit. If the living habits of the bird are

without the reach of his study, he should devote himself to the accounts given of it by naturalists, and also examine the best plates in which the species is represented.

The most common attitude is shown in fig. 31. Where several birds are grouped together the effect is often increased by varying the positions; as, for instance, like those shown in figs. 32 and 33, where one bird is represented looking downward, and another reaching upward as if to capture a tempting tid-bit. In such cases various little accessories, as a bird's nest, an insect on a branch or other appropriate thing, increase the attractiveness.

Having fixed on the attitude, it now only remains to put the feathers into their natural order as smoothly and regularly as possible, and to keep them in this state, they should be bound around with small fillets of muslin fastened with pins, as represented in fig. 28. The bird should then be thoroughly dried, by placing it in an airy situation, if in summer; or if in winter near the fire, but not so close as to affect the natural oil contained in the feathers. The want of proper attention in drying ruins many a fine specimen; if long kept damp putridity ensues despite all preservatives, when the skin will become rotten, and the feathers will soon fall off; besides, the mold and long continued damp change the chemical properties of the preservatives used.

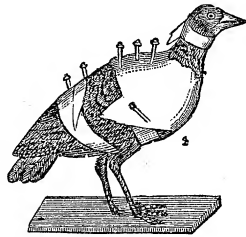


Fig. 28.—Bird Pinned up.

After the bird has been thoroughly dried, the fillets are removed; the wire which protruded from the head is cut off as close to the skull as possible with the wire-cutting pincers elsewhere shown. It must then be attached to a circular, or other shaped piece of wood, with the generic and specific name and sex, as well as its country and locality attached to it, on a small ticket, when it may be placed in a museum.

Young hands commonly suppose that a bird should stand bolt upright, with the legs almost perpendicular, or at right angles to the perch. This is a great mistake, and never to

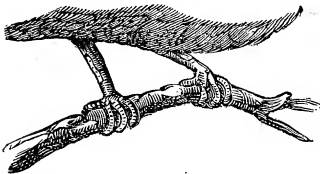


Fig. 29.—Position of Legs on Perch. rest upon in the plane of the

be found in nature. Do we stand rigid, like a foot-soldier on drill? Does not a bird, as well as ourselves, accommodate itself to the thing upon which it rests? Assuredly it does; for birds do not, as a young bird-stuffer endeavors to do, find always a perch to

horizon. It therefore follows that as he keeps himself upright, his legs must accommodate themselves to his perch. So in the ground-birds there is a gentle slope backward from the hind toe, the balance being preserved in both cases by throwing the body forward in proportion. It is not uncommon to see birds preserved with wings and tail spread. Now ordinarily speaking, this is very objectionable, because very unnatural. A bird preserved is supposed to represent a bird in a state of repose, that is, not in flight; the only modification allowable being with regard to those birds whose manner it may be to have the wings more or less open on occasions; and thus the falcon tribe, supposing they are represented as devouring a quarry, or two birds toying with each other. It may be that a bird essentially aerial may be represented as actually on the wing.

With regard to the case there are two methods: one a bell-glass, which glass being now so reasonable, is certainly a very pretty and reasonable way of mounting, but inapplicable to birds which are to be placed on a wall, or to be represented flying; although this may be managed by attaching one wire

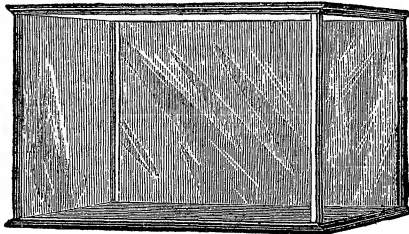


Fig. 30 — The Glass Case for Holding Specimens.

from the point of the wing to a twig sufficiently firm, which it will scarcely appear to touch, if managed adroitly. It is likewise indispensable that a bird for a shade should be stuffed so well, as to look nicely in all positions. One thing must always be remembered, *do not have your case a shade too large*, just clear the object so as not to stint it for room; and in flat cases this applies chiefly to depth, for it should have sufficient light, or it will not look well. Wooden cases should be made as slight (in thickness) as is consistent with firmness; well-seasoned white pine is best; and the case should be formed of back, top, and bottom, open at the front and sides, and at each corner of the front two slight pine supports, rabbited on their inner edges; the whole appearing as in fig. 30.

Having the case prepared, it should be papered with strong manilla paper on the top and back within, and when the paste is dry, washed over carefully with size and whitening,

tinted with a little stone-blue; some add some touches of white subsequently to represent clouds, the ground representing the air; some also paste a landscape on the back, but this must be good, or you had better have plain color. The bird to be placed in this case is either perching, standing, or flying; for the latter directions have been given. As to the two former, the perch must be firmly fixed in the small piece of flat wood upon which it previously stood, and put in upon it, the wood being fastened to the bottom of the case, either by screwing from below, from above, or gluing with stout glue, or by passing wire through two holes in the bottom of the case and the wood, and clinching above; in this case, or in screwing from below, let the wire or the screw into the wood, and putty over neatly, and so if the bird is represented standing.

The bird being fixed, the next thing is the decorating or "weeding," as it is technically called, and here we enter upon a subject so entirely of taste and fancy, that no fixed rules, as to the disposition, can in all cases be given. One rule applies equally to this as to landscape painting, viz., that there should always be a compensation of objects; that is, if you have a tuft of grass on one side which rises toward the top of the case, there should be something in the lower opposite corner to strike the eye, but not to rise above the midway up at furthest, and the ground, or floor, should not be over-furnished with moss, &c. After the bird is fixed, the whole bottom should be carefully glued over with thin glue, taking care, where the bird's feet are on the bottom, not to touch the toes with the glue. Some fine-sifted sand or gravel should then be sifted over it, and it will adhere wherever the glue has touched; for this purpose a small tin shovel is best, of the usual shape, and about two inches wide by four long, with a handle in proportion, which can be made to order at any tinman's for a trifle.

Everything used in "weeding" should be baked in a slow oven, otherwise spider's eggs and minute creatures, which are pretty sure to be contained in it, will make their appearance after the case is closed, in the disagreeable form of destroying your specimen. Moss, &c., by being slowly dried, will also keep its color better. Yellow moss, found on the roofs of old barns, and dark gray of the same species, are very generally useful; and where yellow moss cannot be had, the white or gray may be colored with chrome, and looks as well. Water plants fade, being more or less succulent, and hence a little common water-color with gum will be used with advantage, and look less artificial than oil paint, which is often used. Fern looks very pretty as an adjunct for heath-birds, but it should be dried gradually and carefully, when *quite* full grown, and a small touch of light green, permanent white forming

a portion of it, will give it a freshness and more natural appearance.

Grass in seed (not in flower) of various kinds is also a very pretty addition ; but bird-preservers have a habit of using dyed grass, and yellow and red *xeranthimum* or everlasting, which is certainly to be avoided, and indeed anything which is unnatural. If it is wished to introduce a lump of earth, or an apparent bank, a piece of thick brown paper, bent to the requisite shape, and glued over and covered with sifted sand or gravel, has a very good effect ; but insects and butterflies, or artificial flowers, unless they are extremely natural, would better be avoided. Regard should also be had to the season at which the bird is usually seen. For instance, summer birds are, of course surrounded by green and living objects, but autumn or winter visitants by decaying or dead herbage.

It has often been made an experiment to represent snow, but it is difficult to obtain anything white enough, and at the same time of a crystalline character, which, of course, it should be. Potato farina nicely dried, mixed with Epsom salts pounded very fine, does not make a bad substitute ; but the real difficulty lies behind, namely, the fixing it, and, more than all, the least damp takes very much from its appearance, if it does not destroy the effect, and hence we must have recourse to mineral aid, and any very white mineral powder mingled with powdered glass is perhaps best. It is unnecessary to say that the herbage upon which it is meant to rest should be touched all over with paste, not glue, and the white mixture shaken over it and left to dry. What will lighten the effect very much, if prettily executed, is a back landscape with a dark leaden sky and nearly black earth mingled with moss.

To represent water, a small piece of looking-glass, surrounded with moss, &c., answers very well. The bills and legs of birds should be always varnished, and where the natural color fades after death it should be restored by a thin coat of oil color of the required shade. The bird being fixed and the case garnished, nothing remains but to put in the glass ; this is in three pieces, one for the front and a piece at each end. This can be pasted in with very strong paper round the edge, advancing sufficiently over the glass to hold it. In doing this it is not necessary to be very particular to avoid pasting the glass, as after it is dried it can be wiped clean with a damp cloth. The last operation is a very simple one, and is done in a few minutes. You must procure some black spirit-varnish, which you can make yourself by dissolving the best black-sealing-wax in spirits of wine, and should be kept corked ; when this is good it acts as paint and varnish at the same time, and dries as fast as it is put on. One or two brass rings screwed on at the top of the back of the case will finish the bird, and if the case be nicely and closely made, there is

no limit of time to which the preservation of the specimen may not extend.

We must now describe the mode of setting up a bird with extended wings. After having proceeded with the stuffing as formerly directed, and the central supporting wires have been put in their places, pointed wires are to be thrust from the inside through the wings, reaching as far as the metacarpus and the carpus, that is to the arms and fore arms; the ends which remain in the body are formed into ovals, of the same size as those of the central wires, and firmly attached to them either with threads or small wires. The wings may now be raised to any height wished, and disposed agreeably to the

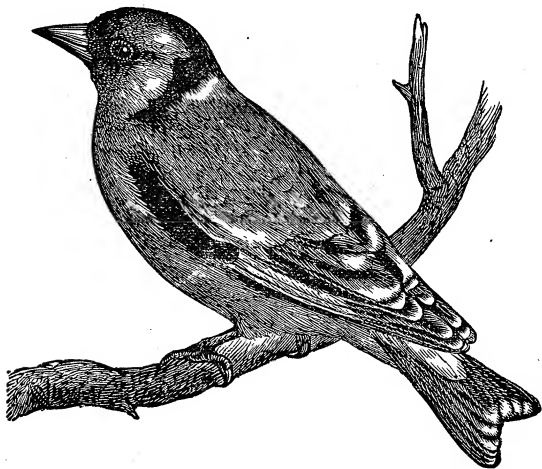


Fig. 31.—The Goldfinch.—Common Position in Mounting.

taste of the operator; and should he feel a difficulty in pleasing himself, a good engraving may be copied.

If it is intended to represent the bird flying, its wings are extended to their utmost stretch, the tail placed horizontally, and expanded, the neck forced forward, the legs and feet drawn close up to the breast, with the toes closed. It may then be suspended from the ceiling, by a piece of very fine *brass* wire, such as is used for piano-forte strings. This may either be attached to a hook in the back, placed betwixt the wings or drawn through the body with a very long slender needle. The best plan, if you have determined on the flying position, previous to stuffing, is to fix this small wire to a transverse piece of strong wire, attached to the oval inside,

which should be placed pretty far forward, so as to balance the bird.

A very spirited and striking position is, when the bird is about to take flight. In this attitude, it is placed with the body inclining forward, and the wings slightly raised, which can be managed without the assistance of the external wires by merely placing a little cotton or tow under the wings, while the skin is yet wet.

The moment of alarm is also an interesting attitude. To express this, the one foot should be placed stretched forward, and the other drawn near the body, and considerably bent. The body must be thrown to one side, with the wing on that side much elevated and spread out, while the other is placed lower and less diffuse; the tail must be expanded, thrown down at the point, and arched; the neck should be elevated, and inclined to the side next the foot which is drawn up; the head turned to one side, and the eye riveted on the object of its terror; the bill must also be open.

In eagles, vultures, and other birds of prey, a favorite attitude is the position of seizing their prey. This varies according to the species. The golden eagle, when he has seized his victim, expands his wings and tail, like a curtain around the bird, gazes upward, and throws his head backward in an attitude of triumph and defense; the feathers of his crest and neck stand nearly erect, and he gazes around in every direction, to observe if he is safe from the intrusion of an enemy before he devours his victim. Suitable birds or small animals may be stuffed and placed in the bird's talons.

Descriptions of this kind are endless; let those who intend stuffing birds study nature in its various details, and where this cannot be come at, good books and prints will be found an excellent substitute.

METHOD OF MOUNTING DRIED SKINS.

Having treated of all the different modes which we know can be successfully practiced, in stuffing recent specimens, we must now say something respecting the setting up of skins which have been preserved by travelers, and sent home from distant parts.

The general method is exactly the same as in stuffing recent specimens. There are, however, some preliminary steps, which it is necessary to know.

If the specimen sent home has been partially stuffed, our first business is to undo the stitches, if it has been sewed—which was an unnecessary process. We then remove the whole cotton or tow from the inside, by the assistance of forceps, and from the neck with a small piece of wire, twisted or hooked at the end. Having finished this, small balls of wet cotton are placed in the orbits of the eyes, and the legs and

feet are wrapped round with wet cotton or linen rags. A damp cloth is then thrown over the bird, and it is allowed to remain in this state till next day. The neck and body are then filled with wet linen or cotton, and it will be ready for commencing setting up in four or five hours.

The eyes are now put in, as directed in the recent subjects, and then stuffed in exactly the same manner. Some difficulty will, however, be experienced with respect to the leg-wires, and it will require more time and care from the dryness of the legs, to get the wire to penetrate. Having proceeded so far as to get the bird generally formed, the wings are next adjusted: this also is frequently difficult, owing to the stiffness, of the tendons, and want of proper attention in skinning and drying them at first. Indeed with some of the South American

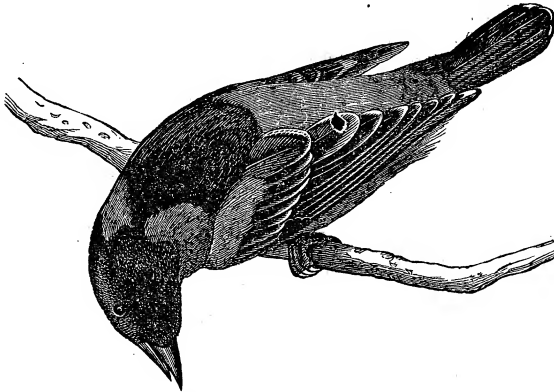


Fig. 32.—The Oriole.—Looking Downward.

birds, a proper adjustment of the wings is found impracticable, owing to the attempts of the native Indians of Guyana, who seldom dispose them properly. There is something extremely curious in the efforts of a man in a savage state. Whether this arises from want of observation, or a vitiated taste, it is difficult to say; but it is a notorious fact, that any attempt at art, by an uncivilized people, is generally widely different from what the object is in nature: and yet the opportunities of these people are much greater, in studying or even observing natural objects than that which is enjoyed by a man in a civilized state.

We have seen a bird entirely mounted by the Indians of Guyana, which was placed in an attitude so fantastic, and so out of all possibility of the bird's assuming in a natural condition, that we could only suppose it to be the harlequin of birds.

When these skins—frequently exceedingly valuable from their rarity—are undone, to be remounted, it is oftentimes found utterly impossible to get the wings to take a natural set; in which case, there is no other remedy but cutting them off close to the body, and fixing them anew. The scapulars are separated, they are softened with damp cloths, and then wrapped up with bands of sheet lead, to give them a proper set. When we have got them in their natural shape, they must be fixed to the sides by cement and cotton, and a long pin through each, with the head concealed among the feathers. The scapulars, which we have cut off, must then be cemented on, and they will effectually cover the joining of the wings. The bird being now arranged, and all the feathers adjusted, it is wrapped round with small bands of fine linen or muslin, and set aside till thoroughly dry.

Should any feathers be disengaged, during the mounting, they must be kept, and when the bird is dry, we can replace them in their proper situations with a pair of forceps, after they have been touched on their shafts with the cement; the feathers around the place in which we intend to insert them, must be held up with the probing-needle, fig. 20, page 33.

If any of the feathers are disarranged in mounting, and have got a wrong set, the only way to remedy the defect is to pull them out with forceps, and re-insert them with cement.

OF MOUNTING BIRDS, FEATHER BY FEATHER.

Rare birds are frequently received from foreign countries, the skins of which are in such a state of decay, that it is impossible to mount them by the ordinary processes above described. The only way in which they can be preserved, is to mount them feather by feather, which, however, is a very tedious method. It is as follows:

Procure a piece of soft pliable wire, such as is used by bell-hangers; or take some of the ordinary wire used, and make it red-hot in the fire, and allow it to cool gradually, when it will become quite pliable. Take five pieces of this, of different lengths, and form them into the skeleton of a body; namely, two for the back, one on each side, and one to represent the breast-bone. Imitate the shape of the bird's body as nearly as possible. The wires must be roughened with a file, at the place where all the wires meet, at the neck and rump; and first wrap the place next the neck round with strong thread or fine brass wire. The two pieces intended for the back must bend gently downward, and be gradually separated from each other toward the center, and brought together again at the place intended for the rump, whither they must intersect each other, and be twisted two or three times, to keep them in their places; they are then spread out as supports for the tail; the side pieces are next formed, so as

to represent the natural bulge of a bird's body, and attached to the rump; the piece representing the breast is then formed, joined at the rump, and afterward continued as long as the other tail-pieces, to support the center of the tail; while at the front extremity a piece is left, for the purpose of forming a neck to which to attach the head. Two leg-wires are attached to the side-wires, by being rolled round them for several turns. Thus we have in our framework an outline of the bird's shape, any slight defects in its form being corrected as the work progresses.

After this body has been properly formed, it must be



Fig. 33.—The Wren.—Position Reaching Upward.

wrapped round with tow-silver, (see department of Recipes,) and the neck thickened to its required dimensions. When this is accomplished, the head, legs, wings, and tail are softened in the usual manner; the eyes are then fixed in with some cotton introduced into the orbits, with a little of the cement. The wings and tail are now placed on a table, with a flat leaden weight above each, to restore them to their natural shape. The leg-wires are then passed through the legs, commencing at the top, and bringing them out at the soles of the feet, and left with a piece extending beyond the claws.

The tail is now fixed on, by first attaching to it a quantity of cotton with the cement, and when dry, it is fixed to the part intended as the rump.

The feet of the bird must be fixed into a piece of wood, as a perch, the ends of which must be left some inches beyond the body. The end next the tail is fixed into a table-vice, with the belly upward, and the head pointing toward the operator. The feathers are now put on, commencing under the tail, or crissum, with what are termed the under-tail coverts; a coating of cement must be previously laid on, to attach the feathers with. It is proceeded with upward to the breast, and finally the length of the neck, taking care to put the proper feathers on their respective sides, as the side-feathers have all an inclination to one side. The bird is now turned with the back up, still keeping the head toward the stuffer; and the wings are fixed on with cement, and pins forced through the beards of the feathers to conceal the heads. When this is done, put on the feathers of the rump, and proceed upward, as has been done with the belly. After reaching the top of the neck, the head is then fixed on with some cotton immersed in the cement, and allowed to dry before attempting to put on the feathers.

In this mode of mounting a bird, there are several things which must be attentively adhered to; these are—first, not to put the feathers too thick, for there is a danger of running short; secondly, all the shafts of the feathers must have a small bit cut off the tip, so as to admit the cement and to give them a firmer hold; and thirdly, that the feathers should all occupy their respective parts; and fourthly, that they should be arranged as they are in nature on these parts, as the disposition of every part of the body is peculiar to itself.

At first, this mode of setting up birds will be found a difficult task, but a little practice and experience, will make it familiar and comparatively easy, although it will always be found a tedious process. We have seen some specimens set up in this way, which we could hardly detect from those mounted in the ordinary manner.

Besides what we have already said concerning the stuffing and preparing of birds, there are many details connected with particular species which demand our attention, and which can only be described as regarding that species. It will, however, be impossible for us to enter into all these minutely, but only give a few examples as general guides. We shall take these in systematic succession.

PRESERVATION OF COLOR.

In the preservation of the feathers of birds, little else is required to prevent the dissipation of their colors than to keep them as much as possible from air and light. These two

agents, which were indispensable to their beauty and perfection in a living state, now exercise their influence as destroyers, and that influence will sooner or later work its ends according to the quality, texture, or color of the object with which it is contending. The feathers are now deprived of two agents, which in a living state contributed to their vigor and their beauty, namely, the internal circulating juices which they received from the body of the animal, and the external application of oil by the bill of the bird, supplied from a gland which is placed over the rump of all birds.

The colors of the rapacious tribes are not so evanescent as those of many others, as they, for the most part, are composed of intense browns and blacks, which are not so easily absorbed by light or air, so that they continue for a very long period without any sensible difference. There are, however, certain other parts which are liable to almost immediate change of color after the death of the animals, and these are the cere and skin of the legs and feet, and the naked skin on the heads and necks of vultures and their congeners. We shall treat of these individually.

OF VULTURES.

The birds of the genera *Vultur* and *Cathartes* of Temminck's arrangement, are distinguished from their heads and generally the upper parts of their necks and a spot on their breast being naked. Now, this naked skin usually loses color and becomes of a dirty brown or yellow. It is evident, therefore, that if we wish to give these parts in our stuffed specimen the appearance they exhibited while alive, artificial means must be employed; and this can only be done by the application of paints or colored varnishes. It is well known, that during life these naked skins on the head and neck, were liable to change of color from the influence of the passions of the bird, as either excited by love, fear, or rage; all of which must be considered in preserving. For example, the skin of the ash-colored vulture is of a livid blue color when the bird is in a quiescent state, but under the influence of love or rage, becomes of a bright reddish hue; so that either of these must be adopted in our preserving, according to the character we intend giving.

The king of the vultures has a fleshy cere of a bright orange color, or rather inclining to vermilion, which is prolonged above and between the nostrils to an elevated comb; a scarlet circle surrounds the eye; the remainder of the head is purplish black. The back of the head is covered by a patch of short blackish down, and behind the eye on either side are several broad and deep wrinkles of skin, giving origin to a thick and prominent fold, which extends obliquely downward along the whole of the neck. This fold, when the bird is in an unexcited

state, is of a reddish-brown, mingled with blue, and is traversed by numerous lines of minute black hairs. From the upper part of the neck, which is of a bright red, the color gradually becomes less intense, and fades into orange and yellow as it descends toward the lower part. The legs and claws are of a dusky black, but sometimes the former are reddish, and at other times of a dirty white. This depends on the age of the bird.

Now, as all these colors which we have described are liable to change, immediately after death, it is evident that considerable nicety will be required to give the preserved specimen the appearance of nature. These must, therefore, be supplied artificially with the varnish colors, which we have particularly described in their proper place; as also the combinations for the formation of compound colors. The reddish brown color mentioned, of which the fold is composed, must be touched by a mixture of the scarlet varnish, with a little powdered burnt-umber and the blue streaks with it is traversed, colored above with cobalt blue. All the varnish colors have a tendency to shine, which, it will be evident, is not the character of any part of the skin, or caruncle of the bird described. As soon, therefore, as it is thoroughly dry, which will be in about an hour, the whole surface must be gently rubbed with very fine sand-paper, which will completely remove the gloss, and give the appearance of nature.

Some nicety will be required in painting between the hairs, but it can be easily managed with a little caution. Sometimes these hairs are liable to become brown, in which case they can be touched with the black varnish.

As these birds are inhabitants of warm climates, some care is requisite; and after killing them, to prevent decay, the tendons of the legs should be extracted to prevent their being attacked by moths, and their place supplied by some cotton and preservatives. The tendons are extracted by means of a longitudinal incision made behind the tarsus. The edges of this incision can easily be brought together when the bird is under the process of preparation.

PARROTS, &c.

Great latitude may be used with the setting up of this tribe—their colors are for the most part very brilliant, but they should not be too much exposed to the light. Those having purple, orange, or lilac tints, are particularly liable to change.

The legs, cere, and naked parts of the face of parrots, and their congeners, will require, for the most part, to be refreshed with the colored varnishes. Their limbs and bills have frequently the appearance of being powdered. In these species, this appearance is to be given by washing the bill, &c., with mastic varnish and dusting the pollen powder through a

pepper-box over them. This powder is described in the Chapter of Recipes.

In this order are also the woodpeckers, which are true climbing birds, and should be attached to the trunk or branches of trees—they seldom expand their wings—they are assisted in climbing by their tail, consequently, it almost always forms an inclined plane to the back of the bird.

The comb of the common cock and its wattles will require to be colored with the red varnish, to which must be added a little lake; as also the comb of the Guinea-fowl. The particular passion of the animal at the time will also have to be studied, and the color of his head and throat, which is liable to great change under different impulses. The male pinnated grouse has a large, skinny membrane on each side of its neck, which it inflates during the season of love, and which is in size and color similar to a ripe orange. This must be colored with the red varnish, mixed with either gamboge, or chrome-yellow. The general habits of these birds are familiar to most people.

OSTRICH, &c.

It falls to the lot of few to preserve this bird; but as the frame-work for it must necessarily be commensurate with its size, the manner of constructing it we shall describe:

A piece of wood eighteen inches long, and four inches in circumference, is first taken, and a hole bored eight inches from one of its ends, from which form a groove, to the shortest end, both above and below; four inches from the other extremity two holes are pierced, at four and six inches from the end. The wire which is to support the head of the ostrich is passed through the perforation, which is eight inches from the end; it must extend eight inches out of the hole; the two ends of the wire are now pressed flat down into the furrows, which have been formed for their reception. Strong wire nails are put in obliquely to keep the wires in their places; the heads of the nails crossing above the wires; and by the addition of strong iron wire they can be still more firmly bound down. The long end of the wire, which has been left uncut, must now be cut off, corresponding to the length of the neck, head, and bill, of the ostrich, which must be accurately measured. The wire must be at least a quarter of an inch in diameter. It must be inserted into the neck previous to putting in the stuffing. The head and neck are now filled with chopped tow, and when properly stuffed, as well as part of the back, the wood must be placed in the middle of the body to supply the place of the oval in smaller birds. The leg-wires must be at least three-eighths of an inch in diameter. When the first one has been forced up, it must now be extended to the hole, which was six inches from the end, passed through

it for the length of six or eight inches; curve it back to the end, and fix it down with two nails. The same is done with the wire of the other leg, which must be passed through the other hole. The whole are now firmly wrapped round with cord. The other parts of the stuffing are done as directed for smaller birds.

Besides a strong application of arsenical soap, we would

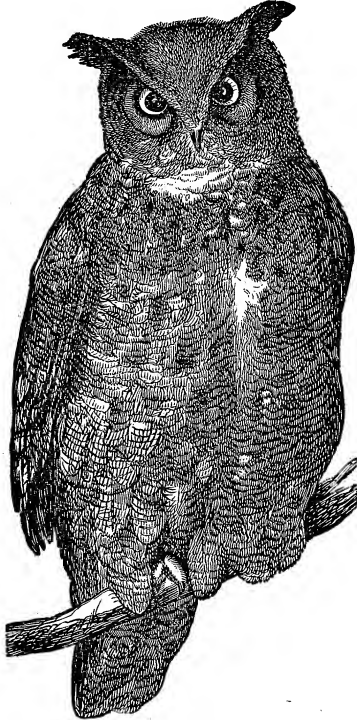


Fig. 34.—Virginia Eared Owl.

recommend Mr. Waterton's plan of touching all the feathers with the solution of corrosive sublimate, and the roots of the feathers should be well soaked with turpentine, which ought to be repeated at intervals of some months.

The same method of stuffing is adopted with the emu, the galeated cassowary, and other large birds. The head of the latter bird is of a fine vermilion behind, and also the wattle

on the throat, with its appendages ; these must be colored with the red varnish ; the sides of the face and throat are of a beautiful violet tinge, which is composed of lake and Antwerp blue, in combination with the white varnish. When dry, these must be dimmed with sand-paper, as formerly directed ; the legs must get a coating of the same color, with the addition of some white lead to render it paler.

OWLS.

In skinning the different species of the owl genus, much care is to be exercised in drawing the skin of the neck over the head, as it is generally so very large in proportion to the thickness of the neck that it is no easy task to get it to pass over without either stretching or tearing the skin ; this must be assisted by the use of the nails of the thumbs, and easing it all round with the end of the scalpel-handle.

The attitudes of these birds are always very simple. They are generally sitting in an upright posture, or devouring their prey, in which little energy is expressed.

WADERS.

This order consists of birds which frequent the sea-shore, margins of lakes and rivers, feeding on fish, worms, &c. In stuffing, they must necessarily always be placed in standing or walking postures. They walk with a slow and measured step. Many of them enter the water without swimming, and hence their designation, Waders. As we recommended in the vulture tribe, the tarsi must be opened, and the tendons taken away to prevent putridity, to which they are very liable.

Birds of this order must be placed on flat boards, or circles of wood turned for the purpose. Their skins are of a very greasy nature, and require to be particularly well primed with the arsenical soap, and after they have absorbed this, with the solution of corrosive sublimate.

THE FLAMINGO.

This bird is one of those, whose head cannot be passed within the skin of the neck during the operation of skinning, so that a different mode of treatment becomes necessary. When obstacles of this nature come in our way, we must, in the first place, bare the neck as high as possible, by introducing the scalpel-handle between the skull and the skin. The neck is then cut off as high as we can reach, and the skin pulled straight while it is yet soft. It now becomes necessary to make an incision behind the head, by which to remove the remaining vertebræ and the brain of the bird ; the skin must be laid back to the right and left, and cut as low as the first vertebra. The occipital hole is then enlarged, that we may more easily extract the brain ; and the eyes are taken out by

the same opening. The orifice is then sewed up with very fine stitches, taking care to separate the feathers at every stitch.

The wire of the neck must be placed before the stuffing is commenced. The other parts are stuffed in the ordinary way. The leg-wires are next put in. The bone of the tarsus is pierced near the heels with a triangular bodkin (see page 33, fig. 18). The point of the leg-wire is now introduced into the perforation. When the point has reached the knee-joint, we must press pretty hard while we turn it round and round, till it penetrates the apophysis of the tarsus, after which, it will easily be forced to the top of the thigh. The feet being pal-mated, must be spread, so that the membrane which connects the toes may be distinctly seen, and the webs put down with small pins.

The same mode of treatment is pursued with the *Jabirus* (*Mycteria Australasia*, and *Americana*).

GREBES, &c.

These are all covered with a very thick, glossy, and close plumage; their legs are placed far behind. They are but ill adapted for any variety of form in stuffing. When out of the water they can hardly walk, and sit quite erect with the point of their toes merely seen beyond their feathers. An error very common in stuffing this bird, is exposing the tarsus too much, which in a living state, is hardly ever visible while sitting. They are very easily prepared, as the thickness of the feathering conceals most defects.

GEESE, DUCKS, &c.

The chief thing to be attended to is the placing of the legs. They are, for the most part, set far back. Some of the bodies are erect when sitting, with the legs almost entirely concealed, and others, such as the swan, goose, &c., have their bodies placed horizontally. The thigh-bone (fig. 2*f*, page 25,) should be forced close to the breast in front, with an angle of forty-five degrees below. The body should be nearly horizontal, and the neck in the form of an S.

The duck tribe have, in general, large heads, and like the flamingo, cannot be passed through the neck, so that it frequently becomes necessary to make an incision at the nape for extracting the brain and eyes.

Others of this order have very fat skins inside, so that great caution is necessary to prevent it from soiling the plumage while taking off the skin. A very large proportion of cotton and tow, therefore, becomes necessary.

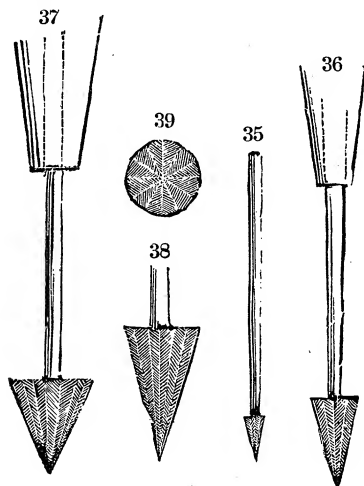


PART FOURTH.

The Smithsonian Institute Method of Cleansing, Preparing and Preserving Bird's Eggs.

GENERAL DIRECTIONS FOR EGG-BLOWING.

EGGs are emptied with the least amount of trouble, at one hole, which should be drilled in the side with such an instrument as shown in the sketch, figs. 35, 36 and 37. The great object to be attained is the formation of a circular hole with smooth edges. Collectors not having such a drill as is here recommended, will find a common nail or three-cornered needle a useful substitute, but great care must be used. The hole should, of course, be proportioned to the size of the egg, and the amount of incubation it has undergone. Eggs that are hard sat upon are more easily blown by being kept a few days, but the operation must not be deferred too long, or they are apt to burst violently immediately on being punctured, though this may be avoided by holding them under water while the first incision is made. The hole being drilled,



Figs. 35 to 39.—Egg Shell Drills.

[Figs. 35, 36 and 38, natural size. Figs. 38 and 39, enlarged]

the lining membrane should be cleared away from the orifice with a pen-knife, fig. 40, by which means not only is the removal of the contents, but also the subsequent cleansing of the specimen facilitated. The small end of a blowpipe, fig. 41, should then be introduced, while the other extremity is applied to the mouth, and blown through, at first very gently.

If the embryo is found to be moderately developed, a stream of water should be introduced by means of a syringe, fig. 44, and the egg then gently shaken, after which the blowpipe may be again resorted to, until by the ultimate use of both instruments, aided by scissors, figs. 46 and 47, hooks, fig. 45, 49 and 50, knives, figs. 51, 52 and 53, and forceps, fig. 16, the contents are completely emptied. After this the egg should be filled with water from the syringe, gently shaken, and blown out, which process is to be repeated until its interior is completely cleansed, when it should be laid upon a pad of blotting paper or fine cloth, with the hole downward, its position on the pad or cloth being occasionally changed until it is perfectly dry. During this time it should be kept as much as possible from the light, especially from the sunshine, as the colors are then more liable to fade than at any subsequent time. In the case of very small eggs, when fresh, the contents may be sucked out by means of a bulbous tube, fig. 45, and the interior afterward rinsed out as before.

It is always advisable, as far as possible, to avoid wetting the outside of the shell, as the action of water is apt to remove the bloom, affect the color, and in some cases alter the crys-

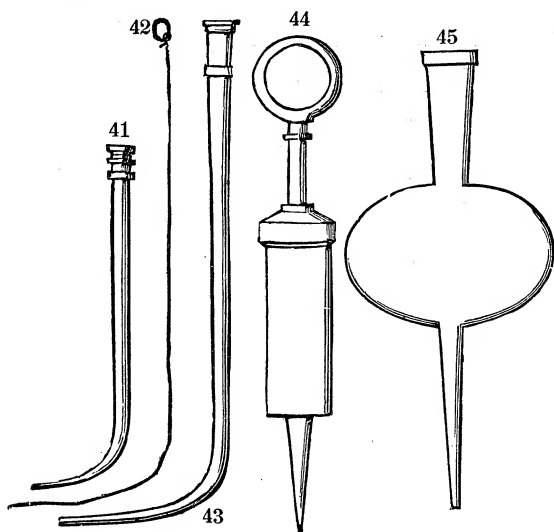


Fig. 40.—Penknife, half natural size.

tallization of the shell; consequently dirt stains or dung spots should never be removed. While emptying the contents, it is as well to hold the egg over a basin of water, to avoid breakage in case of its slipping from the fingers. Eggs that are very hard sat upon, of whatever size they be, should be treated in the manner which we shall give a little further on, in describing fig. 55, which is a method superior to any other known at present to the writer for preventing injury arising to them. Should the yolk of the egg be dried up, a small portion of carbonate soda may be introduced, with great care that it does not touch the outer surface of the shell, in which case the color is likely to be affected, and then the egg filled with water from the syringe, and left to stand a few hours with the hole uppermost, after which the contents are found to be soluble and are easily removed by the blowpipe, assisted by one of the hooks. It is almost unnecessary to add, except for the benefit of beginners, that the manipulation of the different instru-

ments requires extreme caution, but a few trials will give the collector the practice necessary for success. Those who may still prefer to blow eggs by means of two holes, should not make them at the ends of the eggs, nor at opposite sides, but on the same side, fig. 54. In this case the hole nearest the smaller end of the egg should be the smallest, and the contents blown out at the other. If the holes are made at the ends of the eggs, it not only very much injures their appearance as cabinet specimens, but also prevents their exact dimensions from being ascertained accurately; and if they are made at opposite sides, the extent of the show surface is thereby lessened.

Eggs should never be written on until the shells are perfectly dry, or the ink will be found to run, and the inscription



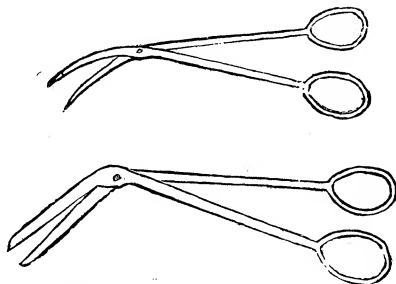
Figs. 41 to 45.—Implements used in Egg-Blowing.

[Figs. 41 to 44, natural size. Fig. 45, half natural size.]

will be found illegible. Eggs with chalky shells, such as those of gannets and cormorants and others may be conveniently marked by incising with a pin or the point of an egg-drill. The inscriptions should always be placed on the same side as the hole or holes, and confined within the smallest limits possible. For drilling the hole or holes the side presenting the least characteristic markings should be selected.

DESCRIPTION OF EGG BLOWING IMPLEMENTS.

Figs. 35, 36, and 37, represent drills for making neat and circular holes in the shell. These drills should be made of the best steel that can be procured, and of different sizes. Fig. 35 is meant for the smallest eggs, even humming bird's, up to those say of a robin. The grooves forming the drilled surface should be cut with a chisel. Fig. 36 will suit the generality of eggs, excepting those of very large birds and of sea fowl, which usually lay eggs with a strong but soft shell. The grooves may be cut either with a chisel or a file, but if with the latter, greater care will be requisite in its use. Fig. 37 is intended for the largest eggs, and even some of the smaller ones which have a chalky shell, such as the *crotophaga*. The grooves are cut with a file. In the manufacture of these drills the greatest care is necessary that the grooves should lie parallel to one another, and that their edges should be smooth. The smaller the drill the more acute should be the angle it forms at the point. The drills may be fitted with handles or



Figs. 46 and 47.—Scissors.

not, according to fancy. Those with handles are less likely than the others to cramp the fingers of the performer, an inconvenience which often causes breakages.

A separate sketch is given with the enlarged views of the end of a drill, in order to show more plainly the manner in which the grooves should be cut.

Figs. 41 and 43 represent blowpipes for emptying eggs. They are best made of metal, and for this purpose nickel or German silver is preferable, as being less liable to rust. A collector should have two sizes, as a large size is not convenient for small eggs, and a small one causes loss of time in blowing large eggs. The chief point to be attended to in their construction is that the lower orifice should be as large as the size of the pipe permits. It is of course necessary that they should be perfectly smooth outside toward the lower end.

They may be straight, although the curve will be preferable.

Fig. 45 represents a tube for emptying small eggs by suction. The bulb is to receive the contents of the egg and prevent them from reaching the mouth of the operator and thus causing nausea. This instrument is best made of thin glass, as thereby it can be easily kept clean. The same remark applies to this as to the last, with respect to the size of the lower orifice.

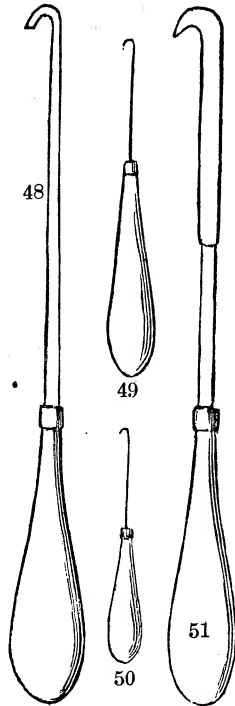
A piece of thin wire, fig. 42, long enough to pass entirely through the tubes, should be always kept at hand by the operator, to remove obstructions which are likely to occur from small pieces of the embryo or half dried yolk being accidentally drawn into the tubes or blowpipes.

Fig. 44 represents a syringe, which will be found useful in rinsing out the inside of an egg. It may be made of any metal, though the pewter ones are apt, from their weight to be clumsy. Nickel is recommended as for the common blowpipes. The lower orifice should be as large as possible. The ring at the top should be large enough for the insertion of the operator's right thumb, as it must be remembered that he has to work it with one hand. The nozzle as shown in the figure, is rather too tapering. It should be smaller in proportion at the upper end.

Figs. 46 and 47 represent scissors of shapes likely to be found very useful. Fig. 47 for cutting through the bones of the embryo before it is extracted, and fig. 46 for cutting off portions of it while it is being extracted by one of the hooks represented in figs. 48, 49 and 50; which should vary in size from that of an ordinary pin to that of stout wire. The length of their straight portions should be rather more than the diameter of the egg they are used on.

Fig. 51 represents a knife with a crooked blade, somewhat like a bill hook, and may be useful in cutting up the embryo prior to extraction.

Figs. 40 and 52 represent a pen-knife and scalpel with elongated blades or shafts, to admit of their being introduced into the egg to cut up



Figs. 48 to 51 — Various Implements.

[See description.]

the embryo. Fig. 40 is also, perhaps, the best instrument with which to remove the lining membrane from the hole. This is done by inserting the blade perpendicularly and slightly scraping the edge of the hole, as soon as it drilled.

Fig. 53 represents a forceps for extracting the pieces of the embryo when cut up. The spring should not be too lively,



Fig. 52.—Scalpel, half natural size.

as its resiliency may occasion breakage. The grasping surfaces should be roughened to prevent the pieces slipping.

Fig. 55 shows a piece of paper, a number of which when gummed on to an egg, one over the other, and left to dry, strengthen the shell in such a manner that the instruments

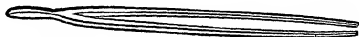


Fig. 53.—Forceps, half natural size.

above described can be introduced through the aperture in the middle and worked to the best advantage, and thus a fully formed embryo may be cut up, and the pieces extracted through a very moderately sized hole; the number of thicknesses required depends greatly upon the size of the egg, the length of time it has been incubated, and the stoutness of the shell

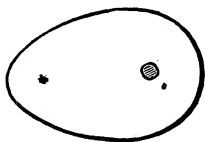


Fig. 54.—Holes Drilled in Egg.

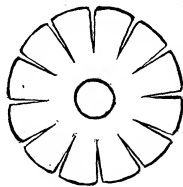


Fig. 55.—Cut Paper.

and the paper. Five or six is the least number that it is safe to use. Each piece should be left to dry before the next is gummed on. The slits in the margin cause them to set pretty smoothly, which will be found very desirable; the aperture in the middle of each may be cut out first, or the whole series of layers may be drilled through when the hole is made in the egg. For convenience sake the papers may be prepared already gummed, and moistened when put on in the same way that adhesive postage-stamps are used. Doubtless patches of linen or cotton cloth would answer equally well. When the operation is over, a slight application of water, especially if warm, through the syringe, will loosen them so that they can

be easily removed, and they can be separated from one another and dried to serve another time. The size represented in the sketch is that suitable for an egg of moderate dimensions, such as that of a common fowl.

Observations.—The most effectual way of adopting this plan of emptying eggs is by using very many layers of thin paper and plenty of thick gum, but this is of course the most tedious. Nevertheless, it is quite worth the trouble in the case of really rare specimens, and they will be none the worse for operating upon from the delay of a few days, caused by waiting for the gum to dry and harden.

PART FIFTH.

Skinning, Preserving and Setting up Fishes, Reptiles and Molluscous Animals, &c.

OF FISHES IN GENERAL.

THE best method of securing the scales and colors of fish, is, as soon as they are caught, to apply cambric or tissue paper to them, which will soon dry and adhere firmly; the body may be then taken out and the skin dried. When the skin is to be stuffed, roll it in a moist cloth, which will not only render it pliable, but also soften the tissue paper, so as it can be removed, when the colors will be found to be much brighter than by any other method with which we are yet acquainted.

OF SKINNING FISH IN GENERAL.

The fish should be procured as fresh as possible, more particularly if it is one of those on which the scales are loosely attached. Lay it on one side and cut out the gills with a pair of scissors, then introduce a little tow or a piece of sponge into the place to prevent the blood from flowing during the process of skinning; carefully wipe the sides of the fish with a damp sponge; let the fins be raised and gently extended, and two pieces of paper, something the shape of each, be placed under them, only extending a little beyond them. Coat the paper with a weak solution of gum-arabic, and put a piece of similar size on the top of the fin, by pressing these gently they will adhere and dry in a few minutes; these will keep the fins extended, and preserve them during the operation of stuffing. When these are dry, take a piece of tissue paper or thin silk, and press it gently on one side of the fish.

The natural glutinous matter which covers the scales will be sufficient to make it adhere firmly, it will soon dry and form a strong protection to the scales during the skinning; without this precaution the skin could not be removed from mullet, sea-beaver, &c., without the scales being much disfigured, and losing many of them. Indeed, in such fishes, it is not amiss to put on an additional coating of paper with gum-water. This will not only secure the scales, but will also assist in keeping the proper form of the fish, by preventing distention.

When these papers are thoroughly dry, turn the fish on a soft cloth, with the uncovered side upward, and open it with sharp scissors from the bottom of the tail-fin to nearly the point of the snout, keeping as correctly on the lateral line as possible, which can be seen in most fishes. The cheek should be afterward cut open, so that the flesh may be removed from it, cut also the flesh from the opposite cheek, and supply its

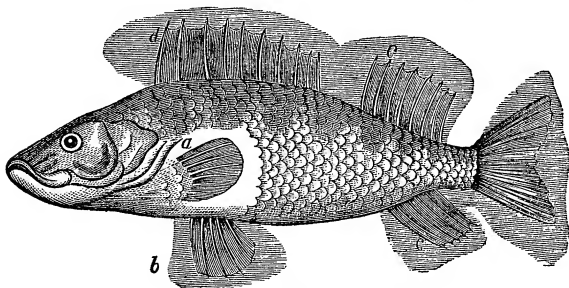


Fig. 56.—Common Perch, showing application of the Paper.*

place by cotton. The skin must now be detached from the flesh, which will require some care at first. It must be commenced at the head, and separating it downward with the assistance of a knife, and the fin-bones must be cut through with scissors. The spine must now be cut through close to the head, and also at the tail, and the body removed.

All the animal matter having been completely removed from the skin, the inside must be wiped dry, and the preservative applied in the same manner as directed for birds and quadrupeds. Great care is necessary to prevent it from being too much distended.

In sharks and large fishes, an incision is made below the head, and extended to the fin of the tail; the skin is then separated on each side with a scalpel, cutting back as far as

*DESCRIPTION OF FIG 56.—The common perch, showing the manner in which the paper is attached for the purpose of extending the fins. a, pectoral fin; b, ventral fin; c, anal fin; d, first dorsal fin; e, second dorsal fin.

possible, so that the vertebræ may be cut close to the head. The tail is then skinned. The head is pushed inward, and the skin passed over it above, and all the cartilage cut carefully away. Care must be taken not to enlarge the branchial openings too much, which would render it necessary to sew them up again, and it is not easy to hide a seam in a fish's skin.

Diadon, *Tetradon* and *Balistes*, and their congeners, are opened by the belly. The *Ostracion* is enveloped in a skin, which consists of a single piece, the tail of which only is free and flexible. The opening in the belly must not be large; the tail must be opened, the flesh cut away, and stuffed with cotton.

STUFFING.

The skins being properly anointed, are filled with tow or cotton. This must be so managed that there will be no prominences on the outside of the skin, which, in fishes, is smooth and even for the most part. When properly filled, they must be sewed up, and set aside to dry in the air, but not exposed to the rays of the sun. In a few days, the papers with which the fins were extended are taken off, by damping them with a sponge. The glass eyes are now introduced, after filling the orbits with cotton and a little cement to secure them in their places. The skins may then be varnished, and laid aside to dry. Mr. Bullock, of the London Museum, always used turpentine varnish. Some specimens of his mounting have as much the appearance of the living subjects as any we have seen.

SHARKS.—In stuffing these large fishes, it is necessary to use a stick for a center support. This must also enter the head, through the opening of the throat. If it is intended that the specimen shall be suspended from the ceiling, wire-hooks must be fastened into the wood. From these must be placed upright wires, so that they penetrate the skin, and pass through the back. Let the whole internal surface of the skin be well rubbed with the preservative. The body is then stuffed to its full size, and afterward sewed up. The stuffing of the head must be completed through the orbits of the eyes, and also by the mouth. This finished, the glass eyes are inserted, as in other animals, and fixed by means of cement.

Many species of fish have semi-transparent cartilages connected with the eyes. These must be imitated with gum-arabic and powdered starch, as well as the cornea of the eyes.

The skins of all fish, which are similar to that of sharks, must be well supplied with spirits of turpentine, after they are mounted, more particularly the head and fins; but as they are not glossy, they do not require to be varnished.

When the fins are strong, it is necessary to keep them extended by means of a wire introduced through them.

The frog-fish, or fishing-frog, fig. 57, is easily preserved, as the colors are not so liable to change as in many other species.

Salmon, trout, tench, carp, pike, &c., are very easily preserved, as the scales are firmly attached to the skin; and although they become somewhat dim from drying, their colors and brilliancy are considerably restored by means of varnish, if applied before they are thoroughly dried.

After a lapse of time, the varnish will rise into little scales; to remove these, nitric acid, diluted in water, must be applied to the whole external surface, which has the effect of completely taking off the varnish, or at least of raising it from the skin, which, when allowed to dry, can be wholly removed by rubbing it with a small brush. It may then be varnished again; when dry, it will ever afterward continue quite solid.

The late Mr. Stuckbury had a method of preparing the fresh-water fishes of Britain, which was much admired at the

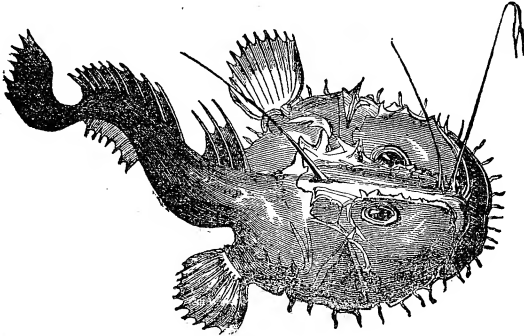


Fig. 57.—The Frog Fish or Fishing-Frog.

time. He skinned them under water, by which means he retained the scales in great perfection. But this method is too troublesome to be generally adopted.

What is above recommended will apply to almost all fishes; but where there is any difficulty, it must be left to the ingenuity of the operator.

Those travelers who do not wish to take the trouble of skinning fishes themselves, should preserve them in barrels of spirits. Each should be wrapped up in a separate piece of cloth, to prevent their scales being rubbed off by friction.

When travelers intend to preserve fish in spirits, they ought to provide themselves with casks of from four to ten gallons, well bound with iron hoops. An opening is cut near the bung-hole, of the dimensions of six inches by four, of this shape *u*. The piece of wood cut out must be so beveled, out-

wardly, that it cannot fall into the cask, and must be used as a stopper, when the barrel has been filled with specimens. The fish put in should each be numbered with a small leaden ticket, or piece of wood, with the number turned or cut out, and corresponding notes taken of its locality, whether male or female, and of its name, if known, or the provincial name of the country, with any other circumstances connected with its history which can be procured. When the barrel is filled, the stopper must be put in, and hermetically sealed, to prevent the evaporation of the liquor.

If a female is procured, much swollen with spawn, an opening must be made at the anus, and the spawn extracted by it. The liquor must not be too strong, otherwise it will injure the colors of the fish. See the strength mentioned in the receipts.

Amateurs can preserve small specimens of fish very well by simply removing the entrails, eyes and brains, and powdering freely and thoroughly with alum or saltpeter on the flesh side, and allowing to dry with slow heat; having previously closed the opening by which the entrails were removed, and filling the interior with waste cotton. They may be fastened to thick card-board, with wire running through the fish and turned on the back of the card. Varnish can be applied afterward. We have even preserved small sturgeon by simple drying, without any preparation whatever, but these specimens are very liable to the attacks of small insects.

LOBSTERS, CRABS, &c.

Crabs, lobsters, and their congeners are all protected by a shell, which is easily preserved, although there is considerable difficulty in preserving the colors of some species.

The flesh must be extracted from the large claws of lobsters and crabs by breaking the smallest possible piece from their points and introducing a small crooked wire; in the smaller claws the flesh must be allowed to dry, and to facilitate this, extremely small perforations should be made in opposite sides of the shell by means of a sharp triangular awl, so as to allow the air to pass through it.

In lobsters the branchite and all the intestines must be cut away, the latter is effected by separating the body from the lower parts, and then extracting the internal parts with any sharp instrument; it should then be dried and cemented together, after being well anointed with the preservative. In crabs, the body with all the limbs attached, is pulled separate from the back shell, and the whole fleshy matter carefully picked out, and preserving powder and the solution of corrosive sublimate applied to the different internal parts. In drying lobsters, crabs, &c., they should be exposed to a free current of air, but not to the sun's rays, as it reddens the shells of crustaceous animals.

It need hardly be mentioned, that before applying the preservatives, the shells should be well washed with cold water.

The hermit crab always takes possession of the shell of some turbinated univalve as its domicile. These are easily preserved by pulling out the animal after it is dead. An incision is made in the soft tail of the animal, and the contents allowed to run off; it is then filled with cotton and imbued with the preservative, some cement is then put on the tail, and the animal returned to its shell, which completes the operation of preserving.

In sending home crustaceous animals, the larger species should be emptied of their fleshy matter, which, however, is not necessary with the smaller species; they should be packed in middling-sized cases, and each wrapped in separate papers, with a thick bed of cotton or flax between each. In lobsters, and the species which are allied to them, care must be exercised in preserving the tentacula or feelers which emanate from their heads, as these become very brittle after drying. When setting up specimens which have been sent home, they should be immersed in *cold* water for some time, to give pliability to the tentacula and other parts, without which it will be impossible to set them up in any way without their breaking.

Mr. Bullock recommended that crabs and all other crustaceous animals should be immersed in corrosive sublimate and water for an hour previous to their being put into attitudes.

When the joints become loose they are generally attached by glue, but the cement is much better.

N. B.—On no account whatever use *warm* water in cleaning crustaceous animals as it is certain to change their colors.

SERPENTS IN GENERAL.

SKINNING.—In skinning serpents there is some nicety required, to cut them so as not to disfigure the scales; the opening should be made in the side, commencing at the termination of the scales; and they should on no account be divided, as upon their number the species is mostly determined.

It is a very frequent practice to send home serpents without the head, which renders them quite unfit for any scientific purpose. This proceeds from the fear of receiving poison from the fangs. But there is not the slightest danger of being affected, as these can easily be cut out by means of pincers. The head should be cleaned and the brain removed, in the same manner as recommended for birds and quadrupeds, the skull anointed and then returned into the skin.

When the skin is removed, it may be rolled up and packed in a small space. The simplest way to preserve small species is to put them in spirits, which must not be too strong, as it will destroy the colors. [See department of Recipes.]

STUFFING.—The skin, if not recent, must be first softened in the manner recommended for birds, page 44. A piece of wire is taken the length of the animal, which must be wrapped round with tow till it is of a proper thickness, and above the whole, a spiral band or sliver should be carefully wrapped. It is then placed inside of the skin, and sewed up. The eyes are placed in, as directed for quadrupeds and birds. When dry give the serpent a coat of varnish, and then twist it into any attitude wished. A favorite and striking one is to have it wound round some animal, and in the act of killing it.

A simple but rather rough way of skinning a snake, where there are no scales, is the following: Open the mouth and separate the skull from the vertebral column, detaching all

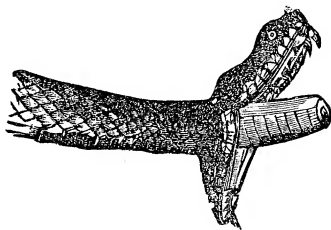


Fig. 58.—Serpent's Head Prepared for Skinning.

surrounding muscles adherent to the skin. Next, tie a string around the stump of the neck thus exposed (fig. 58) and, holding on by this, strip the skin down to the extremity of the tail. The skin thus inverted should be restored to its proper state, and then put in spirit or stuffed, as convenient.

FROGS AND TOADS.

SKINNING.—The mouth is opened, and the first vertebra of the neck is cut. The whole inside of the mouth is cut out with scissors. The two jaws are next raised up, and the skin is pushed back with the fingers of the right hand; while the body is drawn back in a contrary direction with the other hand, and the whole body is then drawn out at the mouth. The legs are then returned to their proper place.

Lampreys, eels, and fish of similar form, may be skinned in the same manner as are frogs and toads, by drawing the body through the mouth.

STUFFING.—The simplest method of stuffing frogs and toads is with sand. A small funnel is placed into the mouth, and well-dried sand poured in. When full, a small piece of cotton is pushed into the throat, with some of the cement, to keep the sand from escaping on moving the animal.

The frog is then placed on a board, and in an attitude. When quite dry, give it a coat of varnish. When this has perfectly dried, very small perforations are made under the belly with the point of a needle, and the sand allowed to escape, leaving the body of its natural form.

These animals are liable to change of color from drying and should, therefore, be painted with the varnish to their natural hues. There is less difficulty with toads in this respect, as they are usually of a brown color, and not liable to much change. They may be perfectly preserved in spirits.

Mr. Burchell, in his four years' journey through Africa, glued the skins of the smaller serpents perfectly flat on paper, which preserved the size of the animal, and the skin retained all the beauty of life.

CROCODILES AND LIZARDS IN GENERAL.

SKINNING.—All this tribe are skinned in the same manner as quadrupeds. Care is, however, required in skinning the tails of the smaller species, as they are very liable to break. The skin being of a dry nature requires but little of the preservative. After they are thoroughly dried they will keep a very long time without decay.

STUFFING.—Stuff them as directed for quadrupeds. They admit of but little variety of attitude. The small species are apt to change color in drying; the color should be restored with the colored varnishes, and afterward dimmed with sand paper. To keep them in their natural colors, they should be preserved in spirits. The skins of such as are glossy should be varnished after they are perfectly dry.

TORTOISES AND TURTLES.

SKINNING.—The first operation is to separate the back and breast shells with a strong short knife, or chisel. If the force of the hand is inadequate, a mallet may be used, taking care not to strike so hard as to crack the shell.

These two bony plates being covered by the skin, or by scales, the scapula, and all the muscles of the arm and neck, in place of being attached to the ribs and spine, are placed below, from which cause the tortoise has been termed a retroverted animal. The vertebral extremity of the scapula is articulated with the shield, and the opposite extremity of the clavicle with the breast-plate, in such a manner that the shoulders form a ring for the passage of the trachea and œsophagus.

After the turtle is opened, all the flesh which adheres to the breast-plate, and also to the upper shell, is removed, while attention is paid to the parts as above described. The head, fore-feet, and tail are skinned as in quadrupeds; but

none of these must be removed from the upper shell, but left attached.

All these fleshy parts being removed, the shells are washed out with a sponge, and carefully dried. They are then slightly rubbed with the arsenical soap.

STUFFING.—Wires are now passed through the middle of the legs, after the skin has been rubbed with the preservative. The skull is returned to its place, and the whole of the head, neck, and legs stuffed with chopped flax or tow. The parts of the skin, which have been cut, are then sewed together. The back and breast plates are then united by four small holes, being bored at their edges, and united by strings or small wires. The junction of the bones may then be attached with the cement, colored so as to correspond with the shell.

If the calipash is dirty, it may be cleaned with a slight solution of nitric acid and water; afterward clean washed, oiled, and then rubbed hard with a woolen rag, to give it a polish.

SHELLS, &c.

Cuttle-fish, and all other mulluscous animals, can only be preserved in spirits. The same observation applies to the animals which inhabit that numerous tribe called testaceous shells. They must be detached from the shells, and put into spirits, while the shells themselves must be preserved, independent of the animal.

Shells naturally arrange themselves under three distinct heads; marine, land, and fresh water.

Marine shells are only to be expected perfect, when procured in a living state. The way to extract the animal, is to pour in some warm water on it; but, if made too hot, it is liable to crack the shells. When the animals are dead, they can easily be pulled out with any hooked instrument, or fork, or, if the animal is small, by a common pin. This applies to all marine shells, whether univalve, bivalve, or tubular. It is of great consequence to preserve the ligament of bivalve shells entire, so that the valves may not be separated. The animals of land and fresh-water shells are killed by the same means, only that the water requires to be very hot.

Unless the shells are covered with any extraneous matter, it is not necessary to clean them. Marine shells are, however, very liable to be incrustated with other marine bodies, particularly with *Serpula* and *Balms*, &c. These must be started off by means of a sharp instrument: an engraving tool is well adapted for this purpose. This must be done with great caution, in species which have spines and other excrescences, as they are very liable to be broken. Should any of the calcareous matter still adhere, this must be removed, by applying to it a *very weak* mixture of muriatic acid and water, ap

plied with the point of a quill, and then plunged into water, and allowed to remain till the acid is quite extracted. But on no account whatever, attempt to eradicate these parasitic bodies by means of acid, or acid and water, alone, as the chances are that the shell will be completely destroyed by their application. We have seen many fine and valuable shells destroyed by an injudicious application of acids—they should never be used when it can possibly be avoided. We have, on the other hand, seen shells which were so completely enveloped in calcareous crust, that it was impossible to trace their external surface, most thoroughly cleared of all this, without being touched at all by acids, the whole being removed by a small knife or other sharp instrument; and these, in many cases, having long and tender spines externally.

Nothing can be more monstrous than the application of pumice-stone, which some recommend, for polishing shells; as is also the use of tripoli, rotten-stone and emery. Neither do we approve the application of varnishes, as such shells never have their natural luster.

If a shell has been found dead upon the beach, it is probable that it will have undergone a certain degree of decomposition, that is, it will have parted with some of its animal matter, and consequently the colors will have faded, and the surface present a chalky appearance. To remove this, take a small portion of sweet oil and apply it to the surface, when the colors which are invisible will appear. When completely saturated with oil, let the shell be rubbed dry, and placed in a cabinet. Oil may also be applied after acid has been used, and it will be found extremely useful, when applied to dry the epidermis, which it will prevent from cracking, or quitting the shell entirely, which it frequently does.

Whether marine shells are procured in a living or dead state, a very necessary precaution is to immerse them in pure tepid water, after the animal has been extracted, and allow them to continue in it for an hour or two, so as completely to extract any salt or acid which may be in them.

Fresh-water shells are liable to a calcareous or earthy incrustation, which must be removed by immersing them in warm water, and afterward scraping and brushing them with a nail-brush or tooth-brush. Much nicety is necessary in cleaning these, as their thinness renders them in general liable to be broken. A little sweet oil will improve the appearance of the epidermis, and render it less liable to crack.

Land shells seldom require any cleaning, except washing in water, as they are not liable to incrustations of any kind.

When shells are perforated by marine animals or otherwise broken, if the specimen is rare, it is desirable to remedy these defects as far as possible. They may be therefore filled up,

or pieces added to them with the cement, which may be colored when dry to imitate its original state,

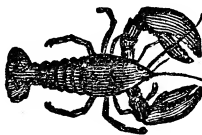
OF POLISHING SHELLS.

Many species of marine and fresh-water shells are composed of mother-of-pearl, generally covered with a strong epidermis. When it is wished to exhibit the external structure of the shells, the epidermis is removed, and the outer testaceous coating polished down, till the pearly structure becomes visible. It has been a common practice to remove the strong epidermis of shells by means of strong acids, but this is a hazardous and tedious mode of operating. The best method is to put the shells into a pan of cold water, with a quantity of quicklime, and boil it from two to four hours, according to the thickness of the epidermis. The shells afterward must be gradually cooled, and some strong acid applied to the epidermis, when it will easily peel off. Two hours are sufficient for the common muscle being boiled. The shells are afterward polished with rotten-stone and oil, put on a piece of chamois leather.

The epidermis of the *Unio margaritifera* is so thick, that it requires from four to five hours boiling. After the epidermis has been removed, there is beneath it a thick layer of dull calcareous matter, which must be started off with a knife or other sharp instrument; this requires great labor, but when accomplished a fine mother-of-pearl is exhibited, which adds an agreeable variety as a specimen.

Various *Turbos* and *Trochus* are also deprived of their epidermis, and polished with files, sand-paper, pumice-stone, &c., till the pearly appearance is obtained; but all these modes are invented for disfiguring rather than improving the shells in the eye of the naturalist, and should never be resorted to except where the species is very common, in which case it is well enough to do so with one or two specimens to show the structure of the shells.

After the operation of polishing and washing with acids, a little sweet oil should be rubbed over to bring out the colors and destroy the influence of the acid.



PART SIXTH.

The Collection and Preservation of Spiders, Insects, &c.

OF SPIDERS.

THE class *Arachnides* includes all animals of the spider kind. These were formerly arranged among insects, but have been formed into a separate class by Lamarck. The general instructions which we shall give regarding insects will apply to spiders, but there will be additional care required in regard to the bodies, a spider's body being very difficult to preserve, from its liability to shrink into a shapeless mass. To prevent this, the body should be pricked with the triangular awl, fig. 18, and the contents pressed out; it should then be stuffed with very fine carded cotton or down, which can be pushed in by a heckle tooth, or bodkin or probing-needle, figs. 19 and 20, blunted a little at the point. When properly distended, the small aperture should be filled with a little cement, or a solution of gum-arabic. The legs of the larger species, such as the bird-catching mygale (*Mygale avicularia*) and the scorpions, are also liable to shrink, and should be stuffed in the same manner as that of the body.

In those species of spiders which we have thus prepared, and whose colors are rich and likely to be affected by the action of the atmosphere, we must endeavor to arrest its progress by immediately imbuing the animal after it is set up with the solution of corrosive sublimate, and in an hour after with a thin coating of a very weak white-spirit varnish; for this purpose, take a teaspoonful of the ordinary white-spirit or elastic varnish, and add to it two spoonfuls of spirit-of-wine, apply this with a fine camel-hair brush, which will quickly dry, and have a strong tendency to preserve the color. The varnish being thus reduced in strength, will not leave any gloss on the insect, nor will it be at all perceptible.

Mr. Samouelle, author of *The Entomologist's Useful Compendium*, in speaking of preserving spiders, says: "The best preserved specimens that I have seen are those where the contents of the abdomen have been taken out and filled with fine sand. I have preserved several in this way, and find it to answer the purpose."

Mr. Donovan, author of *The History of British Insects*, and many other splendid and useful books on insects and natural history, makes the following observations on the preservation of spiders: "To determine whether some species of spiders could be preserved with their natural colors, I put several into

spirits-of-wine ; those with gibbous bodies soon after discharged a very considerable quantity of viscid matter, and therewith all their beautiful colors ; the smallest retained their form, and only appeared rather paler in the other colors than when they were living.

“During the course of last summer, among other spiders I met with a rare species ; it was of a bright yellow color, elegantly marked with black, red, green, and purple ; by some accident it was unfortunately crushed to pieces in the chip-box wherein it was confined, and was therefore thrown aside as useless ; a month or more after that time I observed that such parts of the skin as had dried against the inside of the box, retained the original brightness of color in a considerable degree. To experiment further, I made a similar attempt, with some caution, on the body of another spider (*Aranea diadema*), and though the colors were not perfectly preserved, they appeared distinct.

“From other observations, I find, that if you kill the spider and immediately after extract the entrails, then inflate them by means of a blowpipe, you may preserve them tolerably well : you must cleanse them on the inside no more than is sufficient to prevent moldiness, lest you injure the colors, which certainly in many kinds depend on the substance that lies beneath the skin.”

Scorpions, and all the spider tribe, may be sent home in spirits, which will preserve them perfectly, and when taken out and dried, they will be found to have suffered nothing from their immersion. We have seen some specimens set up after being sent home in spirits, which rivaled any which have been preserved in a recent state. The animals of this class are particularly liable to the attacks of insects, particularly in warm countries, on which account, the mode of transporting and keeping them in spirits, is, perhaps, superior to all others. If, however, they are set up in a warm climate, they should be well soaked with the solution of corrosive sublimate, made according to the recipe of Mr. Waterton. [See chapter of Recipes.]

For the setting up of this class see the directions for preserving insects.

MYRIAPODA.

The mode, pointed out for the preceding class, and for insects, also applies to the class *Myriapoda*, containing gally worms, the *Scolopendra*, and others, which were formerly ranked as insects. They may also be sent home in the same way, or they may be set up as directed for insects.

OF COLLECTING INSECTS.

Preparatory to collecting insects, certain apparatus must be

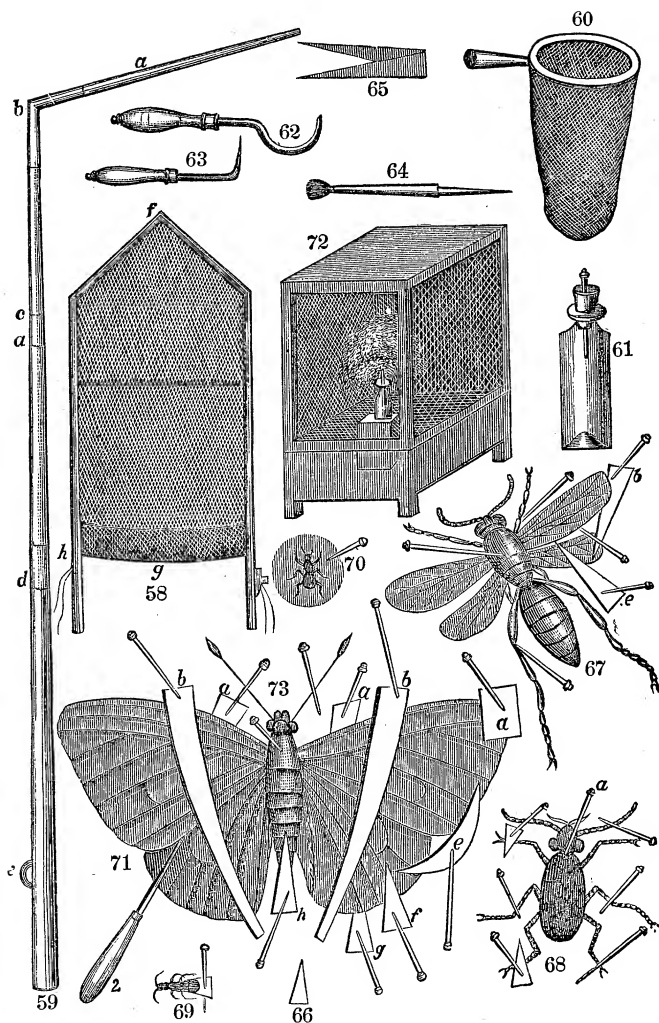
provided, not only to enable us to secure them, but also to preserve them after they are caught. First, we must be provided with a quantity of wooden boxes, from 18 to 20 inches long, 15 to 17 inches wide, and two inches deep. These should have well-fitted lids, with hinges, and fastened by a wire catch, or small bolt. The bottom should have a layer of cork, about the sixth of an inch in thickness, which should be fixed down with very strong paste made according to our recipe; and also some wire nails, to prevent it from springing. Over the cork should be pasted white paper. The box should be anointed inside with oil of petroleum. If that cannot be procured, make an infusion of strong aromatic plants, such as cinnamon, aloes, thyme, laurel, sage, rosemary, or cloves, and wash the inside with it. A small packet of camphor should be wrapped in a piece of rag and deposited in a corner of the box.

We must also be provided with a quantity of *insect pins*, of different sizes, corresponding with the size of the insect. The pins used for setting should be longer than those which are taken to the field.

Bottles, with mouths from an inch and a quarter to two inches in diameter, must also be procured, and these must be three-fourths full of spirits, such as weak brandy, rum, gin or whisky.

Hunting Box.—We must besides have what is termed a hunting box, for carrying in our pocket, when seeking after insects. This should be made of strong pasteboard, or chip, for lightness, or, if this is no consideration, of tin. It must be of an oblong-oval shape, rounded at the ends, for the convenience of the pocket. It should be from eight to ten inches long, four to five inches wide, and two and a half to three inches deep. It must have a layer of cork both in the bottom and top of the lid inside, for attaching insects to, when caught during the day. The larger insects are placed at the bottom, and the smaller ones on the lid.

The Entomological Net.—We next procure a net, fig. 58, constructed similar to a bat-fowling net. This is either made of fine gauze or coarse muslin; it may either be green or white—the latter is the best for observing small insects which may be caught; the green, however, is better adapted for catching moths. The net-rods should be made of hickory or beech; they ought to be five feet in length, quite round, smooth, and tapering to an obtuse point, as at fig. 59; the oblique cross-piece at the point fig. *a*, should be of cane, and fitted into the angular ferrule; the rod, marked *b*, must be divided into three or four pieces, so that it may be taken asunder and carried in the pocket; the upper part of each joint must have a ferrule affixed to it, for the purpose of articulating the other pieces, *d*. Each joint should have a notch or check, as marked at *c* to prevent the rod from twisting.



Figs. 58 to 73.—Articles Used in the Collection and Preservation of Insects.

The net itself, fig. 58, must have a welting all round it, doubled so as to form a groove for the reception of the rods. In the center of the upper part or point, at *f*, it must have a small piece of chamois leather, so as to form a kind of hinge; this must be bound round the welting, and divided in the middle, so as to prevent the cross pieces from slipping over each other; *g*, shows about four inches of the gauze turned up, so as to form a bag; *h, h*, are strings for the purpose of passing through the staple *e*, to which the net is firmly drawn on each side. When the net is used, a handle is to be held in each hand.

If it is intended to take insects on the wing, by means of this net, for which it is admirably adapted, it may be folded together in an instant. If the gauze is fine enough, and preserved whole, even the smallest insect cannot escape. It may be also applied in catching coleopterous insects, which are never on the wing, as well as caterpillars. When used for this purpose, the entomologist must hold it expanded under trees, while another must beat the branches with a stick. Great numbers of both insects and larvæ will fall in the gauze, and by this means many hundreds may be captured in a day.

Another method is to spread a large table-cloth under trees and bushes, and then beat them with a stick. An umbrella reversed has frequently been used for the same purpose. Bosc, the celebrated naturalist, used this last method, he held the umbrella in the left hand, while he beat the bushes with the other.

The Hoop or Aquatic Net, fig. 60.—This net is used for capturing aquatic insects, which are either lurking at the bottom, swimming through the liquid element, or adhering to plants. It may also be successfully used in sweeping among grass and low herbage, for coleopterous insects, and others which are generally to be found in such situations. The socket, for the handle, may be made of such dimensions, as will answer the second joint of the entomological net-rod, which will save carrying another handle; or a walking-stick may be made to fit it.

Phial, fig. 61.—This may either be made of tin or glass, and used for collecting coleopterous and other creeping insects. The mouth should be nearly an inch wide, and a cork exactly fitted to it, in the center of which must be inserted a small quill, to afford air, and inserted about an inch beyond the cork, to prevent the insects from escaping. If the bottle is made of tin, and of a larger size, a tin tube must be introduced into its side, and terminating externally at the surface.

Digger, fig. 62.—This instrument is either made of iron or steel, and is about six or seven inches in length, fixed into a turned wooden handle. It is used for collecting the pupæ

of lepidopterous insects, at the roots and in the clefts of the bark of trees; and also for pulling off the bark, particularly from decayed trees, under which many curious and rare insects are frequently found. It is most useful with an arrow-headed point.

Setting Needles, fig. 63.—Fitted into a small wooden handle, the needle itself should be about three inches long, and about the thickness of a small darning-needle, slightly bent from about the middle. Fig. 64, is a straight needle, which is used for extending the parts of insects; at one end of the handle is the needle, and at the other a camel-hair pencil, which is used for removing any dirt or dust which may be on the insects. The pencil may be occasionally drawn through the lips, brought to a fine point, and used for disposing the antennæ and palpi of insects of the minute kinds.

Brass Pliers, fig. 65.—These are used for picking up small insects from the roots of grass, &c. They may also be used for laying hold of small insects, while they are yet free and not set up.

Quills.—These are of great use in carrying minute insects. They should be neatly stopped with cork and cement, at one end; the other end should be provided with a small movable cork, for a stopper. Each end should be wrapped carefully round with a silk thread waxed, to prevent them from splitting.

Pocket Larvæ-Box.—For collecting caterpillars, this box is very essential: it consists merely of a chip-box, with a hole pierced in the center of the top and bottom, and covered with gauze, for the admission of air. It will be necessary to put into the box some of the leaves on which the larvæ feed, as they are very voracious, and cannot long exist without food.

Pill-Boxes.—No entomologist should be without five or six dozen of these useful articles. They are of great value in collecting the smaller species of lepidopterous insects such as the tineæ, &c., and only one specimen should be put in each box, as, if more than one, they are apt to injure each other's wings, by beating against each other.

Setting-Boards.—These must be made of deal boards, from a foot to fifteen inches long, and eight or ten inches broad, with a piece of wood run across the ends, to prevent them from warping. They are covered with cork, which must be perfectly smooth on the surface, with white paper pasted over it. Several boards will be required, by persons who are making collections, as some of the insects take a considerable time to dry, so that they may be fit for introducing into a cabinet.

The boards should be kept in a frame made for the purpose. It should consist of a top, bottom, and two sides; the back and front should have the frames of doors, attached by small hinges, and their centers covered with fine gauze, for the free

passage of air; the sides should have small pieces of wood projecting from them, for the boards to rest on; which should be at such a distance from each other, that the pins may not be displaced, in pushing the boards in, or drawing them out. The frame should be placed in a dry airy situation.

Braces.—These are merely small pieces of card, cut in the form illustrated by fig. 66. They are pinned down on the insects, to keep their wings, &c., in a proper state, till they acquire a set, as shown in the insects extended at the bottom of page 81, figs. 67, 68, 69 and 73.

Fan Forceps, fig. 74.—This very useful instrument to the entomologist, must be made of steel or iron, and about eight or ten inches in length; its general construction is like that of a pair of scissors, and it is held and used in the same manner. Toward the points are formed a pair of fans, or hoops, which may either be square, oval, hexagonal, or octagonal in the edges, and the centers covered with fine gauze. The general size of the fans is from four to six inches. These are used for capturing bees, wasps, and *Musca*. They are also used for catching butterflies, moths, sphinxes. If an insect is on a leaf, both leaf and insect may be inclosed within the fans; or if they are on a wall or the trunk of a tree, they may be very easily secured by them.

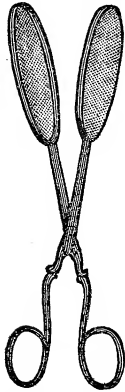


Fig. 74.—*Fan Forceps.*

If a butterfly, sphinx, or moth, is captured by the forceps, while yet between the fans, it should be pressed pretty smoothly, with the thumb-nail, on the thorax or body, taking care, however, not to crush it. It may then be taken into the hand, and a pin passed through the thorax, and then stuck into the bottom of your hunting-box.

SETTING AND PRESERVING INSECTS.

Insects of the orders *Coleoptera*, *Orthoptera*, and *Hemiptera* are very easily preserved. They may all be speedily killed without injury, by immersing in scalding water; they should then be laid upon soft blotting-paper, for the purpose of absorbing as much of the moisture as possible; or they may be placed in a tin box, with a little camphor in it, near the fire, which soon kills them. This is besides of considerable effect in their preservation.

Insects of the cricket and locust kind have tender bodies, and are sure to shrivel in drying. The intestines should therefore be extracted, while they are yet moist, and the skin filled with cotton.

When coleopterous insects are set with the wings displayed, the elytra should be separated, and the pin passed through

their body, near the middle of the thorax, as in fig. 67. The wings are exhibited as in the act of flying, and are retained in this situation until they are quite dry, by the card braces, *a*. The insects of this order should always have a pin passed through the right elytra, on the right side, as shown at fig. 67, *a*: that is, it should pass underneath, between the first pair of feet and the intermediate ones.

The legs, palpi and antennæ, should be displayed in a natural order on the setting-board, and retained in the position by means of pins and braces, as shown in figs. 67 and 68. These must be kept in that state, either longer or shorter, according to the insect and state of the weather, as if placed in a cabinet before they are quite dry, they are sure to get moldy, and will ultimately rot.

Minute insects should be attached to cards with gum, as shown in figs. 69 and 70, with legs and other organs displayed. Entomologists generally adopt triangular cards, as at fig. 66, as less liable to hide the parts of the insects.

MOTHS AND BUTTERFLIES.

When the large moths must be killed, destroy them at once by the insertion of a strong, red-hot needle into their thickest parts, beginning at the front of the thorax. If this be properly done, instead of lingering through several days, they are dead in a moment.

Butterflies are soon killed by passing a pin through the thorax; but probably the safest way is to use the red-hot needle. The pin passed through the thorax of small moths, generally proves almost instantly fatal to them.

The best manner of preserving the minute species of moths, is by pill-boxes, as above stated, each moth being kept in a separate box. The best method of destroying them is this: A piece of flat hard wood is taken, and a circular groove cut in it, sufficiently deep to admit the mouth of a tumbler being placed within it. In the center of the wood, pierce a hole about a third of an inch in diameter in its center; place the pill-box under this tumbler, with the lid off, and the insect will soon creep out; but whether it does so or not, a match well primed with sulphur is lighted and placed into the hole under the center of the tumbler, which will suffocate the insect in a few seconds. I have also found this an effectual method of killing the larger species of butterflies, and moths. In piercing them, the pin should be quite perpendicular, that no part of their minute frame should be hidden by its oblique position.

The larger insects of this order are set by braces chiefly. A single one should in the first place be introduced under the wing, near the thorax, as shown in fig. 71, and a longer brace extending over the wings, as at *b, b*. These should not bear

upon the wings, but be ready to rest gently on them, when required. The wings are now elevated to their proper position by the setting-needle *c*, and other braces are used as necessity dictates, in the manner represented at *d*, *e*, *f*, *g*, and *h*. The feet and antennæ are extended and kept in their places by means of pins ; in which operation small braces are also occasionally used.

The French entomologists set butterflies, moths, and sphinxes, on a piece of soft wood, in which they have excavated a groove for the reception of the body, as deep as the insertion of the wings. They are otherwise preserved as above directed.

In the larger butterflies, moths, and sphinxes, the abdomen should be perforated, its contents extracted, and then stuffed with fine cotton, after having been washed internally with the solution of corrosive sublimate. Indeed, the cotton should also be rubbed with the arsenical soap before being introduced, as these insects are particularly liable to the attack of smaller insects, such as the mite.

Several of the moth tribe are extremely liable to change their color some time after they have been placed in a cabinet. This change is frequently occasioned by an oily matter which is common to many of them. This first makes its appearance in small spots on the body, but soon spreads itself over the abdomen, thorax, and wings ; and ends in a total obliteration of all the beautiful markings. A method which has been sometimes successfully adopted is to sprinkle all the wings with powdered chalk, and holding a heated iron over it ; the chalk absorbs the grease, and may then be blown off by means of a pair of small bellows. Another way of applying the chalk, and perhaps the better of the two, is to throw some powdered chalk on the face of a heated iron, and then put it into a piece of linen cloth, and apply it to the body of the insect ; the heat of the iron will soften the grease, and the chalk will absorb it. Another way is to hold a heated iron for a few minutes over the insect, and then to wash the spotted or greasy places with ox-gall dissolved in water, applied with a camel-hair pencil, and afterward wash it with pure water, and dry it by the application of blotting-paper, and when perfectly dry imbue it with the solution of corrosive sublimate. But grease seldom appears where the contents of the abdomen have been removed.

DRAGON-FLIES, &c.

Dragon-flies are often difficult to kill, being powerful and nervous animals. When caught they should be transfixed through the sides, and it sometimes becomes necessary to put braces on their wings to prevent them from fluttering while in the hunting-box. The only certain method of killing them speedily is by the hot needle. They may also be killed some-

times by placing them under a tumbler and suffocating them with vapor of tobacco or sulphur. Some entomologists put them in scalding water for an instant, and some with whisky or alcohol.

The contents of the abdomen should always be removed from dragon-flies, otherwise it will become black and shining through the skin, and destroy the beautiful bands with which they are ornamented. They can be stuffed with cotton or a small roll of paper introduced. If these precautions are attended to, the insect will preserve the perfect beauty of its living state.

The other species of the orders *Neuroptera*, *Hymenoptera*, and *Diptera*, soon die after being transfixed. They may be set by braces and pins, as represented in figs. 67, 68 and 71.

Some two-winged insects are very perishable in point of color after death, particularly in the abdomen, the skin of which is very thin. The only way of remedying this is to pierce the abdomen, and after taking out the contents the cavity it should be filled with powdered paint the same color as the living subjects, which will shine through and give it all the appearance of nature.

METHOD OF RELAXING DRIED INSECTS.

Insects frequently get stiffened before the entomologist has leisure to get them set; and it usually happens that those sent home from foreign countries have been ill set, and require to be placed in more appropriate attitudes after they have fallen into the hands of the scientific collector. They may be relaxed and made as flexible as recently killed specimens by the following simple process, from which they can receive no injury: Pin them on a piece of cork and place the cork in a large basin or pan of tepid water, and cover the top tight with a damp cloth, taking care that it is sufficiently high not to injure the insects. In most cases a few hours is sufficient to restore them to their original flexibility, so that they may be easily put in their proper positions. In some instances, three or four days are necessary to relax them thoroughly, so as to set the wings without the risk of breaking them; no force whatever must be used with any of the members. When set up after being relaxed, they must be treated in exactly the same manner as recent specimens.

We must again caution the entomologist to be careful that he applies the solution of corrosive sublimate to all his specimens, otherwise there is little chance of their continuing long without being attacked by the mite; they ought to be frequently imbued.

Mr. Waterton, who has studied deeply the subject of preserving animal substances, and applied them not alone in Great Britain, but under the influence of a tropical climate.

makes the following observations upon the preservation of insects: "I only know of two methods," says he, "to guard preserved insects from the depredations of living ones. The first is, by poisoning the atmosphere—the second is, by poisoning the prepared specimens themselves, so effectually, that they are no longer food for the depredators. But there are some objections to both these modes; a poisoned atmosphere will evaporate in time if not attended to, or if neglected to be renewed; and there is a great difficulty in poisoning some specimens on account of their delicacy and minuteness. If you keep spirits of turpentine in the boxes which contain your preserved specimens, I am of opinion that those specimens will be safe as long as the odor of the turpentine remains in the box, for it is said to be the most pernicious of all scents to insects. But it requires attention to keep up an atmosphere of spirits of turpentine; if it be allowed to evaporate entirely, then there is a clear and undisputed path open to the inroads of the enemy; he will take advantage of your absence or neglect, and when you return to view your treasure you will find it in ruins. Spirits of turpentine poured into a common glass inkstand, in which there is a piece of sponge, and placed in a corner of your box, will create a poisoned atmosphere and kill every insect. The poisoning of your specimens by means of corrosive sublimate in alcohol, is a most effectual method. As soon as the operation is properly performed, the depredating insect perceives that the prepared specimen is no longer food for it, and will for ever cease to attack it; but then every part must have received the poison, otherwise those parts where the poison has not reached will still be exposed to the enemy, and he will pass unhurt over the poisoned parts till he arrives at that part of your specimen which is still wholesome food for him. Now, the difficulty lies in applying the solution to very minute specimens without injuring their appearance; and all that can be said is, to recommend unwearied exertion."

Mr. Waterton is of opinion, that tight boxes, with aromatic atmospheres, are not to be depended upon, in the preservation of insects. He says: "The tight boxes, and aromatic atmospheres, will certainly do a great deal, but they are liable to fail, for this obvious reason, viz., that they do not render forever absolutely baneful and abhorrent to the depredator, that which in itself is nutritious and grateful to him. In an evil hour, through neglect in keeping up a poisoned atmosphere, the specimens collected by industry, and prepared by art, and which ought to live, as it were, for the admiration of future ages, may fall a prey to an intruding and almost invisible enemy; so that unless the solution of corrosive sublimate in alcohol is applied, you are never perfectly safe from surprise; I have tried a decoction of aloes, wormwood, and

walnut leaves, thinking they would be of service, on account of their bitterness; the trial completely failed."

Many entomologists are satisfied with possessing the insect in its perfect, or imago condition. But it is exceedingly interesting to be able to trace these through their different stages of existence, from the egg to the perfect insect. Besides, we are certain to produce the insects in the highest state of perfection, when we breed them ourselves; and it is, besides, very interesting to have the eggs of the different species, as well as the caterpillar and pupa.

THE EGGS OF INSECTS.

The eggs of insects preserve their form and color in a cabinet, in general without much trouble. Swammerdam had a method of preserving them, when they appeared to be giving way. He made a perforation within them, with a fine needle, pressed out their contents, afterward inflated them with a glass blowpipe, and filled them with a mixture of resin and oil of spike.

THE LARVÆ, OR CATERPILLARS.

The easiest way of destroying the caterpillar is by immersion in spirits-of-wine. They may be retained for a long time in this spirit, without destroying their color.

Mr. William Weatherhead had an ingenious mode of preserving larvæ. He killed the caterpillar as above directed, and having made a small puncture in the tail, gently pressed out the contents of the abdomen, and then filled the skin with fine dry sand, and brought the animal to its natural circumference. It is then exposed to the air to dry, and it will have become quite hard in the course of a few hours, after which the sand may be shaken out at the small aperture, and the caterpillar then gummed to a piece of card.

Another method is, after the entrails are squeezed out, to insert into the aperture a glass tube, which has been drawn to a very fine point. The operator must blow through this pipe, while he keeps turning the skin slowly round, over a charcoal fire; the skin will soon become hardened, and after being anointed with oil of spike and resin, it may be placed in a cabinet, when dry. A small straw, or pipe of grass, may be substituted for the glass pipe. Some persons inject them with colored wax, after they are dried.

THE PUPA.

When the insects have escaped from their pupa skin, the skin usually retains the shape and general appearance it did while it contained the insect. It is therefore ready for a cabinet, without any preparation whatever. But if the animal

has not quitted its envelope, it will be necessary, either to drop the pupa into warm water, or to heat it in a tin case before the fire; the former mode however is the best, and least liable to change the colors of the pupa.

METHOD OF BREEDING INSECTS.

Breeding Cages.—These must be made of chestnut, or any hard wood, as pine is apt to kill the caterpillars, from its strong smell of turpentine. The best form for these, is represented in fig. 72. The sides and front are covered with gauze; *a*, is a small square box, for the reception of a phial of water, for placing the stalks of plants in, which it is intended the caterpillars are to feed. The most convenient size for a breeding cage is, eight or ten inches in breadth, four deep, and one foot in height. It is not proper to place within a cage more than one species of caterpillar, as many of them prey upon each other. Indeed animals of the same species will devour each other, if left without food. The caterpillars of insects, for the most part will only eat one particular kind of food, so that it is better to have no more than one sort in a cage.

There must be at the bottom of the cage earth to the depth of two inches; this should be mixed with some fine sand and vegetable mold, if possible, to prevent it from drying. The cages should be kept in a cool cellar or damp place, because many insects change into the pupa condition under the earth; so that it would require to be somewhat moist, to prevent the destruction of the animal. The shell or case of the pupa also becomes hard, if the earth is not kept moist; and, in that event the animal will not have sufficient strength to break its case, at the time it ought to emerge from its confinement and must consequently die, which but too frequently happens from mismanagement.

Some seasons are more favorable than others for the production of caterpillars, and to keep each kind by themselves would require an immense number of cages, as well as occupy much time in changing the food, and paying due attention to them. To obviate this, some persons have large breeding cages, with a variety of food in them, which must be cleaned out every two days, and fresh leaves given to the caterpillars; as, on due attention to feeding, the beauty and vigor of the coming insects will much depend.

The larvæ of insects, which feed beneath the surface of the earth, may be bred in the following manner: Let any box, that is about three or four feet square, and two or three feet deep, be lined internally with tin, and a number of very minute holes be bored through the sides and bottom. Put into this box a quantity of earth, replete with such vegetables as the caterpillars subsist on, and sink it into a bed of earth,

so that the surface may be exposed to the different changes of the weather. The lid should be covered with brass or iron net-work, to prevent their escape, and for the free admission of air.

Cabinet.—Such is the advanced state of entomological science, that a collection of British insects requires a cabinet of from 50 to 100 drawers, which are generally about fourteen or fifteen inches in length, eighteen in breadth, and about two inches deep. The bottoms should be lined with cork, of about the sixth of an inch in thickness. It must be chosen as free from cracks and knots as possible. Each drawer must have a lid of glass, and an edge of wood very nicely fitted, so as to prevent, as much as possible, the admission of air or dust. This lid must rest on a rabbit.

The young entomologist should obtain a cabinet of about thirty drawers, arranged in two tiers and covered in with folding doors. There is a great convenience in this size, as the cabinet is rendered more portable, and at the same time admits of having another of the same size being placed above the top of it, as the collection increases, without injuring the uniformity, and thus the drawers may be augmented to any extent. It is immaterial whether the cabinet is made of mahogany or walnut; sometimes they are constructed of cedar-wood, but seldom of pine, or any other soft wood. Small cells must be made in the inside of the fronts, for camphor.

Corking of Drawers.—The simplest way to get the cork is to purchase it of a cork-cutter, ready prepared, but it will be much cheaper for the entomologist to prepare it himself. In this case, it should be cut into strips, of about three inches wide, with a cork-cutter's knife, to smooth the surface and to divide it. The strips should be fixed in a vise, and cut to the thickness required with a fine saw; but grease must not be used in the operation, as it will not only prevent the cork from adhering to the bottom of the drawer, but will also grease the paper which should be pasted on its surface. The black surface of the cork should be rasped down to a smooth surface. After having reduced the slips to about three-quarters of an inch in thickness, the darkest, or worst, side of each slip should be glued down to a sheet of brown, or cartridge, paper; this should be laid on a pine board, about three feet in length, and the width required for a drawer or box; a few fine nails, or brads, must be driven through each piece of cork, to keep it firm and in its place, until the glue be dried: by this means sheets of cork may be formed the size of the drawer. All the irregularities are filed or rasped down quite to a level surface, and then polished smooth with pumice-stone. The sheet, thus formed and finished, is glued into the drawers. To prevent its warping, some weights must be equally distributed over the cork, that it may adhere firmly to the bottom of the drawer. When quite dry, the weights are removed, and the

cork covered with fine white paper, but not very thick. The paper is allowed to be quite damp with the paste before it is placed on the cork, and, when dry, it will become perfectly tight.

Insect cabinets should be kept in a very dry situation, otherwise the antennæ, legs, &c., will become quite moldy. The same evil will ensue if the insect is not perfectly dry, before it is placed in the cabinet. Should an insect be covered with mold, it can be washed off with a camel-hair pencil, dipped in camphorated spirits-of-wine; in which case, the insect must be dried in a warm or airy situation, before being placed in the cabinet.

There should always be plenty of camphor kept in the drawers, otherwise there is great danger to be apprehended from mites; where these exist, they are easily discovered by the dust which is under the insects by which they are infested; in which case, they must be immediately taken out, and rubbed clean with a fine camel-hair pencil, and well imbued with the solution of corrosive sublimate, and then placed near a fire, taking care, however, that too great a heat is not applied, as it will utterly destroy the specimen. The butterfly, sphinx, and moth tribes are extremely liable to the attack of mites, and should therefore be frequently examined.

Store Boxes.—The neatest manner of constructing these, is to have them about a foot square, the top and bottom about two inches deep, on the same principle as backgammon boards, the inside being lined with cork.

STAR-FISH.

Those star-fish which have fragile crustaceous tentacula, are difficult to preserve. They must first be immersed in fresh water for four or five hours, and then extended on a plank of soft wood; the rays must be properly arranged, and pins used to keep them so, till they are quite dry. These are stuck into the plank, alongside the rays, and not into the rays themselves. They must not, however, be placed near a fire, or in the rays of the sun, as in either case, they will have a tendency to change their colors. It is almost invariably found that all colors in the crustaceous coverings of animals become reddish by exposure to the heat of the sun or of a fire.

The larger kinds should have the flesh cut out of the inside of the rays, and a little of the dry preservative applied to them. The species called medusa's-heads undergo the same preparation as other star-fish, only that much caution is required.

When these are packed, they will require great attention. The larger kinds should be wrapped in fine and soft paper and the smaller ones packed between layers of cotton, as all the parts are very brittle.

SEA-URCHINS.

There is a great difficulty in preserving these animals, in consequence of the spines with which they are invested, principally from the care required in retaining the natural positions, the spines of which are, in many species, pointed in all directions. This is particularly the case with those of the genus *Cidarities*. These animals inhabit the Mediterranean and Indian seas, and are distinguished by the shells having large tubercles, pierced with holes, for a muscular cord which moves the spines. These spines are extremely large, solid, and heavy, and are very liable to fall off, even from their own weight while drying.

The anal opening should be a little enlarged, a small spatula introduced, and the whole intestines removed; it should then be immersed in fresh water for a quarter of an hour, taking care to preserve the spines. When taken out, fill the shell with cotton; the shell should then be placed on a plank to dry, and between each spine a pad of cotton, to prevent the weight of the shell resting on the spines, and also to keep those on the upper surface in their proper place, and so that they may all radiate from the body of the shell.

In sending them home, each should be separately packed, retaining the cotton between the spines, placing them in a box, so that they cannot rub against each other, and with a thick padding of cotton between each. Small species should be placed in little boxes, and packed as above directed.

Nothing is more difficult than to preserve entire the spines of these large shells, and it is seldom that the larger species can be kept complete. But these can be again fixed, if they have fallen off. The whole spines of the *Echini* and *Spatangi* are seated on small tubercles. A little hole must be drilled in the end of each spine, at its base, with a triangular awl, or a saddler's awl, to the depth of about a quarter of an inch; a needle, or very fine wire is introduced into the perforation after it has been filled with cement. The shell of the *Echinus* must now be filled with melted bees'-wax: care is taken to stop up the openings, while in the act of pouring in the melted wax. When the wax has cooled, a hole is bored in each tubercle, for the reception of the needle, which must first be warmed at a lighted candle, and the wax on cooling holds the needle firmly in its place.

A better plan, however, than the above is, to use very fine wire which ought to be bent as nearly at right angles as possible, before being introduced; and, having filled up the vacancies of one side in this way (always leaving as much outside as will fit into the perforation made in the base of the spine), pour in some cement, made as thin as it will flow easily, and then set it aside to dry. Repeat the same opera-

tion with the other side ; and, when dry, the spines may be placed on the projecting wires with cement, as above directed. The wire which is left outside should be roughened with a file here and there, previous to its being inserted, so that it may the better retain its hold in the cement.

CORAL, &c.

Zoophites, or corals, generally live in families or congregated masses. Their axis is of a horny consistence, generally hard, and disposed in layers ; their surface is usually furnished with small spines covered by a gelatinous substance. The axis of the *Gorgona* is also of a horny consistence, and the fleshy matter by which it is covered contains detached particles, that are very friable in nearly the whole species. These are first placed, for an hour or two, in fresh water, and then dried, while the branches are held open. The same method is adopted with the *Pennatulæ*, or sea-pens.

There is no difficulty in preserving the calcareous covering of the various madrepores, &c. ; all that is necessary is to immerse them in fresh water for some hours, so as to extract the salt, and then dry them thoroughly.

In packing the small kinds, they may simply be placed in cotton ; but the ponderous and heavy ones should be fixed to the bottom of the case which is to contain them. This is done by passing cords between the branches at the base, and bringing these through holes bored in the bottom of the box, and fixed outside with nails. The feet of the madrepores have sometimes large openings, in which case, advantage is taken of them, to introduce pieces of wood into these natural apertures, and then nailing them to the bottom of the case.

We have known many fine specimens of all kinds brought home, by gluing them to the sides and bottoms of packing-boxes ; and, when removed, the packing-box is taken to pieces, and floated in water to moisten the glue, and the specimens can easily be taken off.

Sponges require merely to be soaked in fresh water and dried. No care is necessary in packing them.

Infusoria, *Entozoua*, *Alcalepha* and other minute or soft-fleshed sea animals cannot be set up by the taxidermist.



PART SEVENTH.

Of the Preparation of Natural and Artificial Skeletons.

GENERAL REMARKS.

AS much of the flesh should be removed from bones intended for preparation as possible with the scalpel, but it is not required that they should be separated from each other, more than is necessary for placing them in a vessel for the purpose of maceration. The bones are to be entirely covered with water, which should be changed every day for about a week, or as long as it becomes discolored with blood; after which, allow them to remain in water without changing till putrefaction has thoroughly destroyed all the remaining flesh; this will require from three to six months in our climate, according to the season of the year or temperature of the atmosphere. In tropical climates, fourteen days will be sufficient to disengage the flesh completely from the bones.

The large cylindrical bones of the thighs and arms should have holes bored in their extremities of the size of a goose quill, to give the water access to their cavities, and a free exit to the medullary substance.

As the water will gradually diminish in quantity from evaporation, more should be added from time to time, so that none of the bones, or any part of them, may remain uncovered, as by exposure to the atmosphere they would become of a dirty color, and have a disagreeable appearance. To be free from such stains, is considered a great beauty in skeletons.

In towns, the macerating vessels should always be closely covered, as from neglecting this, the water is apt to get mixed with particles of soot, and other impurities, which have a strong tendency to blacken the bones. When the putrefaction has destroyed the ligaments, the bones are then fit for cleaning, which is done by scraping off the flesh, ligaments, and periosteum. When this is effected, the bones should be again laid in clean water for a few days and well washed; they ought then to be placed in lime-water, or a solution of pearl-ash, for a week, when they may be taken out to dry, after having soaked them five or six hours in pure water, to remove the solution of pearl-ash, which would act upon their surface when exposed to the atmosphere.

In drying bones they should not be exposed to the rays of the sun, or to a fire, as too great a degree of heat brings the remaining medullary oil into the compact substance of the bones, and gives them a disagreeable oily transparency. This is the great objection to the process of boiling bones, for the

purpose of making skeletons, as the heat applied in that way has the same effect, unless they are boiled in a solution of pearl-ash, which some are of opinion is one of the most effectual methods of whitening them by its effectually destroying the oil. But there can be but little doubt that bleaching is, of all methods, the more effectual where it can be done to its greatest advantage, namely, in a pure air, and more especially on a sea-shore. It is much more difficult to clean the bones of animals that have died in a good condition than those that are lean and reduced by disease.

OF NATURAL SKELETONS.

Natural skeletons are made without separating the bones from each other, in which case all the animal ligaments are allowed to remain entire. This plan is usually adopted only with young and small animals, because the ligaments when dry, being divested of their natural flexibility, occasion an inconvenience, as the different extents and varieties of motion cannot be shown in the different articulations.

In making these, we are first to remove from the bones the skin, muscles, tendons, and viscera, and, in short, everything except the connecting ligaments and cartilages, which ought to be carefully preserved. This is done without any regular order of dissection; neither in this part of the process need any attention be paid to making the bones clean. The brain may be removed through an opening in the large fontanel, if the subject is very young, if not, a perforation may be made with the trephine for that purpose. Some separate the head from the spine, so that the brain may be more easily removed by the occipital hole. The skeleton is put in water and allowed to remain for several days, it is then taken out and more thoroughly cleaned by a knife, forceps, and scissors, and replaced in fresh water. This is repeated from day to day, constantly changing the water, the object being to preserve the ligaments fresh and transparent. It is of great consequence to work hard by daily scraping and scrubbing until the bones are deprived of their blood and oleaginous matter and become white and clean, then remove them into clean lime-water, or solution of pearl-ash, for two or three days to take off any greasiness, and give a more beautiful white. When they have laid long enough, wash them with clean water; they are then placed in a position, by the assistance of a frame or piece of wood and wire, exposing them to a current of air. When perfectly dry, they may receive a coating of copal or mastic varnish.

It must be kept in view, that if the preparation is allowed to remain too long in the state of maceration, the ligaments themselves will be destroyed by putrefaction, and the intention of procuring a natural skeleton defeated.

An excellent and simple way of procuring natural skeletons of mice, small birds, and fish, is to put them into a box of the proper size, in which holes are bored on all sides, and then buried in an ant-hill. The ants will enter numerously at these holes and eat away all the fleshy parts, leaving only the bones and connecting ligaments; they may be afterward macerated in clean water for a day or two to extract the bloody color, and to cleanse them from any dirt they may have acquired, then whitened by lime and alum-water, and dried in frames or otherwise, as may be most convenient. In country situations wasps may be employed in this service; these are most voracious animals, and if a skeleton is placed near one of their nests, or in an empty sugar-cask, where they resort in plenty, they will perform the dissection with much greater expedition, and equally well as the ants. Wasps have been known to clean the skeleton of a mouse or small bird in three or four hours, while ants would require a week to effect it.

When the animal is of a large size, the ligaments are sometimes unable to sustain the weight of the bones, in which case an iron wire, of sufficient thickness, is passed through the center of the back-bone, which must pass out anteriorly, so as to fix the head to the cervical vertebræ. It is made in the form of two forks, the one for the support of the interior, and the other for the exterior part; for this purpose two pieces of iron wire are taken the length of the skeleton; they are twisted together, leaving a fork at each extremity, and are then both fixed to the board on which the skeleton is to be placed. One of these should enter the ribs and encompass the back-bone, between the scapular bones of each shoulder, the other two should pass between the bones of the pelvis.

It not unusually happens that pieces of the skeleton detach one from another, in which case, two holes are bored in the ends of the bones, which are separated, and are reunited by means of small brass wires.

OF ARTIFICIAL SKELETONS.

Skeletons of man and animals of a middling and large size, cannot be made in the manner described for natural skeletons. In this case, the bones, covered by the flesh, are immersed in water and allowed to remain without changing, until the soft parts begin to get putrid, when the animal matter is easily removed; and by repeating the maceration two or three times, it may all be completely abstracted. The duration necessary for the first maceration will depend upon the state of the atmosphere, being always much shorter in summer than winter.

After the fleshy matter has been completely freed from the bones, they should be exposed on the roof of a house, or other convenient situation, until they are rendered quite white, and free from grease.

The fat in bones bears a close resemblance to the fixed oils. In the bones of whales it exists fluid like oil. In the long bones of oxen, horses, and other large quadrupeds, it is semi-fluid, constituting the marrow. When, therefore, this is present in considerable quantity, the process may be much accelerated by drilling holes with a gimlet, or other instrument, in the opposite ends of the bones, and injecting by means of a syringe, a tepid solution of pearl-ash, the potash combining with the oleaginous matter, forming a kind of soap, which being soluble in water, is easily removed. Chloride of lime is also employed for the same purpose.

The relative proportion of earthy and animal matter varies according to the nature of the bone, and the purposes it is intended to serve. The bones of quadrupeds and birds contain a much greater proportion of earthy matter than those of reptiles and fishes, and hence are more easily cleaned. Here it may be remarked, that the color of bones varies in different animals. In some common fowls it approaches to a dark yellowish brown. Food exercises considerable influence on the color, as is demonstrated in animals which feed on madder.

When the bones are perfect and dry, they are connected by means of wire and screws, &c. This is the most difficult part of the operation, as it requires considerable skill to reassemble the bones, so that they may be placed in their natural order and position. The operation is begun at one of the extremities, by making holes in the apophysis, or round ball of the bone, fig. 75. This is effected by means of a drill or a lathe, or with a gimlet, although this instrument has hardly sufficient power for perforating so hard a substance as bone.



Fig. 75.

The bones are then attached to each other in their natural order, with annealed iron wire, or brass wire, by means of the perforations which have been made. The ends of the wire should be twisted, and not too firmly, but sufficient to allow a little play between the articulation; this mode to be pursued till the whole wires are put together. They are then ready for placing on a board, and are kept erect by one or two perpendicular bars of iron, suited to the weight of the skeleton. In the larger species of birds, one support is necessary; it is passed through the breast-bone, and attached under the spine, as represented in the skeleton of the goshawk, fig. 2. The position of this support must be varied according to the attitude in which the skeleton is to be placed.

In skeletons of the horse, the ox, the hippopotamus, the rhinoceros, the camel, and the elephant, the links of wire which we have above described, are insufficient to unite their bones; for these, two iron pegs are used with a head at one end, and a screw at the other. Each screw is provided with a

nut, and each pair of screws must have a narrow plate of iron bored at each end to pass the screw through. Supposing the bones of the leg and thigh, of a large quadruped, are to be united, a hole is bored through the apophysis, about two inches from the extremity, and the same having been done with both leg and thigh bones, they are brought together, and one of the screws passed into one of the holes of the plates which we have mentioned, and then through the perforations in the bone, and lastly into the other plate; they are tightened together by means of the nut. The screws should be nearly an inch longer than the thickness of the bones. The two ends of the bones are thus united and supported by the two plates which are kept together by the screws. Provision must be made for the play of the bones, by leaving a sufficient distance in boring the holes, through which the pegs are passed. This we have represented in fig. 76, showing one iron plate and one nut, by which the screws of the iron peg are tightened, the head of the other iron peg, the nut and screw of which are placed on the opposite side.

The horse and other large animals require a double bar to support them, as represented in fig. 1, page 8. A bar is also passed through the vertebræ of the neck, spine, and tail, and the ribs are attached by means of wires, or flat pieces of plate iron.

In these larger animals, the heads are for the most part sawn through, for the purpose of studying the structure of the internal cavity and partitions. These are kept together by means of a hinge, so that they can be opened and shut at pleasure.

PART EIGHTH.

Of the Chase, and the Manner of Collecting Animals, &c.

QUADRUPEDS AND BIRDS.

IT is hardly necessary to recommend a double-barreled gun. One of the barrels should be loaded with small shot, or dross of lead or sand for small birds, and the other with large shot. These should have much less powder than an ordinary charge, so as not to tear and injure the animals. Paper, cotton, or flax, and powdered dry earth or ashes should form part of the naturalist's stores.

When a bird is killed, a small quantity of dry dust is put on the wound. For this purpose, the feathers must be raised

with a pin, or a gun-picker, close to the wound. The bill of the bird should have a small quantity of cotton or flax introduced into it to prevent the blood from flowing, and spoiling the plumage. The feathers must be all adjusted, and the bird then placed on the ground to allow the blood to coagulate. Every specimen should be placed in a piece of paper of the form of a hollow cone, like the thumb-bag used by grocers. The head should be introduced into this, the paper should then be closed around the bird, and packed in a box filled with moss, dried grass, or leaves.

Birds taken alive in nets and traps are to be preferred to others for stuffing, and also those caught by bird-lime, which must be removed by spirits-of-wine.

Birds should always be skinned the same day they are killed, or next day at farthest, particularly in summer, as there is a danger of putrefaction ensuing, by which the feathers will fall off. However, in winter there is no danger for some days; but in tropical climates they must be prepared soon after they are killed. The same observations apply generally to quadrupeds.

Bats and owls are caught during the day, in the hollows of aged trees, in the crevices of walls, and ruins of buildings. These are animals which, it may be presumed, are still little known in consequence of their nocturnal habits.

Those who prepare for the chase, with the intention of preserving animals, should take care to provide themselves with implements necessary for fulfilling the objects advantageously. The articles most needful are one or two pairs of large pincers, scissors, forceps, scalpels, knives, needles, thread, and a small hatchet, as well as one or more canisters of preserving powder, some pots of arsenical soap, or arsenical composition, and some bottles of spirits of turpentine. If in America, cotton may be employed in stuffing the skins, and therefore a considerable quantity should always be taken along with the naturalist. In parts of Asia and Africa where this cannot be procured, tow must be employed, or old ropes teased down; and where even these cannot be found, dried grass and moss may be used. M. Le Vaillant used a species of dog-grass while in Africa, which is very abundant in that country and it answered the purpose remarkably well.

It being supposed that a traveler has an ample caravan, provided with all the necessaries which we have pointed out, and having killed a quadruped, he will skin it immediately, according to the method which we have pointed out in the preceding page. He will then sew up the skin after receiving a partial stuffing, and having been anointed with the arsenical soap, or composition. All the extremities must then be imbued with spirits of turpentine, and the skin should be placed in some convenient place to dry, so that it may have the advantage of complete exposure to the air. The turpentine

must be again applied at the end of three or four days, more especially around the mouth of the quadruped.

It will be of the utmost advantage to remain a week or ten days at one place; by which means the naturalist will have had time to render himself somewhat acquainted with the animals which localize in that neighborhood. And as some species frequently confine themselves to a very limited spot, by leaving the place too hurriedly he is apt to overlook them.

After the traveler has determined on leaving his cantonment, he must see that all the objects he has collected are in a condition to be removed. He must examine carefully each specimen, and see that they have not been attacked by the destructive insects, so abundant in warm climates. Should flies have deposited their eggs in the lips of the quadrupeds or birds, these must be destroyed by spirits of turpentine. When a set of animals or birds are thoroughly dry, they should be packed in a box or case, which has been well joined.

A journal ought to be kept detailing all circumstances connected with the animals, the places in which they were killed, and the color of their eyes, together with any information that can be procured of their habits from the natives. People are too apt to forget particulars when engaged in such varied pursuits, and the sooner they are committed to paper the better.

Should the traveler, accidentally, or in pursuit of natural objects, find himself possessed of the carcass of any large and fine animals, he would deeply regret not being able to fetch away the skin from want of a knowledge how to separate it from the body. We shall, therefore, suppose that he has killed an animal the size of a bull. He must first make an incision under the belly, in the form of a double cross. The central line must reach from the chin to the anus; the two other transverse cuts must reach from one foot to the other. These are always made inside, so that the seams may be less conspicuous when the animal is mounted. The nails or hoofs must be left attached to the skin; the hoofs may be severed from the bone by laying on a stone and striking with a mallet or a hatchet. After this is accomplished the skin is removed from the feet, legs, and thighs, and treated in other respects as pointed out in skinning the elephant, at page 19. The bones of the head must be preserved if possible, leaving it attached at the muzzle only. All the muscles must be removed from the head, and the bones rendered as clean as possible.

As it is probable that an animal of this magnitude has been killed at a great distance from any habitation, there will not be an opportunity of macerating the hide in alum and water, as pointed out for the elephant. The skin will also be too thick for the arsenical soap to penetrate with effect. Under these circumstances, the next best thing to preserve it, is to take the ashes of a wood fire, and rub it well inside. The

skin should then be stretched along the boughs of a tree, and allowed to dry. The skull, after it has also been dried, must be returned into the skin, and the lips, ears, and feet, imbued plentifully with turpentine, which operation must be several times repeated at intervals. Nothing is more effectual in preventing the attacks of insects than this spirit, and no larvæ will exist in places which it has touched.

The skin will be sufficiently dried within two or three days, so that the hair may be turned inward. If some common salt can be procured, a solution of it should be made, and the hair rubbed with it. Both sides of the skin must be rubbed with this two or three times, at intervals of a day.

When sufficiently dry, the skin may be rolled up and packed. The hair ought to be inward, with a layer of dried grass intervening, to prevent friction during conveyance. The operation of rolling up the skin must be begun at the head.

If the journey is long, the skin should be unrolled, and placed in the sun for a few hours, and the places liable to the attack of moths should be again rubbed with turpentine.

When a skin thus prepared has reached the place where it is to be put up, it must undergo a preparation previous to its being mounted. In the first place, it must be extended along the ground with the hair undermost, so that it may acquire fresh pliability, and those parts which remain stiff must be moistened with tepid water. The skin must then be placed in a large vessel of water saturated with alum, there to remain eight or ten days; after which, it must be extended on half-rounded pieces of wood, and thinned with a sharp knife, which is facilitated by the projections of the wood, enabling the operator the more easily to cut it, while it is gradually shifted, till the whole has been pretty equally thinned. When this operation is completed, it is allowed to soak in water with an equal quantity of that saturated with the alum. Twenty-four hours will be sufficient. It must then be placed on the artificial body, as directed for the elephant.

In hunting for snakes, great caution must be exercised, as it is well known that the bite of some of these proves fatal within a quarter of an hour, particularly that of the rattlesnake and some others. Indeed, it would be more prudent to allow the natives to hunt for these poisonous reptiles, as they are better acquainted with their haunts, and the means of defense to be employed in this dangerous pursuit. They are also better acquainted with those which are poisonous. We may, however, remark, that the poisonous snakes have, in general, much larger heads than those which are harmless, and their necks are also narrow. But it would be well for the novice to inform himself in advance as to the noxious animals he is likely to meet.

Different species of sea weed are frequently covered by minute shells ; weeds should always be carefully examined.

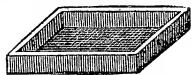


Fig. 76.—Sieve.

Many of the smaller and microscopic shells are found at high water mark among the fine dross and drifted fragments of shells ; this sand should be brought home and examined at leisure. To facilitate the process, a small wire-cloth sieve should be made, of about six or seven inches, as represented in fig. 76, and all the sand sifted through it, and the shells left.

INSECTS.

This class is subject to infinite variety, according to climate and soil. The entomologist, or the mere collector, must not confine himself to those whose beauty of coloring renders them attractive, but collect all that come in the way. Those species which have wings, and fly around plants, we take by means of gauze nets, as also those which swim in the water. For the construction of these different nets, see previous descriptions. Those which live on putrid substances, and such as are disagreeable to the touch, are seized with pincers ; they are first put into camphorated spirits to render them clean. Trees are the habitation of innumerable insects, many of them skulk under the old rotten bark, and others attach themselves to the foliage. A cloth should be spread under the trees, or an umbrella, and the branches shaken with considerable force, when they will fall down, and may then be caught.

Insects may be killed by making a crow-quill into a point, and dipping it into prussic acid, an incision with it may be made immediately below the head of the insect between the shoulders, which usually produces instant death. But this acid must be used with much caution, because its effects are almost as instantaneous and fatal in the human subject as in the lower animals. When cork cannot be had for lining the bottoms of the boxes, a layer of bee's-wax may be used in its stead. The pin should be deeply sunk in this substance, as it is more liable to loosen than when in cork.

It is of much importance to procure the caterpillar as well as the insect, and, in this case, some of the leaves on which it feeds should be placed in a box beside it, so that it may reach maturity. A small perforation should be made in the box for the admission of air.

Every kind of insect, except butterflies, sphinxes, and moths, may be preserved in bottles of spirits, which will not injure them ; when they are taken out they are immediately placed in the position in which it is wished to preserve them, and they are then allowed to dry. Another mode of preserving coleopterous insects, such as beetles, &c., is to put them

in a dry box among fine sand. A row of insects is placed in a layer of sand, and then a new layer of an inch in depth laid on the top, and so on till the box is filled. This mode of packing will not, however, do with soft insects, and those having fine wings.

It is extremely desirable that all the different kinds of spiders should be caught, particularly those which are said to be venomous; also termites, or white ants, the different *Scolopendra* and gally worms, &c. The nests of spiders and other insects should also be sent home; in short, every insect which is remarkable, in any way, either for its history or properties.

It is also of much importance to bring specimens of the plants on which they feed; these should be dried, and their localities marked, the kind of soil on which they grow, and the situations, whether moist or dry, should be noted.

Woods, Hedges, and Lanes.—By far the greatest portion of insects are found in these situations. In woods, the entomologist must beat the branches of the trees into his folding net, and must select for this purpose the open paths, skirts, &c. The trunks of trees, gates, and timber which is cut down, should be carefully examined, as a great many lepidopterous and coleopterous insects are found in these situations, and in no other. In hedges and lanes, many of the most valuable and beautiful insects are found, as also in nettles and other plants which grow under them; these should be well beaten, but more especially when the white-thorn blossoms in the months of May and June. Hedges where the roads are dusty are very seldom productive.

Heaths and Commons.—Many insects are peculiar to these situations from the plants which grow on them, as well as from the dung of cattle by which many of them are frequented, in the latter of which, many thousands of insects may be found in a single day, in the months of April and May. These are principally of the order *Coleoptera*.

Sand Pits.—These are favorable for the propagation of *Capris lunarius*, *Notoxus monoceros*, *Lixus sulcirostris* and other rare insects. Minute species are found abundantly at the roots of grass.

Meadows, Marshes, and Ponds.—In meadows, when the *Ranunculi*, or butter-cups, are in blossom, many *Muscæ* and dipterous insects generally abound. The flag-rushes are the habitations of *Cassida*, *Donacina*, and others. Drills in marshes should be examined, as many species of insects are found on long grass. The larvæ of various *Lepidoptera*, and *Neuroptera* are confined to these situations, more especially if hedges and trees are near the spot. Ponds are rich in microscopic insects. These are obtained by means of the landing net, which, for this purpose, need not be so long as represented in fig. 60, page 81, and should be made of pretty thick cotton cloth, but sufficiently thin to allow the water to escape. The

mud which is brought up from the bottom of ponds and ditches should be examined, and what small insects are found may be put in a small phial filled with water, which will not only clean them, but keep them alive; and in many instances the naturalist will be surprised upon the examination of these, the most wonderful productions of nature.

Moss, Decayed Trees, Roots of Grass, &c.—Many insects will be found in moss and under it; the roots and wood of decayed trees afford nourishment and a habitation to a number of insects; many of the larvæ of *Lepidoptera* penetrate the trunks of trees in all directions; most of the *Cerambyces* feed on wood, as well as some species of *Carabidæ*, *Elateridæ*, &c. In seeking for these, it is necessary to use the digger, shown in fig. 62, page 81. It is sometimes requisite to dig six or seven inches into the wood before they are found.

Banks of Ponds and Roots of Grass.—These are a never-failing source of collecting, which may be followed at all seasons of the year, and in general with great success; those banks are to be preferred which have the morning or noon-day sun.

Banks of Rivers, Sandy Sea Shore, &c.—These situations afford a great variety of *Coleoptera*, *Crustacea*, &c. The dead carcasses of animals thrown on the shore should be examined, as they are the receptacles and food of *Silphiodæ*, *Staphilinidæ*, &c. May and June are the best seasons for collecting these insects.

Dead Animals, and Dried Bones, should be constantly examined, for these are the natural habitats of several insects. It is not uncommon for country people to hang dead moles on bushes; under these the entomologist should place his net, and shake the boughs on which they are hung, as many of the *Coleoptera* generally inhabit these.

Fungi and Flowers.—These are the constant abode of insects, and many curious species will be found on them.

It is a mistaken idea that insects are only to be found in summer, as they are to be met with, either in a living or pupa state, at all seasons. Dried moss, beneath the bark of trees, and under stones, are extremely likely places to find insects in winter; and even then, the entomologist is more likely to procure some of the rare species, than in summer, as these are ranging in search of food, and in situations hidden from view.

At this season, if the weather is mild, the pupæ of *Lepidoptera* will be found at the roots of trees, more especially those of the elm, oak, lime, &c., or beneath the underwood, close to the trees, and these frequently at the depth of some inches under the ground.

In the months of June, July, and August, the woods are the best places to search for insects. Most of the butterflies are taken in those months, flying about in the day-time only. Moths are either found at break of day, or at twilight in the

evening. The following method of taking moths is pointed out by Haworth, in speaking of the oak-moth, *Bombyx Quercus*: "It is a frequent practice with the London Aurelians," says he, "when they breed a female, of this and some other day-flying species, to take her, while yet a virgin, into the vicinity of woods, where, if the weather is favorable, she never fails to attract a numerous train of males, whose only business seems to be an incessant, rapid, and undulating flight, in search of their unimpregnated female; one of which is no sooner perceived, than they become so much enamored of their fair and chaste relation, as absolutely to lose all kind of fear for their own personal safety, which, at other times, is effectually secured by the reiterated evolutions of their strong and rapid wings. So fearless, indeed, have I beheld them on these occasions, as to climb up and down the sides of a cage which contained the dear object of their eager pursuit, in exactly the same hurrying manner as honey-bees, which have lost themselves, climb up and down the glasses of a window."

PART NINTH.

Recipes for the Various Articles used in the Preservation and Setting up of Animals, &c.

SOLUTION OF CORROSIVE SUBLIMATE.

PUT a large tea-spoonful of well-pounded corrosive sublimate into a wine-bottleful of alcohol (spirits-of-wine.) Let it stand over night, and the next morning, draw it off into a clean bottle. When the solution is applied to black substances, and little white particles are perceived on them, it will be necessary to make it weaker, by the addition of some alcohol. A black feather, dipped into the solution, and then dried, will be a very good test of the state of the solution; if it be too strong, it will leave a whiteness upon the feather.

ARSENICAL SOAP.

Invented by Becœur, Apothecary, Metz.

Arsenic, in powder,	-	-	2 pounds,
Camphor	-	-	5 ounces,
White Soap,	-	.	2 pounds,
Salt of Tartar,	-	-	12 ounces,
Powdered Lime,	-	-	4 ounces.

The soap must be cut in small and very thin slices, put into

a crucible with a small quantity of water, and held over a gentle fire, and frequently stirred with a wooden spatula, or a piece of wood of any kind. When it is properly melted, the powdered lime and salt-of-tartar must then be added, and thoroughly mixed. It must now be taken off the fire, the arsenic added gently, and stirred. The camphor must be reduced into a powder, by beating it in a mortar, with the addition of a little spirits-of-wine. The camphor must then be added, and the composition well mixed with a spatula, while off the fire. It may be again placed on the fire, to assist in making the ingredients incorporate properly, but not much heated, as the camphor will very rapidly escape. It may now be poured into glazed earthen pots, and allowed to cool, after which a piece of paper should be placed over the top, and afterward some sheep leather, and then set aside for use. The composition is about the thickness of ordinary flour paste.

When it is necessary to use the soap, put as much as will answer the purpose into a preserve-pot, and add to it about an equal proportion of water. This is applied to the skin or feathers with a bristle brush.

N. B.—It should be kept as close as possible, and used with caution, as it is a deadly poison.

The above is the recipe made use of at the Jardin des Plantes, Paris.

ARSENICAL COMPOSITION.

Mr. Laurent's Recipe.

A distinguished French naturalist, Laurent, recommends the following composition, after ten years' experience, for preserving the skins of stuffed animals. He observes, at the same time, that it penetrates them with greater readiness, and preserves them much better than any preparation which has hitherto been in use :

Arsenate of Potash,	-	-	-	2 drachms,
Sulphate of Alumine,	-	-	-	2 do.
Powdered Camphor,	-	-	-	2 do.
White Soap, powdered,	-	-	-	$\frac{1}{2}$ oz.
Spirits of Wine,	-	-	-	6 oz.
Essence of Thyme,	-	-	-	3 drops.

The arseniate of potash, sulphate of alumine, and soap, are to be placed in a phial, with a large mouth, and the spirits of wine to be poured on them, at a heat of twenty-five degrees, and they will be perfectly combined in twenty-four hours. The essence of thyme is then added, when the phial must be carefully corked. This composition is to be shaken together before it is made use of, and it must be spread over the skin of the animal or bird with a brush.

SOLUTION OF PEARL-ASHES.

Two ounces of pearl-ash to one gallon of water.

ANNEALED IRON WIRE.

Take common iron wire, make it red hot, and suffer it to cool gradually; this renders it soft and pliable, so that it may be easily bent in any direction.

CEMENT.

Fine Whitening,	-	-	-	-	2 oz.
Gum-Arabic,	-	-	.	-	2 oz.
Finest Flour,	-	-	.	-	$\frac{1}{2}$ oz.
Ox-Gall,	a tea-spoonful.				

The whole to be dissolved, and mixed well with water into a thick paste.

This is well adapted for attaching different object, and especially for fixing shells to pasteboard, &c.

GUM PASTE.

White Sugar Candy,	-	-	-	2 oz.
Common Gum-Arabic,	-	-	-	4 oz.

Let these be melted in a pot of hot water, and then strained through a linen or horse-hair sieve. When properly dissolved, add to it two table-spoonfuls of starch, or hair-powder, and mix the whole well together. This paste may be used for many purposes, and it never spoils. It may be dried, and by pouring a little warm water on it, it will soon be ready for use. If it is wished to be all melted, and hurriedly, the pot containing it should be placed in warm water, or heated sand.

FLOUR PASTE.

Make flour paste in the ordinary way, and add to it a small portion of the solution of corrosive sublimate, or powdered corrosive sublimate. This will prevent the attack of mites, to which paste is very liable when dried. This paste may be dried into a cake, and moistened when required.

SOLUTION OF GUM-ARABIC.

The solution of gum arabic is made by simply adding water to it. When used as a varnish, or for attaching objects, it is extremely apt to get too brittle, in very warm weather, and to crack, or split off in scales; to prevent this, a quarter of an ounce of white or brown sugar candy must be added to two ounces of gum arabic.

PAPER PASTE, GUMMED.

Take a coffee-pot, filled with water, and add to it a quantity

of paper, which has been slightly sized, like that used for printing engravings. Let it boil for three hours, and when the water has evaporated, boil it again for a similar length of time. Take out the paper, and squeeze it well in a colander, and then pound it in a mortar, until it is reduced to a very fine paste. It must then be dried. When it is required for use, add to it some of the solution of gum-arabic; and keep it in a pot for use.

POLLEN POWDER.

The paper made as above directed, when well dried, is pounded in a mortar till it becomes a very fine powder, it is then put into a tin pepper-box, and when any of the parts of parrots' bills, &c., are wished to have this powdered appearance, a little of the solution of gum-arabic is washed over the part with a camel-hair pencil, and the powder dusted on it, and allowed to dry.

RED VARNISH.

Take a stick of red sealing-wax beat it down with a hammer, and then put it into a phial, with an ounce of strong spirits-of-wine, which will dissolve it within four or five hours. It may be applied to any part with a camel-hair pencil, and it will dry in less than five minutes.

Black, yellow, and green, or indeed any color of varnish, may be made from sealing-wax of these various colors.

To those unacquainted with the combination of colors, we may mention, that a mixture of blue and yellow produces green; pink and blue makes purple; red and yellow, orange; black, red, and yellow, brown; black and blue, gray. These may be varied, in an infinity of shades, by either color predominating, and by the addition of other colors.

Varnishes of gum-copal and gum-mastic, and white spirit varnish, are also used for different preparations, but as these can be easily purchased at a cheap, or even a cheaper rate than they can be made in small quantities, we think it unnecessary to give recipes for making them.

LUTING FOR RENDERING BOTTLES AIR-TIGHT.

Common Resin,
Red Ocher reduced to a fine powder.
Yellow Wax.
Oil of Turpentine.

These must be melted over a fire in the following manner; and the vessel in which it is made should be capable of holding three times the quantity required, to allow ample room for boiling up. An earthenware pipkin with a handle is the best thing for the purpose, and a lid must be made of tin to fit it. The luting will be rendered more or less brittle, or elastic, as the red ocher prevails.

The wax is first melted, and then the resin; the ocher is then added in small quantities, and stirred quickly with a spatula each time. When all the ocher has been added, it must be allowed to boil six or eight minutes; the turpentine is then added, and briskly stirred with the spatula, and continue to boil it. There is considerable risk of the mixture taking fire, and should it do so, the lid must immediately be put on the vessel to extinguish it.

To ascertain the consistence of the luting, a little must be, from time to time, dropped on a cool plate, or flat piece of iron. If it is too soft, more of the ocher must be added to it; and if too hard, additional wax and turpentine.

TOW AND FLAX SLIVERS.

These are fillets of prepared tow and flax, of from one to three inches in breadth. They are extremely uniform in their thickness, being made to weight, and can easily be procured from any flax-spinning mill, at a moderate price per pound weight.

CARBOLIC ACID.

We have, in a previous portion of this work, spoken of the use of carbolic acid as a preservative. It is very useful in quickly and neatly helping to preserve fishes, when it is not desired to skin them. In such case the intestines are withdrawn by an incision in the abdomen, and a solution of the acid poured in. In regard to insects, if it is desired to preserve them only, without reference to their natural colors, the acid will answer very well, but if it is wished to retain the bright markings which characterize many insects, no carbolic acid must be used, as it in almost all cases darkens with age and discolors the specimens; of course this objection will not hold good in the case of dark and hard-bodied insects, in which instances a solution of carbolic acid can be used with much advantage. Another thing must be remembered—the *pure* acid is never to be used, it being perfectly useless. It must be very much diluted; the following being good proportions:

Carbolic Acid,	-	-	-	1 desert-spoonful,
Boiling Water	-	-	-	2 quarts.

The crystalized acid must first be melted, and then added to the hot water.

SHIELD'S "SUGAR" FOR MOTHS.

For the capture of moths the most successful time is in the evening, or even toward midnight. When seeking them in the dark, the collector proceeds to their known habitat with

a lantern, round which the moths soon gather. Should the fruit-bearing trees not be in full blossom, recourse may be had to "sugaring," or brushing a sweet compound, known by the technical name of "sugar," over the trunks of trees and on stones and posts, to attract the moths. The following is the recipe for making :

Ale	-	-	-	-	-	$\frac{1}{2}$ pint, (nearly)
Common Honey	-	-	-	-	-	$\frac{1}{2}$ pound,
Sugar	-	-	-	-	-	$\frac{1}{4}$ pound,
Rum	-	-	-	-	-	$\frac{1}{2}$ wine-glass,
Oil Bitter Almonds	-	-	-	-	-	5 drops.

The ale is heated, and then the sugar and honey added ; when cold the rum and oil of almonds, mixed together, are added.

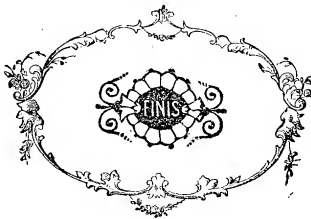
ANOTHER "SUGAR."

A thick syrup, made of brown sugar, with a small quantity of rum.

NICOLAS' GUM PASTE.

Colocynth	-	-	-	-	-	1 oz.
Gum Arabic, in powder	-	-	-	-	-	2 oz.
Starch	-	-	-	-	-	3 oz.
Cotton, finely cut	-	-	-	-	-	$\frac{1}{2}$ oz.

The colocynth is cut into small fragments, and boiled in about a pint of water ; the liquor is then strained, and the starch and gum added to it. The mixture is allowed to simmer on a slow fire for a short time. The cotton, being previously as finely reduced as possible by clipping with scissors, is added, and the whole well mixed. A few drops of the corrosive sublimate solution will make an improvement. The cement may be softened by placing it in boiling water.



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—◆—

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2, " " 4 50	2, " " 35
3, " " 5 00	3, " " 40
4, " " 5 50	4, " " 50
5, " " 6 00	5, " " 60
6, " " 7 00	6, " " 80
7, " " 8 00	7, " " 1 00
8, " " 9 00	8, " " 1 20
9, " "10 00	9, " " 1 40
10, " "11 50	10, " " 1 60
11, per 50 pair. 6 50	11, per 50 pair. 1 00
12, " " 7 25	12, " " 1 20
13, " " 8 00	13, " " 1 40
14, " " 9 00	14, " " 1 75
15, " "10 50	15, " " 2 10
16, per 25 pair. 6 00	16, per 25 pair. 1 25
17, " " 6 75	17, " " 1 50
18, " " 7 50	18, " " 2 00
19, " " 8 25	19, " " 2 50
20, " " 9 00	20, " " 3 00
21, per 10 pair. 4 00	21, per 10 pair. 1 40
22, " " 4 80	22, " " 1 60
23, " " 5 60	23, " " 1 90
24, " " 6 40	24, " " 2 20
25, " " 7 20	25, " " 2 50
26, " " 8 00	26, " " 3 00
27, " "12 00	0, per 100 pair. 25
28, " "16 00	00, " " 20

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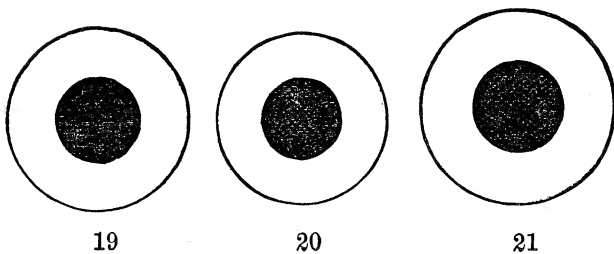
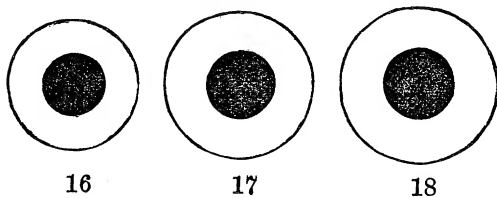
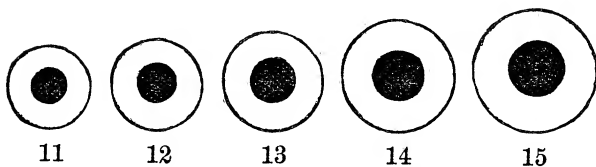
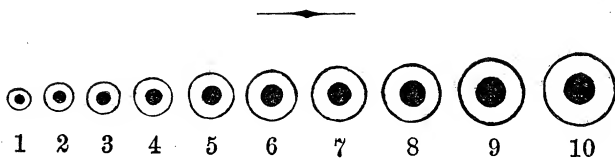
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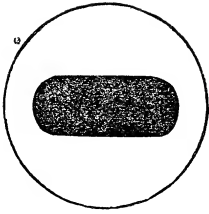
Insect Pins, per 100, assorted, 18 cents nett.

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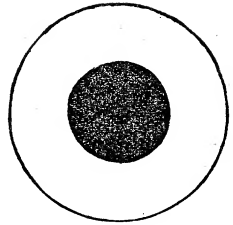
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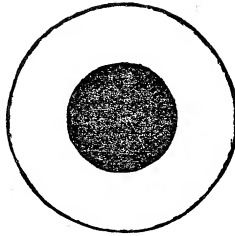




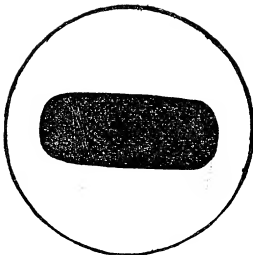
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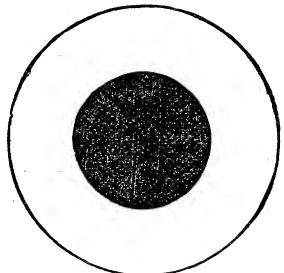
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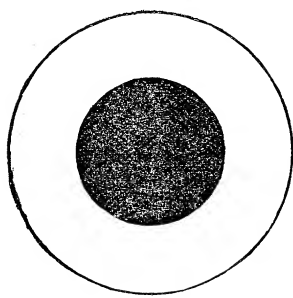
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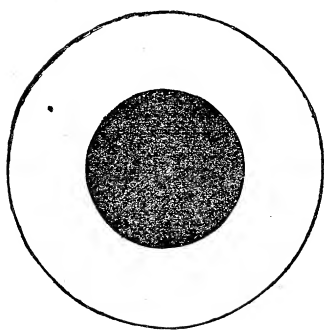
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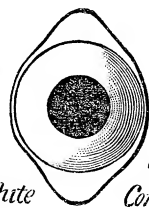
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Cat Eye



White



*blk Eye
Corners Eye*



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