THE

NATURALIST'S GUIDE

FOR

COLLECTING AND PRESERVING ALL

Subjects of Natural History and Botany.

INTENDED FOR THE USE OF STUDENTS AND TRAVELLERS.

BY

WILLIAM SWAINSON, F.R.S. & L.S.

WITH TWO PLATES.

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FOR

COLLECTING AND PRESERVING

Subjects of Natural History and Botany,

BOTH IN TEMPERATE AND TROPICAL COUNTRIES,

PARTICULARLY

SHELLS;

WITH DESCRIPTIONS OF SOME THAT ARE HIGHLY VALUABLE; AND DIRECTIONS FOR PACKING THE WHOLE WITH SECURITY, AND PASSING THEM AT THE CUSTOM HOUSE.

BY

WILLIAM SWAINSON, F.R.S. & L.S.

INTENDED FOR THE USE OF STUDENTS, AND TRAVELLERS IN FOREIGN COUNTRIES DESIROUS OF COLLECTING.

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TO

WILLIAM ROSCOE, ESQ.

OF LIVERPOOL,

AND TO THE GENTLEMEN FORMING THE COMMITTEE

OF THE

Royal Liverpool Institution;

UNDER WHOSE ENLIGHTENED VIEWS AND LIBERAL AUSPICES

THE MUSEUM OF NATURAL HISTORY ATTACHED

TO THEIR

INSTITUTION WAS FIRST FOUNDED,

This Work

IS RESPECTFULLY DEDICATED, WITH EVERY SINCERE

WISH FOR THE SUCCESS OF THEIR EXERTIONS IN THE CAUSE

OF GENERAL SCIENCE,

BY THE AUTHOR.

PREFACE.

At the request of the Committee of the Royal Liverpool Institution, who, with liberal views, have added a Museum to the other scientific objects of their plans, the author first drew up these instructions on a very confined scale for gratuitous distribution. They were intended for such persons who had the wish of benefiting the Museum, then in its infancy; but more particularly for the use of captains of vessels, and other persons holding communication from that great commercial town with all parts of the globe: this object has been attended with much success, and valuable additions have materially increased the original foundation laid for this public repository of natural history. The original "Instructions" have, however, long since been dispersed, and it is with a wish of making them of more general utility that they are now, for the first time, published with very considerable additions.

Several works on the same subject, it is true, are already before the public; but had they appeared satisfactory to the author, he should have refrained from increasing the number by publishing his own; but not one appears to have been written between the two extremes of brevity and unnecessary detail: this deficiency he has endeavoured in the following pages to supply, avoiding the long instructions for erecting elephants and other subjects fit only for a national museum, and confining himself to such simple methods as every individual can easily practise, whether seated in his closet, or travelling a foreign country.

It is almost needless to add, that only such methods for preserving natural productions are here pointed out, as have been successfully practised by the author in various parts of the world; and which are therefore founded on personal experience.

The author cannot refrain, in this place, from soliciting the liberality and support of those persons who have it in their power to benefit the Institution which first gave rise to this little volume. There are many who have natural curiosities sent them by friends abroad,

which they have neither convenience nor inclination to retain, yet do not wish to have them sold; and many others who go abroad would willingly send home the productions of the country they are in, if they felt certain their donations would be carefully preserved and publicly exhibited; for such the Liverpool Museum offers a permanent deposit; every object in it is beautifully arranged in glass cases, and placed in systematic order, with the names of such who, by donations, have thus given it their support. Public lectures on Natural History, Chemistry, and Mineralogy, are frequently read to numerous audiences in rooms adapted to the purpose, by Dr. T. S. Traill, an able and zealous naturalist. One of the important benefits resulting from the Museum is the facility it thus affords of illustrating, by examples, the organization of the natural world; and another is, in the whole being the property of a public body, and, therefore, not subject to sale or dispersion from individual convenience or caprice. The funds of the society, from several causes, will not, however, admit of many important additions being made by purchase; and they,

therefore, appeal to men of science and of liberal feeling in all parts of the world, to assist their efforts in making this Museum an extensive and even *National* repository, for the information of the scientific, the delight of the young, and the admiration of the generality.

THE

NATURALIST'S GUIDE.

QUADRUPEDS.

The larger quadrupeds are in general so bulky, and their conveyance to this country so inconvenient, as well as expensive, that very few travellers will be disposed to attempt their preservation in an entire state; particularly as, when mounted, they require so much room. Since Mr. Bullock's Museum has ceased to exist, no other in this country possesses more than a few species. It is, nevertheless, recommended to travellers to procure the skulls with the teeth in a perfect state, of any animals which circumstances may prevent their not preserving entire; and to note down in their journals any peculiarities respecting the habits and economy of such as come under their own observation, as well as of those they may only learn a report of from the natives.

When it becomes impossible to preserve even the skull, measurements should carefully be taken of the length, width, and circumference of the body and limbs, and their relative distances; but more particularly the number and position of the grinding and cutting teeth in each jaw, and the form of the hoofs or claws: minute attention to these particulars is absolutely necessary, as they will afford hereafter the primary guides to a scientific knowledge of those animals the traveller may discover.

The skulls and horns of the various species of Rhinoceros will be highly interesting, as there is reason to believe that several species exist, of which the horns only have reached Europe; the sex and probable age of the animal should also be noted.

Skulls may be easily prepared by parboiling the head, and separating the fleshy parts with a knife or scraper; taking care to remove the brains by means of the hole at the back of the head where it joins the scrag: when it is clean and dry the jaws should be tied together, and the skull exposed to the sun until the smell has evaporated.

Animals of a middling or small size, may be

preserved and transported with more convenience, and will be interesting additions to our Museums, as well as afford us a knowledge of many species, whose furs only have reached England as articles of commerce: persons engaged in this branch of trade have, therefore, constant opportunities of bringing home such skins, prepared by the method here detailed, and which they can also instruct the natives to do, in cases where the animals are not found near the coast. Divide the hair on the under part of the body, in a line down the middle; and with a sharp knife or scissars make a straight slit from the breast to the vent, taking care not to cut too deep, otherwise the knife will penetrate beyond the skin, and cut that which confines the bowels, which would then obtrude, and retard the operation as well as dirty the fur; keep a little cotton or tow by you, and lay it on the flesh as you go on separating it from the skin, putting some into the mouth, and using it to absorb the blood which may run out where the animal has been wounded; go on separating the skin on each side with your hand, using a knife or

scissors to cut any of the muscles which may attach it to the body; when the skin is so far separated that the thigh is seen, loosen the skin all round, and draw the thigh from it as far as the last joint of the leg, which may be then cut off, leaving that and the foot attached outside to the skin; proceed in this manner with both the hind feet, putting cotton or tow both on the skin and body as you go on, which will keep all clean. When the lower part of the animal is thus free, cut the tail off at its root; turn the subject on its belly, or, if convenient, fasten the rump to a small hook, and draw the skin off on the back towards the head; separate the fore feet in the same manner as the others have been done, and then continue drawing the skin over the neck and head till the back part of the skull is exposed; still go on gradually, and cut off the ears at the base, and a little beyond you will begin to see the eye, which should be scooped out without breaking, either by passing the end of a teaspoon all round, between the eye and its socket, or cutting the roof of the mouth away and taking them out inside. The skin being

now quite separated from the carcass, detach it at once by cutting away the scrag of the neck where it joins the skull.

The skin must now be laid on a flat board or table; and you proceed to clean the skull by removing the flesh, muscles, and small bones from the roof of the mouth, the sides of the jaws, and the tongue; this may be done with a common penknife, using another more blunt for scraping the bones clean; the muscles which unite the jaws should not be entirely removed, otherwise it will destroy the natural form of the head: a good sized quill should be cut like a toothpick, and used for scooping out the brain through the small hole at the back of the skull, which will be easily seen when the flesh has been scraped from the bone; and if this hole is not sufficiently large, it may be widened by cutting it all round with a strong knife: this part of the operation is most troublesome, and requires most attention. You have now removed all the flesh from the head, and must proceed to wash the bones with the arseniated soap mentioned in the Appendix, both on the outside and inside of the skull, which then may be filled with cotton

or tow; fill up the cheeks, sockets of the eyes, and sides of the jaws in the same manner, so as to give the head that plump and natural appearance which it first possessed: the head should now be turned, by drawing the skin again over the skull, and bringing the fur outside; if the head is large, and the neck small, it will sometimes happen this part of the operation is very troublesome, and must be facilitated by cutting the skin higher up the neck than was originally done. The head being brought to its natural position, extend the skin on the table, spread out the legs, and with a blunt knife scrape away all the pieces of flesh or fat which still remain, cleansing the bone which has been left to each foot in the same way, and as low down to the hoof or claws as possible; this can be done by turning each of them inside out, washing the skin and bones with the soap, and then returning them to their natural position, filling up the skin of each leg with tow: the tail should be next extracted, and treated in the same way: last of all, wash the remaining parts of the skin with the soap, and begin at the neck to stuff the subject, as near as can be of the original size. Be pro-

vided with several sizes of what are called glovers' needles (which are three-sided at the point), and, according to the size of the animal, begin sewing up the body at the upper part, making the stitches outward (that is, inserting the needle *inside* the skin, and drawing it out towards you), putting in tow or cotton as you go on, but taking care not to distend the skin beyond its natural size; in this manner finish the sewing at the vent; always minding to put the needle inside, and at the edge of the skin, by which means you will prevent having it entangled with the hair or fur. Thus prepared, expose the stuffed animal to the heat of the sun, which, in tropical countries, will dry a small subject in two days.

The noses of quadrupeds thus prepared, should be well filled with tow, strongly saturated by the composition, as well as the mouth, because as the greatest portion of flesh will always remain in these parts, they are the most liable to attract carnivorous insects during the process of drying; in larger animals the soles of the feet must be cut beneath, and some of the fleshy muscles removed with a knife, always

applying the composition to such parts, and sewing up the orifice.

To those who wish to pay proper attention in preserving the skins of quadrupeds, it is essential they should take the principal measurements of each subject before they begin; and, where time permits, the bones of the legs should be preserved either in the skin or out of it.

Many travellers may not, however, have time even to stuff the skin; in such cases it may be dried, putting a small quantity of tow only in the feet, head, and tail; this method will be more convenient for conveying them to any distance, as a great many would pack on each other in a common box; but in all instances the skins must be carefully washed with the arseniated soap.

Unless the operator has an intention of forming a Museum of Quadrupeds, the mounting of them in their natural positions is attended with so much trouble and inconvenience, that the cost of the necessary instruments, &c. would far exceed the price they might be done for by any professional person; and in this

place I shall mention the name of Mr. Gould, (Animal preserver to the Zoological Society), of Golden Square, as the most scientific ornithologist among the commercial naturalists of London, and an excellent preserver of animals generally. Mr. Havell, also, of 77, Oxford Street, has one or two able artists of this kind in his employ, and has generally a large collection of bird skins for sale at fair prices.

India swarms with wild animals, where they are hunted by the Europeans for pleasure: such gentlemen would confer a great benefit on science at large, and on the British Museum in particular, if they would let their servants skin some of the animals so procured, and send them home by any of the ships now trading to India from London. The animals of Madagascar, as well as of Borneo, New Guinea, and even of Sumatra and the other Ionian Islands, are still very imperfectly known; and not even a common Mouse or Squirrel should be thrown aside as useless.

The several kinds of Sloths, found in South America, are much wanted; and the traveller in those regions, when pressed for food, may safely eat their flesh. I have partaken of it on

many occasions, and found it not only palatable but agreeable.

It may here be mentioned that the heads of large animals should be carefully sawed in two, in order to remove effectually all the nerves and brain.

BIRDS.

Collections of these beautiful and interesting creatures are much more common than of quadrupeds; for as they are now generally preserved in skins, and kept in drawers like shells, they occupy little space. I shall first give a few hints to the sportsman, which will be useful in warm latitudes, though, in some respects, quite inapplicable to our northern countries.

The sportsman should always choose the dawn of day for his excursions, not only on account of the refreshing coolness of the air, so grateful within the tropics, but as being the time when the greatest number of birds are both seen and heard: a little boy may carry the basket or box which is intended to hold

the game; this will enable the sportsman to enter the woods and thickets with less difficulty; in the box should be put some pieces of any soft paper, together with some cotton or tow; before each bird is put in, just smooth the feathers, and twist a piece of tow round the bill and nostrils; if the wound bleeds much, a little of the tow should also be laid on it, and the bird can then be wrapped in paper; by this means one will not injure the other by the shaking of the box, which is best made of tin, as it keeps the birds cool. In two or three hours a sufficient number may be killed to occupy the day in preserving; by that time the heat of the day commences, the birds become silent, and retire in the deep shades of the woods, and the sportsman had best return home. Towards the cool of the evening the birds again emerge from the shade, and the sportsman may once more use his gun, if any more subjects are wanted; but no birds will keep beyond a day without some degree of putrefaction, which may always be known by the feathers coming off on the belly; it is, therefore, most advisable that no more speci-

mens should be shot than the collector has the means of preparing in twenty-four hours.

Birds in these countries are in general so tame, that there is little occasion to be very particular about the kind of gun, or quality of powder; the first should, for convenience, be light; and the last good. Birds of the size of a thrush or hawk should never be killed with shot larger than No. 8; but for Creepers, Humming-birds, and Finches, what is called dust shot is by far the best, and the charge should be very small. Humming-birds are best shot when on the wing, hovering over the blossoms of trees, on which they feed. In some parts of America the natives have a method of procuring these little creatures by shooting them with a blow-pipe, without the least injury to their plumage; and whenever they can be got in this state, the specimens will be much better for preserving.

We now proceed to the immediate object of their preservation. On taking the bird out of the paper, smooth the feathers, and make the wings, neck, and joints lax, by moving them a little backwards and forwards; the throat

should be cleaned with a little cotton, some also must be put in the bill, and the nostrils closed in like manner by shoving in cotton with the blunt end of a needle: this will prevent the feathers being soiled by the blood oozing out while the head is cleaning. This done, have by you the following articles, which may be contained in a little box: —

A small pair of pointed scissors, and a larger ditto, blunt at the ends.
A sharp penknife, and a stouter ditto.
A thin goose quill entire, and another of larger size, cut like a toothpick, for cleaning out the brains.
Scraped chalk, in a box, for absorbing blood.
Cotton or tow.
Tin box of arseniated soap, small brush, and phial of spirits of wine.
Needles and silk. Towel.

Thus prepared, lay the bird on its back, and divide the feathers down the middle of the breast and belly; then, with a penknife or scissors, cut a straight line from the breast bone to the vent, just deep enough to go through the outer skin, without injuring that

which confines the bowels. Proceed to shove the skin gently on one side from the flesh with the finger, until there is enough to take hold of; while, with the other hand, keep on working the blunt quill between both; do this until the skin becomes so far separated, that the thigh begins to appear, taking care at the same time to put a little cotton both on the body and skin as they become exposed: and if the bird bleeds much, apply the scraped chalk, which should be laid on the blood, which it quickly absorbs on being slightly pressed, and may then be shaken off in flakes; work the skin sufficiently loose round the thigh to admit of the joint being shoved underneath, cut it through with your knife, and leave the rest of the leg (or drumstick) attached to the skin. Proceed with the other side of the bird in the same way; when that is done, a very little more separation of the skin will enable the finger being passed round the back of the bird, near the rump, which may then be cut off just above where you feel the roots of the tail feathers; lay on a little cotton, clean the body, and lay the bird on its side: proceeding to separate the skin all round till you see the

base of the wings, which must be treated the same way as the legs, cutting them off at the first or shoulder joint. The skin must now be drawn over the neck and head, as in quadrupeds; but with more care, on account of its greater delicacy: just beyond the skull you will perceive on each side a little hollow, which are the ears; they must not be cut through, but the point of the knife inserted so as to scoop out the skin: still go on gently, and the eyes will soon appear; the white filmy skin which covers them must be first cut through, and then they may be taken out by loosening all round between the eye-ball and the socket, taking care that in so doing the eye is not broke. Separate the skin from the carcase by cutting it off at the back of the skull, where a small hole must be made for scooping out the brains; a little cotton, worked about the inside with the quill, will cleanse it thoroughly; proceed to scrape the temples, roof of the mouth, and jaws; the tongue should also be cleansed, but invariably left in the mouth. Before you fill up the eyes or skull with cotton, wash all the bones with the soap, and then carefully draw the skin again over the head. In some birds

this will be found difficult, from the neck being slender, and, therefore, not allowing a sufficient passage for the head; in such cases the angle of the lower jaw (where it is united to the skull) must be cut away; but in Ducks, Woodpeckers, and a few other birds, having very slender necks and large heads, even this will not be sufficient, and an additional opening must be made by cutting a slit through the skin, from the back part of the head, about two inches down the neck, sufficiently wide to admit the skull being drawn through: it is preferable making this opening on the back of the neck rather than in the throat, because the feathers in that part are always longer than those in the front, and consequently the incision, when sewed up, will be less apparent. In the Maccaws and Cockatoos it will be frequently necessary to open the skin from the chin to the vent, or the whole length of the bird, because the neck cannot, by any contrivance, be passed over the head.

The skull being again covered with the skin, take a blunt needle (fixed in a handle), and make all the feathers smooth, first lifting them up in a contrary direction, in order to make

their roots pliable. In the next place, begin to clean the flesh and muscles from the wings; which must be done by drawing the bone out as far as the second joint, separating the skin (by the pressure of the nail) all round: large birds, however, require an incision being made for this purpose along the second joint, between the two bones which you will feel on the inside of the pinion, as in such subjects this part is very fleshy; while in Creepers, Humming-birds, and others very small, the first joint only may be cleaned. Wash the skin and bones with the soap, but (in small birds) put no cotton within; do the other wing in the same manner, and then proceed to the legs, which must likewise be drawn out to the knee joint; the bones cleaned, soaped, and cotton or tow wrapped round to bring them of their original size: clean the rump, and gently remove all the remaining flesh from the skin of the body, which must afterwards be washed with the soap.

The bird being now in a fit state for stuffing, get a moderately stout iron wire, one end of which is bent; at this end fasten on a length-

ened piece of cotton, proportionate to the neck of the bird, and pass it by the mouth down the throat; the wire may then be disengaged from the cotton, and drawn back by itself; the cotton must be pulled sufficiently down, so that none remains beyond the mouth; close the bill, and tie it round with some thread. Nothing now remains but filling and sewing up the skin; and as the same rules which have been previously given for quadrupeds (p. 15) are equally adapted to birds, it is unnecessary again to repeat them: observing only that the two shoulder bones of the wings should be brought together before the breast is sewed up (which will make the wings lie in their natural position); and that the bone of each leg must be shoved so far up, that the knee joint comes in a straight line with the rump. The feathers being smoothed, place the wings flat on the sides, and put your specimen on a board, either on its back or side, laying it in a nest of tow, in which state it may be dried in cold countries by a gentle fire, and in tropical regions by exposure to the heat of the sun, without any fear of being attacked by ants or other

insects, provided the outside of the legs and bill is washed with the soap or spirits of turpentine.

These instructions may appear very complex to young beginners; but a little practice will soon overcome every difficulty, and eventually make them so easy, that two or even three birds can be thus prepared within an hour.

If the traveller has not sufficient leisure to sew up the skin, it may be folded with only a piece of cotton between; this will prevent it from being pressed much in packing. The method of keeping bird skins between leaves of paper, like plants, is very objectionable; as the pressure on the skull destroys the natural shape of the head.

GENERAL OBSERVATIONS.

Large birds, when prepared in hot climates, should have the shoulder and part of the thigh bones removed from the skin, dried by themselves, and preserved in paper, numbered outside to correspond with that on the skin: this

is a useful precaution to prevent their being attacked by insects before they are well dry.

If the traveller finds his ability unequal to skinning a Humming-bird, he may suspend these little creatures by a thread (fastened to the bill) from the ceiling; and if there is a current of dry air, they will soon become hard; but as in this state the soap cannot be applied, they must be put into a small box, with some camphor, by themselves, and the lid pasted down to exclude air and insects. Bats may be prepared in the same manner as small birds, but the best method is to send them home in weak spirits: those of tropical countries are very numerous, and but little known. Many sea birds have their skins coated with so much fat, that, while scraping it off with a blunt knife, powdered chalk, or very fine dry sand, must be used to absorb the grease, which would otherwise soil the feathers. Many of these birds have the body of a pure white, and may, therefore, be opened down the back, instead of the belly; by which method the feathers will run no risk of being soiled.

The different species of Toucans, all of

which inhabit tropical America, have their bills (in a fresh state) variegated with many colours; these should be either drawn or described before the skin is prepared. The economy of these singular birds is very little known, and any information on their food, habits, and manners, will be highly valuable.

I shall not here enter into a detail of the different methods by which birds are set up in their natural positions. To do this successfully, much time and practice is necessary; to a traveller, therefore, the information would be useless, while to those who reside at home it is recommended to employ professional persons for this purpose, who may be found in London and most parts of the country. To spoil the skin of a rare or favourite bird which we have carefully preserved, merely to try our own skill in setting it up, is surely not worth risking for a few shillings; and those who wish to be thoroughly acquainted with this finishing operation, will understand more from an hour's instruction by any animal preserver, than he would gather from reading the long, but necessary details found in most books treating on this subject; to which, therefore, the reader is

referred. Skins of birds prepared in the manner here detailed may be set up on wires, with the greatest ease, at any future time.

To the traveller who is desirous of attaining something more than the mere possession of beautiful bird skins, it is recommended to affix to each species a small number, marked on a little piece of thin lead, corresponding to a similar one in his note book; under which he should shortly write down the colours of the legs, eyes, and bill, the skin round the nostrils, and that which often encircles the eye; the gizzard of every bird should be cut open, and the crop examined, to discover the natural food; the sex also should be ascertained. An attention to these points would greatly increase our knowledge of many families of birds at present little known. Duplicates also of such species among the smaller birds, as have any thing remarkable in the form of their tongue, &c. should be put in a bottle of weak spirits; as interesting subjects for comparative anatomy. The different kinds of Creepers are particularly desirable in this state.

Captains of vessels, and others, who do not wish being at the trouble themselves of skin-

ning birds, will find them offered for sale at several of the West India islands, particularly Trinidad; likewise at Parà, Cayenne, Guiana, Surinam, the Cape of Good Hope, New South Wales, &c.; but these generally consist of the more showy kinds, which are well known to the naturalist.

It may not be irrelevant from the subject to recommend in this place, a method of forming a collection of small birds, not generally practised, but possessing many advantages, as it obviates the great objection of want of room. It is by keeping the birds (prepared in an extended position on the back) in the same kind of drawers (with camphor) as are used for either shells or minerals. Glass eyes may be put in the head, and each bird can thus be taken up and minutely examined in the hand: when spread on cotton they have a very beautiful appearance, and a moderate sized cabinet will thus contain near 800 specimens, which, if put up in glass cases (independent of the expense), would fill a large room; the whole of the author's collection is preserved in this manner.

Skins of birds should be packed in boxes,

each specimen carefully wrapped in paper, and the spaces filled up with cotton or any soft substance; and when the lid is shut, all the seams should be closed up with tow, and rubbed with pitch. If the box is small, strong paper pasted over the seams will exclude all insects. The traveller in Africa should provide himself with cotton before his voyage commences; but in America and India it can be procured in abundance.

The great perfection in preparing skins consists in removing all the flesh, and well cleaning those bones which necessity requires should be left; another is, in not distending the skin too much; this is a fault with all young practitioners, who always put in more stuffing than is necessary; indeed very little is requisite for large subjects, otherwise, in packing, they would occupy much room: the habit should be acquired by beginners, when using the knife, of cutting *from* them; and when the fleshy muscles of the wings and legs are to be removed, if they are cut quite through all round and close to the joints, the whole may be stripped off the bone with ease and expedition.

Dead birds, in northern countries, will remain in a fit state for preservation a long time, if laid in a box with some charcoal; in this state they are often received from the continent.

FISH, MARINE ANIMALS, &c.

THE impossibility of preserving the beautiful but evanescent colours of fish, and the unsightly appearance they generally present in spirits, have conspired to render our knowledge of these animals very imperfect. A wide and interesting field is, therefore, open to such naturalists who have the means of drawing and describing them in a recent state. Innumerable species abound in tropical seas, which are for the most part unknown, and their preservation in spirits is always practicable; several moderate sized bottles, with wide mouths, may be carried out (particularly on long voyages), half filled with weak gin, rum, or other spirits, not very strong, and in which small specimens of fish may be put, affixing a number (scratched on thin lead) to each, and stating, in the journal, where found, and adding a particular de-

scription of its colours when first caught. Travellers, in narrating their voyages, are very frequently mistaken in supposing, that several fish peculiar only to northern latitudes are found in other hemispheres; there may be a general resemblance, but nothing more; it is, therefore, very desirable that either small specimens of such should be brought home, or accurate notes made of the following particulars. Form, length, and colours; position of each fin, and number of rays in each, stating which are soft, and which bony; shape of the head and mouth, and which jaw is the longest, if they are with, or without, teeth; if the teeth are firm or flexible, and their size, shape, and in what position they are placed; if the palate is smooth, or toothed; if the scales are large and easily come off, or small and firm; situation of the vent; if either of the jaws are furnished with fleshy beards (cirrii); and if the mouth is capable of much extension; if the gill covers are smooth, spined, or minutely toothed; and the number of the fleshy gill rays on each side. By attending to these particulars, a scientific naturalist will easily discover whether the fish thus described is new

or already known. There are several ways of skinning and stuffing fish, the best of which is that invented by Mr. Bullock: one great disadvantage, however, attends them all; for the specimens cannot in a dry state be properly examined by the scientific naturalist.

Wide-mouthed bottles should always form part of a traveller's equipment on long voyages; they may be fitted into a case of any size, and will likewise serve for preserving singular marine Molluscæ (or soft animals), different kinds of Crabs, Prawns, and Shrimps, none of which should be rejected because they bear a resemblance to those of Europe; all these subjects should be cleaned from slime, dirt, &c. and soaked a few hours in fresh water; the bellies of the larger fish may also be opened, by making a narrow slit with a knife; this will empty the inside, and admit the spirit more freely.

SNAKES, LIZARDS, &c.

Lizards may be skinned in the same manner as quadrupeds, but with more delicacy.

Snakes are preserved by skinning; but unless the skull and jaws are left, they will be of no manner of use: it is to be regretted that nearly all the skins of these reptiles sent from South America, are prepared in this mutilated state by the natives; without the head they are, however, not worth the trouble of bringing home. It is, I think, by far the best way, whenever the size will admit, to preserve all these reptiles in spirits, taking notes of their colours before putting them in. Mr. Burchill, the African traveller, has made known another, and a very excellent method, which consists in skinning the Snake soon after it is killed, fastening down the skin with strong gum or glue on paper, laying over it another coat of gum, to exclude the air, by which means the colours were preserved better than by any other process.

There are a number of distinct species of large Snakes both in Africa, India, and South America, all confounded under the name of *Boa Constrictor:* travellers in these countries, therefore, would do well to give them an attentive examination.

INSECTS.

Directions for breeding, rearing, and collecting the insects of Europe have been so often published, that it becomes unnecessary to repeat them in this work: the observations which follow are, therefore, more applicable to exotic insects; referring the student to Samouelle's Entomologist's Compendium, a very useful book, and which treats on these subjects fully.

Provide several small sized boxes, lined with thin cork, for the pocket; as well as others of a large size as store boxes, to hold the insects when they become dry; these latter may be all of the same size, and made to slide down perpendicularly into one case; a quantity of various sized pins must be procured, pincushions, an aurelian's net, covered with thin gauze muslin, and also a pair of hand forceps, all which articles may be purchased at any of the dealers mentioned in the Appendix. If the collector intends remaining abroad any length of time, he should provide a duplicate set of these things, to guard against accidents. Per-

haps the most simple method of taking insects on the wing is by means of a long light cane, having a hoop, with a bag of muslin, attached to one end; presenting the exact appearance of an angler's landing-net, though the bag should be deeper: the art of using it consists in striking at the insect, so as to bring it within the circle of the hoop, which, by being then suddenly turned, twists the muslin bag, and confines the insect inside; it should be killed (if not a hard winged, or beetle-like insect,) by gently pressing the breast, or that part to which the wings are attached. The insect may then be shaken out of the bag into the palm of one hand, while the collector uses the other to stick a proper sized pin through the breast, or between the wings. It must here be observed as a general rule, that Butterflies or Moths must on no account have their wings even *touched* with the fingers, as the mark will always injure their soft and beautiful colours; but if it has fallen, or requires handling, always take it by its legs, or stick a pin in its breast sufficient to lift it. Locusts and large Beetles must be put into boxes by themselves, otherwise they will entirely destroy each other before the

collector reaches home: the large ones are very difficult to kill; the best way is to plunge them into hot water, and their bodies afterwards must be slit open underneath with a fine pair of scissors, and the inside, after cleaning, stuffed with cotton. Beetles of all kinds, excepting such as have soft hair on them, are safely and compactly preserved in weak spirits. To make the wings of insects lie flat, card bracers must be used (as represented at Pl. 1), having a pin stuck through one end, and the slip of card passed over the wings till they are dry.

It is almost incredible the rapid destruction which the collector's acquisitions are exposed to in tropical climates, unless he pays the most vigilant attention to them. If any of his boxes, before being papered up, are left on the table, the ants will enter between the crevices of the lid, and destroy every insect in one night. To remedy this, he should have made a small iron stage, something like a common gridiron, resting on four feet, which, for packing, may turn up and lie on the sides; these feet should be placed in as many little tin pans, filled with water; this will effectually prevent the ants

getting to the boxes containing the insects, which must be shut up, and placed on the stage; for if left open, they will be attacked by the cock-roaches, which, in these countries, fly about the houses in the night: the insects may thus be preserved till enough specimens are dry to fill a store box, into which they can be put, sticking the pins firm, and pasting the lid and all the joints over with paper.

The collector must ever bear in mind that insects are only valuable when the legs, wings, and horns are in a perfect and unbroken state; and that most of those usually received from abroad, having these parts mutilated, are hardly worth the trouble and expense of sending: if, therefore, in putting them in the store boxes, any should be broken, the part must be carefully pinned down (by one of the card bracers) nearest the insect it belongs to. The best situations for collecting insects in warm countries are the skirts of woods, lands newly cleared, and rather open tracts near plantations. The insects of Brazil are now become so common in Europe, that they are, in general, not worth bringing home, unless caught in the

interior. Those from Africa, on the other hand, are valuable; particularly from Sierra Leone, and all along the coast as far as the Cape of Good Hope. Mr. Barrow mentions, that in the long chain of woods towards Algoa Bay, the variety of insects he saw were innumerable; yet our collections, in all probability, do not possess one of them. A most excellent method of procuring night-flying insects, is by sitting at a table with a good-sized lantern on it, and the window open; all insects are attracted by light, and in this manner I have caught more than 200 in one night, without quitting the chair. The insects of China, when perfect, and those from all parts of India, are much wanted.

The scientific naturalist should direct his attention to the economy of the different kinds of Ants found in warm climates, each species having, in general, some peculiarity of its own: he should also distinguish those insects which inhabit the low tracts, from such as are found only on mountainous districts; noticing the probable height of such situations (from the level of the sea) in his journal. Where the same species is found in several parts of the

country he is travelling, a few collected in each province should be preserved and labelled, particularly Coleoptera, or those insects with hard wing-cases. Specimens of the different insects producing the silks of India would be highly interesting, in the caterpillar, the chrysalis, and the moth state; as well as all those which are either beneficial or injurious to man; as information on such points might lead to very important results.

Circumstances may occur which will render the following method of preserving coleopterous insects very useful. After killing them, get a small box, with some very fine dry sand, sprinkle a layer of sand at the bottom, and then put a layer of insects, and so on alternately till the box is filled, shaking it well before closing up the lid. In countries where store boxes and pins cannot easily be procured, this plan will answer very well with coleopterous insects, but those only; they may likewise be put into bottles, filled up afterwards with sand; but with greater danger of being injured.

The boxes of insects sold at the Cape of Good Hope, and in China, are generally of

little value; but a commission might be given to the persons who make them up, to procure insects of less showy appearance, among which many scarce subjects are likely to occur.

A small canvas knapsack will hold all the articles an entomologist requires while collecting in hot climates; and it may be carried, with one or two good-sized corked boxes, by a little boy.

SHELLS.

Collecting Exotic Shells.

In no branch of Natural History are there more collections than in this: it certainly possesses the great advantages of beauty and durability; the procuring and preserving them is attended also with less trouble and risk than any other subjects. To those who wish to make it a lucrative pursuit, it likewise holds out great encouragement. The different implements the collector should be furnished with will be mentioned; the situations which are to be searched; and countries the most abounding in these beautiful productions.

A canvas knapsack, slung across the shoulder, may be furnished with three or four tin boxes (like anglers' worm boxes) made of different sizes, these will hold small or delicate shells; two oyster knives, for separating shells from rocks; a hammer and chisel to get at such as perforate other substances; and a landing net with very small meshes, having a screw fitting on one end of a walking staff, of light but strong wood; a small spade may also be added, capable of being fixed on in the same way: the net can be employed with much advantage either for assisting the collector in getting shells, otherwise beyond his reach, or (if searching for fresh water species) to scrape the bottom of lakes, rivers, or ponds.

The lowest ebb of the tide is always the best time for searching after shells on the coast; the rocks and stones which are then left exposed should be carefully examined for such shells (as limpets, barnacles, ear-shells, &c.) as adhere to them; they must be separated by passing a knife suddenly between them and the substance they are on. Muscles and other bivalves (or such shells as are composed of two pieces) are likewise found in these situa-

tions; and, wherever the rock or mud is pierced with round holes, the collector may generally be sure of finding bivalves within, by breaking it away with his hammer: the little puddles of salt water left by the sea should all be visited, and any loose stones or sea weeds carefully examined, as many shells will be found in such places; other kinds live below the surface, and their habitations are known by little round hollows observed in the sand; these may be dug out with the spade, though they are generally at some depth.

If any shells appear to have been cast up recently on the beach, they may be collected; but such as have lain some time are generally so injured by the friction of the tide, and the heat of the sun, as not to be worth the trouble of bringing home. After a gale of wind, or violent storm, the shore should be immediately visited, as very fine shells are often cast up, and, if the coast is extensive, a few boys might be easily engaged to assist in the harvest; for it not unfrequently happens that the next flow of the tide will take every shell away.

Captains of vessels, sending their boats on shore for wood or water, would find their

advantage in ordering those people who remain with the boat to search about for shells, and bring off all that they find.

Small islands and coral reefs, not exposed to violent surfs, are in general particularly rich in shells; the different kinds of tree oysters, clams, and pearly-mouthed Snail-shells, are often found in such situations very plentifully. But the most productive mode of collecting is by the traul or drag-net; and if captains of vessels going to hot climates (particularly the South Sea islands) could be persuaded to carry one with them for this purpose, its produce would quickly repay its original cost. Wherever dead or broken shells are observed on the beach, it is a certain indication that the coast is productive, and the traul-net should be tried in every direction, both in shallow and deep water; the tender shells, to prevent injury, may be put by themselves in a jug with water; if a great many of one kind are thus brought up, the best only in colour, size, or perfection, may be selected: trauling will enable the collector to procure a great variety of shells, which (from inhabiting only very deep water) can seldom be got by any other means.

Shells may also be caught in lobster pots, and are frequently found adhering to cables, the bottom of old ships not coppered, and pieces of timber, on piers, posts, &c. partially covered by the tide; also by baiting a line with raw meat, as a great many live on animal substances. In Roman Catholic countries shell fish form an important part of food during Lent and other holidays; many kinds may, therefore, be purchased in the fish markets, which should be frequently visited, particularly those of the Mediterranean; both at Naples and Tarento the edible shell fish are very abundant, and the salt water lakes near the latter town are more productive than, perhaps, any place in Europe. Very fine and large narrow brown Muscles, which bore the rocks, are frequently seen in the markets of Malta; at such times also the fishermen may be engaged to bring other kinds which, not being used as food, they do not collect.

On the coasts of India, where the sea is transparent, shells at the bottom may be seen at a great depth; Divers in this country are common, and they can easily procure shells,

which, from living in deep water only, may prove very rare.

Shells inhabiting fresh waters, although plain in appearance, are always desirable, and often very valuable. The rivers of America, and especially of Brazil, abound with clam shells, having pearly insides; these must be got at either by a net, or by wading for during the dry season; and the common people of the country may always be applied to on these occasions with advantage. The fresh water bivalves of Africa and Asia are almost entirely unknown, though from the numberless rivers in both these continents, there is reason to suppose many extraordinary shells might be found in them; lakes and ponds may generally be searched with success; either for small snail shells, near the surface of the water, or on weeds which may be got at by the landing-net; or by wading after the bivalve shells which are found just below the mud.

Land shells are equally valuable; in Europe a great variety are found beneath the barks and at the roots of old trees, among moss, &c.; but I never discovered them in such situations

in tropical countries; they may, however, be sometimes seen crawling, early in the morning, on plants and leaves of trees; it will be a good way, whenever the opportunity occurs, to offer a trifling reward to the native boys or negroes to collect these shells at so much a dozen. Many of the large kinds found in Africa are eaten, and the natives, therefore, best know where to find them; they should be told to bring in all kinds, small and large, and none must be thrown aside because they have a resemblance to the common kinds found in this country. It is a very general error, with all persons not sufficiently acquainted with the subject, to imagine that because the Snail shells, Cockles, and Muscles, they meet with in distant countries, have some resemblance to those found in England, they are, therefore, not worth collecting: this is so far from being the fact, that scarcely one shell inhabiting the Indian seas has been found in those of Europe; each circle of the globe has its own respective animals and plants, and their geography in many instances is as certain as that which divides England into counties.

The foregoing general directions for collect-

carrying out a trawl with them, might be amply repaid by one or two successful hauls. The Orange Cowry, which comes from Otaheite, and is worn as an ornament by the chiefs, might, in all probability, be thus procured, and many other shells, quite unknown in England. Further north, the coast of California is very productive: from this country several beautiful kinds of Ear shells are brought; of these, such only should be collected as are not worn or worm-eaten on the outside.

From the Peruvian coasts, now thrown open to the commerce of this country, many novelties have already come, and more will doubtless be found. The West Indies, and coasts adjoining, are not near so productive as those of India; nevertheless, many beautiful species are to be met with, particularly the varieties of the Spondylus (an oyster-like shell, covered with spines); these are found at several of the islands, but principally at Guadaloupe, where they may be purchased; those having the spines perfect, and coloured on both sides, are the most valuable. It is quite useless bringing home the great Conch shells, with a pink inside, so common in these countries; or the

little boxes of small shells, divided into compartments, which are sold by the negroes.

The coasts of Brazil, Cayenne, and Terra Firma, have hitherto afforded but few varieties, though many rare land and fresh water species are found in these countries; and the little islands on the coast may present many novelties, particularly further south towards St. Catherine's. A few very rare shells have been sent home from the river Plate; and at the Falkland Islands are found many kinds of Limpets and other shells. In a voyage to India, the Cape-de-Verd Islands may be searched with advantage; and Senegal and Guinea likewise produce many varieties of Melon shells. The land and fresh water species from these countries are fine, and should be industriously sought after, and the natives employed for this purpose, in addition to the personal exertions of the collector.

The shells from the Red Sea are fine, and in great variety, though few come from Egypt and the African coast bordering the Mediterranean. The western coast of Sicily also is said to produce many beautiful prickly oysters.

To the English conchologist the coasts of

Cornwall and Devonshire present the greatest variety of marine species, principally got up by the trawlers; the collector should often go with these people, and have all the refuse or "trash" of their nets put into buckets, which can be taken home and examined: among the sea weed, &c. thus brought up, will generally be found many small varieties. In most other respects, the same methods recommended for collecting exotic shells, may be followed advantageously on our own coast: the land and fresh water species, however, should be sought for in other situations; the crevices and the barks of old trees, the moss round the roots, loose stones, old walls, palings, &c. should all be examined for the smaller land shells; while the net for scraping the bottom of streams or rivers must have the meshes very small, and may be made of twisted wire. Having now given ample instructions, under most circumstances, for collecting shells, we proceed to their

PRESERVATION.

When the collector returns home, the land and fresh water shells may be put into a basin

of hot water, first washing off, with a nail-brush, any mud or dirt; the animals thus killed may then be taken out with a pin or needle, and the shells laid separately on a cloth to drain; the sea shells should be treated something in the same way, but the water must not be boiling, otherwise the colours of many kinds will change; they should be left longer also in the water, as the animal is not so soon killed, and the fresh water will take away the saline particles. The fish of all bivalve shells are never dead until the shell begins to gape; the animal can then be taken out with a knife, in the same way as you would separate an oyster, but, if possible, not breaking the hinge; rinse the shell in water, and tie the two valves together with a piece of thread; if some of the lesser bivalves are delicate, they may be slightly wrapped in cotton, and put inside the larger ones; this will save room, and ensure their safety.

All shells should be left a few hours in cold water after they have been killed; this will allow the bodies of the animals to shrink, and they will be more easily extracted. Whenever the mouth is closed up by a lid, it should on

every occasion be carefully preserved and replaced; but the collector should on no account attempt to clean the shell by acids or any other means; simply brushing it with water is enough. It is a great error many people run into, who think that the more the colours of the shell are seen, the more valuable it becomes; now it is precisely the reverse, for a scientific collector in England will give more for a shell covered by its rough coating, than when it has been taken off by unskilful hands.

PACKING.

Cotton or tow should always be preferred for packing. The very large specimens must be put in a box by themselves. Those more delicate and small may be enclosed in chip boxes, or wide-mouthed phials, and then made up into one package: the generality of shells can be packed in stout boxes, placing, alternately, a layer of shells and a layer of cotton, and filling up the spaces between the shells to prevent their touching; wrapping also a piece of cotton round such as are most likely to be

injured; when it can be done with convenience, each specimen may be first wrapped in soft paper. Always put those of the largest size at the bottom, and the spaces between may be filled up with small stout shells, in addition to the cotton: when all are packed, the small chip boxes containing the more delicate subjects can be placed near the top.

Before concluding the subject of Shells, the following hints are more particularly addressed to the scientific traveller, whose inclination and opportunity may lead him to study a subject of real importance to science; and that is, the investigation of those animals to which shells are only a covering. This, as far as regards those of Europe, has been done to a great extent by many naturalists of high reputation on the Continent; but of the innumerable species found in warm latitudes very little, comparatively, is known; and their investigation cannot be too strongly recommended to those who have the rare opportunity afforded them. For this purpose the sea shells may be placed in a basin of salt water, and as soon as the animal emerges from the shell, it should be carefully watched, and accurately drawn or

described on the spot. There are many native artists in India whose accuracy in detail, is as remarkable as their ignorance of perspective, and these may be employed by such as are not draftsmen themselves, under the immediate superintendence of the naturalist; a mere outline of the shell itself will be only necessary: when the inhabitant has been examined, it can be killed in hot water, and put into spirits, with a label corresponding both with the drawing and shell. A series of drawings, descriptions, and specimens, thus made of the testaceous animals found in the Asiatic ocean, would be of far greater importance to science, than all the empty shells which have ever been brought from that productive country, and will perpetuate for ever the name of him who first supplies this knowledge.

It is likewise strongly recommended to such conchologists as reside on our own coast, to pay more attention to this subject than they have hitherto done. New shells are continually added to our British Fauna; but, with the exception of that truly great naturalist, the late Colonel Montague, not one English writer has paid the least attention to the animals. A

few of those which require particular illustration are the following :—*Strombus, Pes Pelicani, Solen vespertinus,* in comparison with *Solen vagina* or *Siliqua. Nerita glaucina;* the different shells improperly placed among the *Volutes; Patella Chinensis, vulgata, Græca,* and *fissurata, Helix ianthina, Pholadidea Luscombiana* (Goodall), all the species of *Serpula* and *Bulla.* The drawings and descriptions which any intelligent conchologist made of these animals, the author would feel pleasure in publishing, in their name, through the medium of his Zoological Illustrations, in case any more eligible mode might not offer. The subjects in spirits must, however, accompany the drawings, which, if left with Mr. Wood, will be faithfully returned.

PLANTS.

The importation of exotic plants into this country has become of late years a considerable source both of profit and pleasure; and many of the principal nurserymen send out

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The importation of exotic plants into this country has become of late years a considerable source both of profit and pleasure; and many of the principal nurserymen send out

collectors expressly for this purpose to many distant countries: but the transportation of living plants is attended with great trouble, and still greater risk; and should only be resorted to in particular cases, or when it is impossible to procure seeds or roots. Small round holes must be made in the box or barrel that contains them, and which can be placed in the middle of the vessel, taking care to cover the top whenever the sea is rough.

Most plants can, however, be sent to this country either by their seeds or bulbs, and the methods that have been recommended are innumerable; that pursued by the French botanists consists in placing the oily and hard seeds between alternate layers of sandy earth; and the others in brown paper bags, in both cases pervious to air. Seeds, during the damp and rainy seasons of the tropics, may be put with charcoal. Moist sugar is also recommended by some as a good preservative; but no seeds should be packed until they are sufficiently dry. Seeds of all plants hurtful or beneficial either to man or to animals, should be industriously procured, as well as specimens of the

plants in flower: those that are large, thick, or of remarkable appearance, are infinitely better preserved in weak spirits.

We are still ignorant of many plants which produce the most common gums and other medicines sold in the shops; nor have any correct representations been published of the numerous tropical fruits we hear so much of. Coloured sketches, and the preservation of the fruit itself (when not very large) in spirits, would form materials for a most interesting and valuable work.

The process of drying plants for the Herbarium, has been stated as very difficult in tropical countries during the rainy season, when they are so apt to rot in the process; this, however, I have never found, and suspect it originates in suffering the progress of desiccation to stop, by not changing the paper sufficiently often. The method I pursued in South America was as follows: the presses were made about the size of a common folio book, and consisted of two planks of mahogany 1¼ inch thick, with a narrow piece let in at each end to prevent their warping; at each of these ends was a press screw, about 4½ or 5 inches long: the paper for drying the plants was made into

books fitting into the press, between every two or three of which, when filled with plants, I placed a thin board of deal, the same size as the books; this answered a double purpose, that of making the pressure more equal on all the specimens, and separating those plants which were juicy from the grasses, ferns, or others, which dry in half the time; it should be observed that fine cartridge paper I have always found the best, and blotting paper the worst, for this purpose: the whole was then put into the press, and the screws tightened twice a day, the paper being changed *regularly* every morning or evening. Few plants by this method required more than four days pressure; and the process may be accomplished in three, if the paper is changed twice a day, and the leaves of the books heated in the sun, or over a fire, before the specimens are put in. Independent of every other advantage, this method retains the colours of the plant better than any other I am acquainted with.

Fruits, or any other subjects preserved in bottles with spirits, must be well corked, and either secured by bladder, or pitched over; otherwise, if they remain long in hot countries, the spirit will rapidly evaporate.

APPENDIX.

Receipt for the Arseniated Soap.

Arsenici Oxydi.....	℥j.
Saponis.....	℥j.
Potassæ Carbonatis	ʒvj.
Aquæ Saturatæ.....	ʒvj.
Camphoræ.....	ʒij.

This composition should be kept in little tin boxes, and labelled Poison. A small quantity will prepare a great number of subjects. When it is to be used, dip a camel's hair pencil into any kind of spirits, and with it make a lather, which is to be applied to the skin and bones; great care should be taken to prevent any getting under the nails of the operator, as it will separate the skin some way down, and cause pain; to avoid this, the hands should be washed after every application.

Preservative Powder.

Mr. Bullock used a powder, made from the following receipt, for filling up incisions in the noses or hoofs of quadrupeds, or the skulls of

large birds. Arsenic and burnt alum, each one pound, and two of tanner's bark, all in powder, mixed, and passed through a sieve; then add half a pound of camphor, and half an ounce of musk; mix well and keep in close tin canisters.

EXCHANGE OF SPECIMENS.

The Author has constantly a large collection of duplicate specimens in Ornithology, Entomology, and Conchology, ready to exchange with other naturalists in all parts of the world, for their duplicate specimens in the same departments. He has caused many of these to be made up into small elementary collections, particularly instructive to students, which will be exchanged upon the above principle. To insure punctuality on both sides, naturalists abroad are requested to send their consignments, where practicable, to a third person, who may be instructed to deliver them to Mr. S. upon receiving the intended equivalent. Letters of advice should be addressed to him, directed to the care of Messrs. Baldwin and Cradock, Paternoster Row, or to St. Albans, Herts.

LIST OF THE LONDON COMMERCIAL NATURALISTS.

The principal dealers in *Shells* are, Mrs. MAWE, 149, Strand; Mr. STUCHBURY, Theobald's Road, corner of Bedford Row, Mr. SOWERBY, Great Russell Street, Bloomsbury.—In *Birds*, Mr. GOULD, Golden Square, and Mr. Havell, 77, Oxford Street.—In *Insects*, Mr. HAVELL, and Mr. TUCKER, Quadrant, Regent Street.

Mr. Askew, 432, Oxford Street.
Mr. Attanasio, 16, Crombus Place, Commercial Road.
Mr. Dantziker, Wardour Street, Oxford Street.
Mr. Edwards, 13, Earl Street, Westminster (for Cabinets.)
Mr. Eling, High Street, Deptford.
Mr. Havell, 77, Oxford Street.
Mr. Harwood, Houndsditch.
Mrs. Mawe, 149, Strand.
Mr. Stuchbury, 47, Theobald's Road.
Mr. Sowerby, Great Russell Street.
Mr. Tucker, Quadrant, Regent Street.
Mr. Turner, 22, Sidney Place, Newington, Surry.
Mr. White, 12, Cross Street, ditto.
Mr. Willis, Chancery Lane.
Mr. Wood, Fenchurch Street.

ZOOLOGICAL SALE ROOMS.

Mr. Stevens, King Street, Covent Garden.

LIST OF ELEMENTARY OR COMPENDIOUS WORKS, MOST USEFUL TO THE STUDENT OR TRAVELLING NATURALIST.

GENERAL ZOOLOGY. 1. *Cuvier's* Animal Kingdom (*Régne Animal*) in French, Second Edition, 5 vols. 8vo. Paris, 1830. A translation of the above by Dr. M'Murtrie, M.D., is announced, in one thick volume, 8vo. This, if well done, will be a valuable book.

Lesson. Manuel de Mammalogie, 1 vol. 12mo. Paris, 1827.

ORNITHOLOGY. *Lesson.* Manuel d'Ornithologie, 2 vols. 12mo. Paris, 1830.

Temminck. Manuel d'Ornithologie, ou Tableaux Système des Oiseaux qui se trouvent en Europe. Second Edition, 2 vols. 8vo. Paris, 1820.

Wilson. American Ornithology; on the birds of the United States. Edited by Professor Jameson. Edinburgh, 1831, 4 vols. 12mo. A more expensive edition, with coloured plates, is edited by Sir William Jardine, 3 vols. 8vo.

Selby. Illustrations of British Ornithology (or a complete Description of all the British Birds), 2 vols. 8vo. Edinburgh, 1825—1833.

ENTOMOLOGY. *Kirby and Spence's* Introduction to Entomology (or rather to the Natural Habits, &c. of Insects generally), 4 vols. 8vo.

Samouelles. Entomologist's Compendium, 1 vol. 8vo. London, 1819.

CONCHOLOGY. *Swainson's* Elements of Modern Conchology, 1 vol. 12mo. 1835.

Lamarck. Hist. Nat. des Animaux sans Vertebres. Paris, 1818. &c. 8vo. N.B. The fifth, sixth, and seventh volumes contain the Shells; they may be had separately, and are the best upon the species which have yet been published.

BY THE SAME AUTHOR.

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DESCRIPTION OF THE PLATES.

PLATE I.

THE upper figure exhibits the appearance of a bird from which the skin on one side has been removed, showing where the joints are to be cut; the lower represents the carcase after being entirely separated from the skin; this will enable the learner to see which bones should be removed, and which left; below is represented one of the card bracers mentioned at p. 39.

PLATE II.

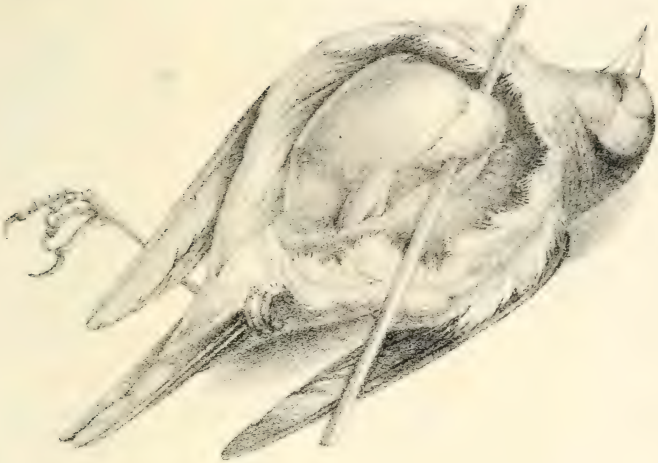
This plate has been added, to make the inexperienced collector familiar with the forms of some of the most rare, valuable, or interesting Shells: their scientific names, and the countries they have been found in, are as follows:—

Fig. 1. *Trochus Solaris* (Lin.) Long spired Sun shell, from Java, half the natural size; the colour is pale fawn or drab.

Fig. 2. *Rostellaria Subulata* (Lam.) The long-beaked Spindle shell, Sumatra and Java; the colour rich fawn, the mouth is either dark chesnut, or pure white—(two-thirds natural size).

Fig. 3. *Cymbiola nivosa* (*Sw.*—Swainson's Ex. Conch.) The Snow-spotted Volute, from New Holland, livid flesh colour, spotted with white, and having two grey bands, in the middle of which are short brown lines—(two thirds).

Pl. 1



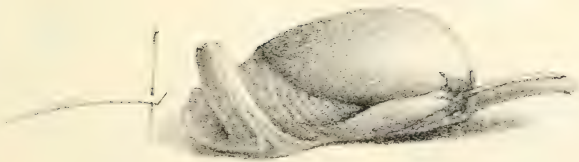


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Fig. 4. *Voluta Junonia* (Lam.) Juno's Volute, nearly white, with bands of red spots. Only two or three specimens of this shell are known; it probably is from some part of the Indian ocean—(half the natural size).

Fig. 5. *Voluta coronata* (Lam.) Coronated Volute, from India, whitish, with reddish dots—(half the natural size). The collector should particularly search after all those shells having teeth on one side of the mouth, similar to these three last.

Fig. 6. *Argonauta vitrea* (Lin.) Venus's Slipper, very thin, and pure white; most extremely scarce—(half the natural size).

Fig. 7. *Avicula morio* (Leach). Black Swallow Mussel, from Pulo Condore. All these kind of shells, which are dark brown in colour, and thin round the edge, should be collected carefully; they adhere to rocks and coral reefs (principally in the Indian seas) by means of a bunch of silky hairs (byssus).

Fig. 8. *Lingula anatina* (Lam.) Duck's-bill Mussel, rather less than the usual size; the animal of this singular shell has a peduncle or fleshy stem. The author will feel infinitely obliged to any traveller who may discover it in this state, and favour him with a specimen in spirits for dissection.

Fig. 9. *Bulimus citrinus* (Brug.) Citron Bulimus (Swainson's Zool. Ill.) or Canary Snail, rather larger than the figure, of a beautiful yellow. This is a land shell, from the South Sea Islands. Its colour varies very much; but every land shell at all like it will be very acceptable.

Fig. 10. *Ovula volva* (Lam.) Weaver's Shuttle, pale flesh colour, the mouth with a pink tinge; India and China.

Fig. 11. *Helix columna* (Lin.) Pillar Helix, India, a pale brown land shell, with darker freckles and lines, the top deep brown—(half the natural size).

Fig. 12. *Chiton spinosus* (Burrow). Spined chiton, from whence unknown: the figure is much reduced. This family of shells are found adhering to rocks at low water, like the limpets. Every opportunity should be taken of plentifully collecting both the small and large ones; they are not at first easily seen, being so much like the colour of the rock. As the author is writing an account of these shells, he will feel grateful for any specimens which may be sent him from abroad, and will make honourable mention of the name of the donor.

Fig. 13. *Achatina perversa* (Zool. Ill.) Reverse or Black-mouthed Land Snail: the ground colour is white, with a pale flesh-coloured band, and several others of a deep black; the left hand side of the mouth, and the edge of the other, is deep chesnut. From near Bahia, Brazil. The figure is half the usual size of the shell.

Figures 4, 5, 6, and 12, are copied from other works, the shells not being in the author's possession: all the rest are original.

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