DIRECTIONS

FOR

COLLECTING AND PRESERVING

SPECIMENS OF NATURAL HISTORY,

IN TROPICAL CLIMATES.

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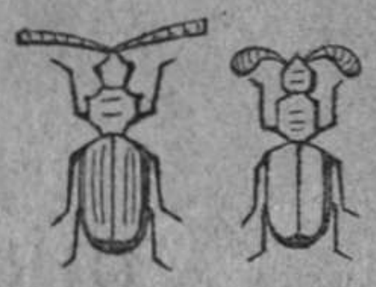
INSECTS.—Insects may be found almost everywhere: look especially for all beetles under stones, under bark of decayed trees, in the inside of ditto, on felled ditto, on trunks of ditto (especially those that have the sap running from them), by beating the boughs into a net or sheet, smoking under and burning inside hollow trees, on long grass and herbage, on flowers, under rubbish (especially on the slopes of mountains, in marshy places), under sea-weed at the sea-side, and indeed they are to be found almost everywhere in warm climates, especially in and near woods and on the slopes of hills, and are generally most abundant in a light sandy soil and in the rainy seasons: they may be collected either by picking with the hands or by sweeping and brushing with a net, according to the situation collecting in: the larger ones may either be put separately into pill or other boxes, or else immersed at once into a bottle of clear spirit, when they almost immediately die; and may either remain in the spirit, and be sent in this way to England (if possible changing the spirit just before sending)) or else the same or following day taken out and soaked for about a quarter of an hour in warm water, and then laid on blotting paper a few hours to dry: after that, either pin and stick in tight in a well-made box, lined with cork or some soft wood, or else—if in a dry country—lay carefully in rows, in a box, on cotton wool: numbers may be packed this way in layers, and generally reach England in beautiful condition. The small beetles may also be collected and sent in the same way, and, if immersed in spirit, put in a separate bottle from the large ones; or else when captured put into a phial with some blotting-paper, and killed when you reach home, by immersing it in hot or boiling water for a minute or two, or placing it in the heat of the sun for a short time: they can then either be pinned or else packed in cotton in rows and layers, as the others, and should not be despised on account of their small size, as they are frequently more valuable than the larger ones. Look especially in

and near ants' nests, and under bark of trees where ants occur, or under stones, for a small beetle about this size and appearance:  they are generally black and brown, and sometimes striped.

Butterflies and Moths (Lepidoptera) must be collected with great care, so that the beautiful scales on the wings are not rubbed off or injured, as they then become generally worthless: they may be bred from caterpillars found on various trees and plants (which is an excellent plan, as they are then very perfect), or else caught by the aid of a gauze net: a ring net, about a foot and a half in diameter and two feet deep, will do very well, attached to a stick three or four feet long. Woods and wild places are generally the best to find them in: it is necessary to pin them as you take them, which must be done with great care, so that the upper parts of the wings are not rubbed; therefore the collector must be provided with a good large box to stick them in. Some of the large and big-bodied moths will probably not die unless a little oxalic or nitric acid is applied to them, which may be done by dipping a long pin or needle into it and running it down the body of the insect, commencing under the mouth, two or three times: they can then either be pinned tight in boxes or else laid between dry cotton, the same as the beetles. Other sorts of insects may be caught and killed the same way, and sent over as before directed, between layers of cotton. No other insects but beetles should be put into spirits; and not these when the colours are beautiful, delicate, and of a chalky texture: the bottles before sending should be *full* of insects, or else filled up with cotton, so that they cannot shake about.

Great care must be taken with all insects that they do not get broken, especially the horns (antennæ) and legs of beetles, and the antennæ and wings of the butterflies and moths, for then their value is greatly diminished.

Beetles, butterflies and moths are the most saleable insects; still any remarkable forms and colours in the other orders should not be passed over. Beetles should always be pinned through the right elytrum, so that the pin may come out between the first and second pair of legs; but all other insects may be pierced vertically through the thorax.

Arachnida.—Spiders, Scorpions and Acari are best preserved in spirits, as well as the Myriapoda, including the Juli, Scolopendræ, and other individuals of the order; but they may be pierced through the thorax (the intestines being carefully removed and replaced by cotton), and pinned tight in boxes, as the insects.

Crustacea.—The marine species may be killed by being immersed in cold fresh water, and they should be left in it for several hours, to free them from the adhering salt, which, if not well washed out, renders them liable to attract moisture from the atmosphere and injures the specimens. When well washed, separate the upper shells, and remove as much of the fleshy parts as possible; then carefully dry and pack them. The smaller species may be pierced with pins, like insects, if the consequent bulk of the packages be not an objection. Entire Crustacea may be preserved in strong spirits or brine.

Sponges and Corallines.—Search the line of sea-weed at high-water mark, and the more the latter are covered with small corals and other parasites the better. Never wash them in fresh water, but dry them as they are found. Never wash or squeeze sponges; the fuller they are of gelatinous or fleshy matter the better. Use unwashed small Fuci as packing, dried, but not to crispness: the boxes should be divided into two or three compartments. Corals should never be washed or bleached, but sent as they come from the sea.

Star-fish and Echini.—These may be either dried or bottled in the saline fluid. If large, plunge them for two or three minutes into boiling water before drying: if small, one minute will be enough. Annelides, Actinia, and other fleshy things, may be bottled with a saturated solution of bay salt, with two grains corrosive sublimate to each quart. Always keep up the strength of the saline solutions by the addition of salt as needed.

Land and Fresh-water Shells.—Land shells are found in many places, such as under stones, in clefts of rocks, on the sides of hills and mountains, under decayed wood and trees, on the trunks, roots and leaves of trees and bushes, in decayed vegetable matter, dried leaves and moss, on small plants; in fact, almost every situation produces them except open and cultivated places: where dead specimens are found, living ones cannot be far off. When collected, bring them home and put them in a pail, or some other large vessel, and pour a quantity of cold water over them; then cover up the vessel for two or three hours, which will cause the animals to come out a little (it is necessary to cover them up, or else they will crawl away): when they are a little out, draw off the water, and pour a quantity of boiling water on them, so as to cover them well: let them remain a few minutes to cool a little; then take out the animals with a large pin or needle, as you would a periwinkle: when they are all done, take a soft brush and wash off gently all the dirt and filth from them, and place them in another vessel of fresh water until all are clean; then shake out well the water that is in them, and place them out to dry, with their mouths downwards, but not in the sun: when dry, if they are small, pack them away in small boxes, writing on the cover the locality and situation in which found. Should the shells be rather large, then wrap each shell in a paper by itself, and pack them away in a larger box, with their localities, &c., with care; but never put by a box that is not quite full without adding sufficient cotton or other soft substance to fill it, for such tender subjects should not have play during their transit. In rivers, lakes, ponds and small streams, will be found many species of shells which—although not handsome—are very interesting, and many of them will prove valuable in England; none, therefore, should be left behind, as it may be a cause of regret hereafter. Some of the shells which will be found in the above-mentioned places are of the same form as the land shells; others are like our fresh-water mussel or cockle: they are mostly found in the mud, sometimes in deep water: dead ones are sure to be found on the banks of lakes and rivers; and if you cannot procure living ones, show the natives the dead specimens, and offer them money to get a quantity of living ones. The rivers and pieces of water abound with shells: be diligent in seeking them, and your labours will be

most amply repaid. Having collected the fresh-water shells, place them in a vessel, and pour a large quantity of boiling water on them: they do not require to be first put into cold water, as the land shells do: as soon as the water is a little cool, pour it off, take out the animals as before mentioned, wash the shells, &c., &c.; but as the bivalve or fresh-water mussel will open wide as soon as the animal is out, it must be tied close before being put out to dry, if not the hinge will break and make the shell valueless. Some of the fresh-water shells that are like the snails have a mouth-piece, or operculum, which must be taken care of: the mouth-pieces should be kept in separate packages, and packed with the species of shell to which they belong, as they are of great service in determining the species. Some of the land shells have also a mouth-piece, which should be packed in the same manner. When the bivalve shells are tied up and dry, wrap each of them in a piece of soft paper, pack them in small boxes, and remember localities, habitats, &c., &c.

Marine Shells.—The best time to collect shells on the sea-shore is at the new and full moon, for then the tides make greatest ebb: the collector should be on the spot two hours before low water, with an assistant to help in turning over the large stones, should there be any, under which will be found many species of Couries, Buccinums, Tritons, Mitres, Cones, and several species of bivalve shells, also many kinds adhering to the stones, which must be taken off with a knife in a careful manner: several species bore into the stone itself, which must be broken with hammers to get out the shells, or, if the stone be soft, cut it carefully with a hatchet, on doing which many more species will be found: care must be taken to avoid breaking the shells: be always provided with a light basket and a small box in it, in which put the smaller and more delicate specimens. The stones when turned over must be well inspected, as many will be found covered with marine matter, which makes them appear like the stone itself: collect all, and do not despise them on account of their unmeaning appearance, for amongst them may be new genera and other very rare shells. Many stones at the very lowest ebb will have most shells on them, therefore the collector must not mind getting a little wet. Amongst other sorts will be found Chitons, which must be taken off in the same manner as the limpet and other adhering univalves: care must be taken, when at home, to separate them from the other shells; put them into a pail of fresh water, and let them remain there from twelve to twenty-four hours, by which time the salt on the fleshy substance that surrounds them will be well soaked out; then cut out the animal, and wash the shells well, inside and out, from all filth, and throw them into another vessel of fresh water, where let them remain till the whole are cleaned; then place them on a narrow slip of board and bind them down tightly, put them in a shady place to dry, and in three or four days they will be fit to pack.

Amongst the rocks on the sea-shore, in the crevices and on them, will be found many species of Patellas, Chitons, Murices, &c. Make a careful survey of every rock and stone; they will amply repay the trouble. All sheltered coves or little bays are the best places in which to find shells: examine these places in preference to others, particularly those in more exposed situations. The first thing to observe when in a new locality is to go along the sands at high-water mark, for many good shells are thrown up by the sea, particularly light bivalves; any time of the tide will

do. Never miss going after a gale of wind, for then many valuable deep-water shells will be found which are not seen at other times. In sheltered bays and places just at the very lowest water-mark, will be found, in the sand and mud, various species of bivalve shells, just beneath the surface, and generally in great abundance: do not neglect to collect all and every species, and in plenty.

In collecting shells, whether terrestrial or aquatic, the collector must always give the preference to live shells,—that is, such as are still inhabited by the living animal,—but if they cannot be obtained, dead shells are better than none, though, for the most part, they are worn and faded. The more delicate species must be packed in cotton or other soft substance, or, in default of such, a fine sawdust. Shells containing their animals, as well as the naked Mollusca, must be preserved in spirits or brine.

Dredging.—It is necessary to have a rope for the dredge from $2\frac{1}{2}$ to 3 inches (60 fathoms long); a fine sieve, a bucket and a ladle; a boat with a small anchor and cable (not less than 30 fathoms), to moor her in the situation where you are going to dredge; a good stout canoe, to convey the dredge away from the boat as far as the rope will allow. The dredge to lie in the bow of the canoe, mouth upwards, handle inwards: when it is conveyed as far as the rope will allow, those in the canoe are to heave,—that is, turn the dredge over gently into the water, and let it be from five to six minutes, until it is fairly at the bottom; then haul it on board the boat: should any obstruction—such as a rock, &c.—prevent its being brought home, place the canoe under the rope and pull her along until the place of obstruction is arrived at; then bring up the dredge, either straight or by taking it a little way back, and let those in the boat haul dredge and canoe towards them until clear of the obstacle: the dredge is to be let down again, and hauled in as before. When the dredge is brought alongside the boat, lift it in, and take out all the mud and sand; half fill the sieve with this, and pour a bucket of water gently on it, the party holding the sieve to shake it gently until all the mud and fine sand has passed through: take out all the larger shells as soon as possible, to prevent their breaking the more delicate ones, and put them into your basket, and the smaller ones into boxes. Should there be many small shells in the sieve, which would take much time picking out, it would be best to throw the sand from the sieve into a basket, and take it home, where it can be inspected more minutely, after having dried it in the sun on paper. The nearer the collector gets to a reef of rocks in sheltered places, the better for shells, as they will lie there for protection; but be careful to throw the dredge clear of the rocks, as it will save a deal of trouble.

The dredge can be made 3 feet 6 inches long and 1 foot wide: the outer edge to be turned outwards about the angle of 30°, and beaten down rather fine: the lower part of the bar should not be less than half an inch thick, with holes punched in it from one end to the other, an inch and a half apart, to lash the bag to: the bag can be fashioned according to the dredge, and made of double bread-bags.

Mammalia.—The smaller animals of this class may either be skinned or inclosed entire (an incision being previously made in the under-side of the animal) in jars or

barrels, which are to be filled up with some spirituous liquor, as gin, or, what is preferable when it can be procured, proof spirit diluted with half its bulk of water. If no spirit can be had, strong brine must be adopted. In respect to their retaining their natural colour, brine is even preferable to spirituous liquors for preserving the specimens. To skin the larger Mammalia, make an incision in a straight line along the belly, from the vent to the throat, and detach the skin carefully with the knife. The skull and the bones of the legs and feet are to be left; the brain, eyes and tongue must be extracted, and as little fat as possible be suffered to remain adhering to the inside of the skin, which is then to be dressed with arsenical soap, for the mode of making and applying which see note at end. If, however, some fat remain which cannot well be got rid of, strew it over with powdered tan, or the bark of oak, willow, &c., previously to applying the soap. The ears, lips and feet of large Mammalia should, when practicable, be well anointed with spirits of turpentine, which will assist their drying and tend to destroy insects: when dry, roll up the skin with the hair innermost, beginning with the head, and put a layer of dried grass or moss between the folds, to prevent its being injured by rubbing. The skin must be occasionally unrolled and examined, and, if practicable, exposed to a hot sun, and fresh spirits of turpentine added. If any symptoms of insects should appear, tobacco (the stronger the better) strewed in the package will be serviceable; and in countries where spices and aromatic drugs can be procured at a reasonable rate, these may be used to great advantage, and even supersede the necessity of applying the arsenical soap. When a very large animal has been killed, under circumstances which prevent the application of the arsenical soap, the skin should be stretched out on the branches of a tree, to give the air free access to every part of it, and, as soon as it is cold, well dressed on the inside with wood ashes. Entire skeletons (especially of the rarer animals) should be procured when possible. It is not necessary that they should be jointed or set up, but, having removed all the soft parts, boil the bones, and when well dried pack them with moss or grass, or the best packing-stuff at hand, so that they may travel securely. Take especial care that not a bone, tooth, or claw, be lost.

Birds.—With respect to birds, the collector should proportion his shot to their size, so as to injure the skin and feathers as little as possible. As soon as the bird falls, the blood should be carefully wiped up, and cotton placed within the beak to absorb any that might flow from the mouth, and thus prevent its staining the plumage. Birds should be skinned as soon as may be after they are killed, for, if suffered to remain till putrefaction has begun, the feathers fall off. The mode of skinning birds is very similar to that of skinning Mammalia, and equal care must be taken both to make the incisions as small as possible and in the least visible parts, and the feathers must be separated so as not to be injured by the knife in dividing the skin; the incision may be made from the vent to the breast: the head and legs must in all cases be carefully preserved, and the os coccygis left in the skin, otherwise the tail-feathers will be liable to drop out. In packing the skins, care must be taken that the plumage be not injured by contact with the harder parts, which for that purpose should be surrounded with cotton, tow, or the best soft packing material at hand, as dried leaves or grass. When more than one individual of the same species can be procured, it is desirable that a second specimen should be preserved in spirits, and the same remark

applies to the smaller Mammalia, and indeed to all the orders. The bird-skins must be dressed with the same materials as those of the Mammalia, but the arsenical soap —if used at all—must not be too liberally applied. As the plumage of birds varies extremely at different periods of their life, and even at different seasons of the year, it is of great importance to obtain both sexes, if possible, of all ages, from the chick just hatched to the adult in its maturest plumage, and also in their summer and winter liveries. Birds' eggs should also be anxiously sought for, and the species carefully identified: the best method of emptying them is to make a single hole near the middle of the shell, of about a quarter of an inch in diameter, into which a small tube is to be inserted, so as nearly to touch the opposite side of the shell, which, being held with the hole downwards, is easily emptied of its contents, by blowing pretty strongly through the tube: if no more convenient instrument be at hand, a straw will make a very serviceable blowpipe. Birds' nests should not be neglected; they possess a high degree of interest: the collector should therefore take accurate descriptions of the materials, form and size, of every kind of nest he finds, always being extremely cautious to ascertain the species to which each respectively belongs: he should also make careful drawings of every variety, and even collect such of the smaller nests as possess any peculiarity in point of material, structure, or mode of suspension.

Reptiles and Fish.—These are best preserved in spirits, each specimen being previously wrapped in a linen cloth; but when too large to be so treated, serpents and fish may be carefully skinned, with the least possible injury to the scales or any of the external organs, and with especial caution not to destroy the form of the skin, which may be preserved by stuffing it lightly with cotton or tow, or by filling it with sawdust, and the skins dried, with the head, feet and fins on. Instead of being skinned whole, fish may be divided into two nearly equal portions, by an incision passing longitudinally through the vertex of the head, the back and belly, but on one side of the dorsal, caudal, anal and ventral fins, so as to leave one half of the animal with the gills and all the organs of motion perfect. Their flesh may then be easily removed from this portion, and replaced by tow, which will preserve the form of the body. When well dried, this portion is to be carefully packed. On the whole, this method is preferable to all others; and fish thus preserved, when provided with proper artificial eyes and mounted on flat boards, afford excellent specimens. The upper and lower shells of the tortoise tribe should be separated by dividing the ligamentous or bony portion which unites them on each side, between the fore and hind legs; after which the fleshy parts may easily be removed,—the head, legs and integuments of the body being carefully preserved. As to the lizards and crocodiles, they may be skinned in the usual manner, care being taken not to injure the tails of the former, which are very brittle, or, when not too large, they may be preserved in spirits, which is still better.

The form and colour of the eyes in all the Vertebrata, of whatever class, should be carefully observed and noted down the moment they are taken.

General Remarks.—Every specimen, dry or in spirit, should have a number attached to it, corresponding to one in the collector's note-book, in which he must enter his memoranda concerning it; as for instance,—

The country where found,
The season when,
Habits,
Habitat,
Local name.

The collector should be furnished with knives, scissors, scalpels, pliers, nets, a large assortment of pins of various sizes, needles, a hammer, small hatchet, packing-cases (large and small, including cork boxes for Lepidoptera and other insects, and a great number of pill-boxes in nests), cotton and paper, and also with a folding-net, hoop-net, water-net, forceps, digger, glass phials, &c., for collecting insects: he must also have a good supply of prussic acid and arsenical soap. The composition and mode of making the latter is as follows:—

Camphor.....	5 oz.
Arsenic, in powder.....	2 lbs.
White soap.....	2 lbs.
Salts of tartar, or, Subcarbonate of potash	12 oz.
Lime, in powder.....	4 oz.

Melt the soap completely with heat in a small quantity of water, and add the potash and lime; then remove it from the fire and stir in the arsenic; next add the camphor, previously rubbed to powder with a little spirit of wine, and mix the whole thoroughly: it should now have the consistence of paste. Preserve it in carefully-closed, glazed vessels, labelled "Poison."

To use it, mix the quantity required with cold water, to the consistence of tolerably clear soup, and apply it with a brush to the inside of the skins.

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