Directions for collecting Zoological Specimens.

Mammalia. The smaller animals of this class may either be skinned, or enclosed 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 dilated 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, & detatch the skin carefully with the knife. (Make all incisions where they will be least visible,

when the skin is set up, as the insides of the legs & thighs; but practice will be the best instructor in this purely mechanical business.) The skull & 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 skin, which is then to be dressed with the arsenical soap, for the mode of making & applying which see below. If, however, some fat remain, which cannot well be got rid of, strew it over with powder'd tan, (or the bark of oak willow &c.) previously to applying the soap. Mr Wiltshire has given the following as the method of dressing skins used in Morocco: Wash the skin in fresh water; scrape off the flesh; and dress the inside with some of the following mixture; alum, two pounds; butter milk, one quart; meal, two or three handsful; fold it up carefully, & press it together. After two days, wash the skin, drain off the water, dress it well on the inside with

o. t. 1.

powdered alum, and fold it up as before. After three days unfold & dry it in the sun, without removing the alum; when dry, sprinkle it with fresh water, again fold it for two hours, and scrape the inside clean, and rub it with sandstone until it become soft and pliable; then hang it up in the shade to dry.

The ears, lips, and feet of the larg 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, & 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 of insects appear.

Tobacco, the stronger the better, strewed in the package, will be serviceable, and in countries

&c.

where spices and aramatic drugs can be procured at a reasonable rate, these may be used to great advantage, and even to 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 brackes 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 if 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.

8.14.

Birds. In respect to birds the collector should proportion his shot to their size so as to injure the skin & 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 & 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 similar to that of skinning the mammalia, and equal care must be taken both to make the incisions as small as possible & in the least visible parts & the feathers should 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 & legs must in all cases be carefully preserved, & the os coccygis left in the skin, otherwise the tail feathers

will be liable to droop 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 remarks applies to the smaller mammalia, and indeed to all the orders. The birds skins should be dressed with 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, & 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 matured plumage; and also in their summer & winter liveries. Birds eggs should also be anxiously sought for & the species carefully identified. The best method of emptying them is, by making a small 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 hole downwards is easily emitted 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 blow pipe. Birds nests are rather nuisances than otherwise, in collections, from their occasioning dirt & litter, and being frequently infested with insects; nevertheless as part and parcel of ornithology, they possess a high degree of interest, & must by no means be neglected. The collector should therefore take accurate descriptions of the materials, form, & size of every 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 & Fish. 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 should be carefully skinned, with the least possible injury to the scales, or any of the external organs, & with especial caution not to destroy the form of the skin, which may be preserved by stuffing it lightly with cotton, or tow, or filling it with saw dust, and the skins dried with the head, feet, & 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 & 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, & 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 deserves the preference above 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 seperated by dividing the ~~bony~~ ligamentous or bony portion which unites them on each side, between the fore and hind legs, after which the fleshy parts may be easily 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, 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 & noted down the moment they are taken. This precaution should never be neglected.

In collecting shells, whether terrestrial or aquatic, the [illegible] naturalist 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 & faded. The more delicate species must be packed in cotton or other soft substance, or in default of such in fine sawdust. Shells containing their animals as well as all the naked mollusca must be preserved in spirits or brine.

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 injure the specimens;—when well washed seperate the upper shells and remove as much of the fleshy parts as possible, and 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 spirits or brine.

Humanity requires that all the animals that we collect

should be deprived of life in the most expeditious and least painful manner, that can be devised, and no agent appears so effectual as pure hydrocyanic (prussic) acid. A small quantity of that fluid is to be placed in a well corked phial, or other close vessel with a piece of blotting paper to prevent its flowing over the specimens. The vapour of the acid, (which the collector must be careful to avoid inhaling) thus fills the vessel, and is so fatal to animal life that almost instant death ensues on placing a subject within its destructive influence. Though chiefly employed for killing insects, prussic acid, used as above directed, is equally applicable to every animal not too large to be exposed to its vapour in well closed cases.

Arachnida Spiders, scorpions and acari are best preserved in spirits as well as the myriapoda, including the juli, the scolopendrae, and other individuals of the order but no good method, sufficiently easy and simple to be practised by the travelling collector, has been hitherto discovered for the effectually securing the colour of

many of the animals of this class especially the spiders

insects. The Thysanuræ, and parasitic insects, the former including the Lepismæ, Petrobii, and Poduræ, the latter the pediculi and mirmidæ, are very minute, and may be collected in quills, and killed by exposure to heat, or the vapour of prussic acid. The parasitic insect infest mammalia, birds, reptiles, fish and even insects. Birds especially are subject to these pests, and in some instances certain parasites are peculiar ~~to a particular~~ to a particular species. The collector must therefore carefully inspect the plumage of all the birds he kills, and accurately note down from what species each individual is respectively taken. The examination must be made whilst the bird is still warm, as the parasites leave the body soon after it becomes cold. Lyonnet laid a sheet of paper on the body of the dead bird, and placed on it a well warmed and folded handkerchief; the heat induced the insects to leave the bird and assemble on the paper, & thus they were easily collected.

201

Coleoptera — Beetles may be at once put into spirits. The late unfortunate Drummond packed Coleoptera, both large and small, in pill boxes, with powdered camphor placing a disc of tissue paper between each layer of insects. In this way not a specimen was injured, and the insects retained sufficient moisture not to need being relaxed before they were pieced. Besides prussic acid and spirits, coleoptera may be killed by immersion in nearly boiling water. The collector must omit no opportunity of obtaining the larvae & pupae as well as the perfect insects and carefully note the species. They may be preserved in spirits or in the following manner invented by M. Laurent. Kill the larvae with prussic acid vapour, then pass a pin into the anus and expel the intestines and their contents by pressing the body between the thumb & forefinger beginning at the head. When well emptied, insert a straw or other small tube proportioned to the size of the larvae into the anus, & fix it in its place by means of a

small pin, passed through the last segment of the skin of the larva and the tube; next expose the skin to a gentle heat over a chafing dish of coals covered with an iron plate, till it has contracted round the tube, which will take about half a minute; then, by blowing through the tube, the skin will swell out & resume its original form, in which state it must be carefully dried over the hot plate, turning the tube round & round, and continuing to blow that the skin may not collapse, and the larva retain its perfect form. If the pin & tube adhere to the skin, cut each off as close to it as possible, without attempting to withdraw them.

Orthoptera. — Including the earwigs, ~~the~~ cockroaches, mantes, locusts and some of the Omoptera, as the lantern fly, (fulgora) and cicada, may all be preserved in spirits, but better dry; In which case they must be pierced through the thorax, the intestines being carefully removed and replaced by cotton.

Of the remaining orders the neuroptera hymenoptera, lepidoptera and diptera, are best preserved by being vertically pierced through the thorax

Coleoptera are always to be pierced through the right elytrum so that the pin may come out beneath, between the first and second pair of legs / with a pin and stuck securely in boxes lined with cork, or some substance sufficiently soft, and elastic, to allow the pin to enter it easily, and hold it securely. To save space, several insects may, but with great caution be placed on one pin; and those lepidoptera whose wings when at rest are caried vertically on the back, may be pierced through the thorax laterally, by which a greater number may be fixed on one pin. The box should be filled with the prussic acid vapour as directed above

The species of these orders, except the lepidoptera may also be kept in pill boxes but preserving them is preferable.

The hemiptera should be pierced through the thorax and the sooner they are caught the better, as they become very brittle on drying.

Asterias (Starfish) including the ophiurae and comatulae as well as the whole tribes of worms amphitrites, nereides, leaches, taeniae gordii together with all the lower animals not provided with shells or other solid covering may be preserved in spirits; or if convenient the

asterias having been first well soaked in fresh water for several hours, may be extended on boards, with their arms retained in the proper position by pins till quite dry, & then very carefully packed in tissue paper & cotton.

The echini (sea eggs) are very difficult to preserve dry with their spines on, especially the Indian species which have very large and very heavy spines. Having killed the animal, expand the anus, and clear out the contents of the body, as completly as possible with a small spoon or ear pick, then soak it for ten minutes in fresh water, taking care that the spines do not fall off. Next fill the shell with cotton and lay it on a board, and introduce between each spine a little ball of cotton, or silver paper, so as to retain them all in their proper position, and let them dry undisturbed. Then pack each specimen carefully in a seperate box, leaving the cotton or paper between the spines. If want of time & stowage room forbid this method, preserve the specimens intire in spirits. At all events, take care that none of the spines be lost, or those of one individual mixt with those of another

Corals, Corallines, and sponges, require merely careful packing, after being sufficiently soaked in fresh water and dried.

Intestinal worms must be carefully sought for in the viscera of every animal which the collector kills, and when found preserved in spirits

General, Remarks. Every specimen, dry or in spirit, should have a number attached to it, corresponding to one in the collectors 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 must be furnished with knives, scissars, skal pels, 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 a great number of pill boxes in nests — cotton and paper — and also with a folding-net, hoop net, water net forceps, digger.

103

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
Pulverized arsenic — — —	2 lbs.
White soap — — —	2 lbs
Subscarbonic of potash	12 oz
Powdered quick lime	4 oz

Melt the soap completely with heat in a small quantity of water, and add the potash & lime; then remove it from the fire, & stir in the arsenic; next add the camphor, previously rubbed to powder with a little spirit of wine, & 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.

In addition to the above a small microscope for the examination of infusory animalcules is desirable, and a