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DIRECTIONS,
FOR
PRESERVING ANIMALS,
AND
PARTS OF ANIMALS,
FOR
ANATOMICAL INVESTIGATION;
AND CONCERNING
EXTRANEOUS FOSSILS.

*H. Bowdell
F.R.S.*

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1809.

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Hunter

ROYAL COLLEGE
OF
SURGEONS in LONDON.

THE COURT of ASSISTANTS, intending not only to support, in a proper Manner, the unparalleled HUNTERIAN-COLLECTION, but also, by correspondent Additions, to make it as conducive as possible to the Illustration of the Structure and Economy of Animals, the Advancement of the Knowledge of Diseases, the Improvement of Surgery, and, by these Means, to the National Benefit and Honour, solicit of Anatomists, Surgeons, and

and Naturalists in general, DONATIONS, directed "*To the Board of Curators,*" of such Preparations, Casts, Models, Paintings, Drawings, Engravings, Manuscripts, printed Books, and chirurgical Instruments, as may promote those Objects.

The following DIRECTIONS, framed by the late Mr. JOHN HUNTER, are intended to facilitate, and render effectual, the Endeavours of such Friends to scientific Inquiries as shall be inclined to further the Designs of the Court, but are not well acquainted with the Arts of preparing, and preserving, animal Substances, for anatomical Investigation.

Persons disposed to forward the public Undertakings of the College, by BEQUESTS of any Kind, are desired to adopt this preliminary

liminary Form :— “ *I give and bequeath to the Master, Governors, and Court of Afsistants, for the Time being, of the Royal College of Surgeons in London, in Trust for the Use of the said College.*”

By ORDER of the COURT.

OKEY BELFOUR, Secretary.

Lincoln's-inn-fields.

DIREC-

DIRECTIONS, &c.

AT the Time of taking an Animal, it would be proper to collect, on the Spot, as many Circumstances of its History as possible, relative to Food, Propagation, Locomotion, &c.

Of the METHODS of CATCHING ANIMALS; and of the primary OBJECTS of ATTENTION in them.

All Animals are naturally wild; and, in many Instances, it needs considerable Art to catch them. The more perfect Animals,
which

which have much progressive Motion, require being caught by Violence, which generally produces some Degree of Injury to the different Parts of the Creature, and too often to its external Form; this Injury will necessarily be in proportion to the Difficulty.

Quadrupeds in general are either caught in Traps, or shot, whence some Parts of the Body are inevitably hurt or wounded. Birds are also commonly shot, to the Injury of their Plumage.

Snakes, Lizards, and Reptiles in general, are caught without being previously wounded, and therefore, with due Care, suffer little in their external Form: yet even these may suffer considerably without that Care, for, as they are commonly caught in the Breeding Season, it is possible that the Organs of Generation,
and

and the Parts contained in them, as Eggs, &c. may be destructively compressed ; it is therefore proper to seize them by the Neck, and immediately to immerse them in Spirit, so as to drown them, or to keep them in a Bag till Spirit can be procured.

Turtles, Alligators, common Fish, Lobsters, and Land-Insects, suffer very little from the Manner of their being caught.

The softer Animals, most of which inhabit the Sea, sustain little Injury from the Mode of catching them ; but as their Shape and Size admit of considerable Variation, their Form may suffer much from the Manner in which they die. Animals without Bone to determine their Shape, or Locomotion, yet having a considerable Extent of muscular Contraction, vary their Figure according to Circumstances,

stances; of this Kind are the Sea-Anemonies, Priapi, Shellfish, Snails, &c., which should be allowed to die gradually, in the Water to which they are accustomed; whence they will die in a relaxed State, and display more of their external Form: but it is desirable to have Specimens in the different Degrees of Expansion and Contraction. When dead they are immediately to be put into Spirit, for fear of Putrefaction, which soon happens.

Such Animals, of whatever Tribe, as are small enough to be preserved whole, should be kept in that State, as those which do not exceed the Size of a small Dog. Such as are so large that they cannot possibly be brought Home entire in Spirit, should be divided into those Parts which characterize them; but only some of the larger Fish, and Quadrupeds, require this

B Treatment.

Treatment. When required, it will in the first Place be necessary, to notice the external Appearances; the Number of Nipples in the Female, and their Situation; whether between the anterior Extremities, as in the human Subject, Monkey-Tribe, Elephant, &c.; or all along the Belly, as in the Sow, Bitch, Rat, &c.; or between the hind Legs, as in the Mare, Cow, &c. If the Female cannot be procured, as probably may be the Case, Inquiry should be made concerning the Nipples of the Male; for it sometimes happens, that the Male, as the Horse for Instance, has no such Parts. It is hardly necessary to describe the external Parts of the Female, as generally the Whole of them may be preserved.

The Situation, and external Appearances, of the male Organ, in its natural State, must be remarked; whether it be along the Belly, as in the
Dog;

Dog ; pointing backwards, as in the Cat, Rat, Rabbit, &c. ; whether covered by the common Skin, as in the Bull, Deer, Bear, &c. ; or by a proper Skin, and only attached to the Belly at one Side, as in the Dog, Horfe, &c. Any other external Part, which cannot be preserved, or which is too large to be kept whole, should be particularly noticed.

When the Examination has proceeded thus far, the Separation is to be begun, by opening the Belly, &c., to see what internal Parts are worthy of Preservation.

When the Animal is opened, for the Purpose of Separation, it will be proper to take a general View of the Parts in their natural Situation ; to examine the Number of Lobes of the Liver, whether there be a Gall-Bladder, &c. ; what be the Kind of Kidneys, whether con-
globate,

globose, conglomerate, or compounded, their Situation, &c.; also to make such other Observations upon the different Organs as may be thought necessary; and afterwards they may be divided, and severally distinguished. Animals, whose Food is not exactly known, should have the Contents of the Stomach examined, to learn, if possible, what Aliment they had taken last; and also of the Colon and Rectum, to determine the Kind of Feces they contain.

Of the TREATMENT, and PRESERVATION, of QUADRUPEDS.

THE Head of a Quadruped should be saved, on Account particularly of the Teeth; if too large, that Part in which the Teeth are placed may be cut off; but this will seldom be necessary.

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The Feet and Tail may be kept attached to the Skin, and dried ; or if the Skin be not preserved, the Feet and Tail only may be either dried or put into Spirit.

The Stomach should be preserved in Spirit, with a Part of the Duodenum ; and the Cæcum, with a small Portion of the Ilium and Colon. But if the Animal be not too large, it will be preferable to cut off, from the Mesentery, the Jejunum and Ilium, (which may be thrown away), and then to strip down, from the Spine, the Contents of the Abdomen, beginning at the Diaphragm, so that the Liver, Stomach, Spleen, Pancreas, Colon, &c., with their Attachments, may be taken out together, as low as the Rectum where it lies in the Pelvis, and then put into Spirit.

The Heart, and Lungs, may be preserved

served together, or, if too bulky connected, the Heart alone.

The Contents of the Pelvis, namely, the Bladder and Rectum, with the internal Parts of Generation, both male and female; also the external Parts, not separated from the internal, with a large Portion of the surrounding Skin, are to be preserved together in Spirit.

Should the female Parts be in a State of Impregnation, they are to be taken out, as before described, without opening the Uterus.

Abortions should be preserved whole : also large Animals, as of the Whale-Tribe, when young and of little Growth ; but when of too advanced a Size, the Tail may be cut off below the Anus, and the Body put into Spirit. If a Whale, although young and comparatively
small,

small, be too big for one Cask, the Head may be taken off, and preserved in another.

Of a large full grown Whale, the following Parts are to be preserved:

The Eyes, dug out, with the Skin of the Eye-brows :

The Beginning of the Aorta, and pulmonary Artery, for the Valves :

The Nipples of the Female, which are placed near the Anus, with Part of the surrounding Skin ; also the Ovaria, and Uterus :

The Fetus, when found in the Belly, taken out with the whole of the Uterus, Vagina, Ovaria, &c. :

The Organ of the Male, taken off with Part of the Anus.

The Bones of Animals are to be preserved ; and the Animal whose Bones are kept, should, if possible, be full grown. The Flesh being
stripped

stripped off, the Bones should be boiled, or put into a Cask with Water, which should be headed in and bunged up.

All the Parts of one Animal should be kept together, and asunder from those of other Creatures.

Of B I R D S.

BEFORE proceeding to divide Birds, too large to be preserved whole, their external Appearances should be accurately observed.

Birds have few internal Parts of Importance for Examination. The Hearts, and Kidneys, of all Birds, it is supposed, are similar.

The

The Liver, Stomach, and Intestines, may all be taken out, as low as the Anus, and preserved.

The Bills of Birds should be kept in Spirit, by themselves; and when many Specimens of rare Birds are met with, the Heads of a few of them should be taken off, for the Sake of the horny Part of the Bill.

The Legs, and Feet, should be preserved; but they may be dried.

Of F I S H.

IN Fish, Regard should be had to the external Appearances; the Number of Fins, their Shape, and where placed; &c. Their Length

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and

and Thickness ; and the relative Distances, and Proportions, of as many Parts as possible ; should be determined.

Attention should also be paid to the following Instructions, relative to the Methods of treating Fish for Preservation, and Inquiry.

In very large Fish, of the Ray Kind, or the Shark, &c., first open the Belly ; then take off the Head, with the upper Part of the Fish, below the Heart, across the superior Portion of the Liver ; by which Means, the Mouths of the Oviducts, if it be a Female, the Heart, and the Head, will all be preserved together.

The Tail is then to be taken off, if a thick One, as that of a Shark, a little below the Anus, and the Trunk alone is to be preserved ; but if that be too large, the Body should be
cut

cut through, above the Pelvis, and the Parts put into Spirit.

If a Female, separate the two Uteri, through their whole Length, where they pass along the Abdomen, on each Side of the Spine; but keep them attached to the Pelvis before, and preserve the Whole.

If with Young, or Eggs, take the Whole out in the same Way, without opening the Uterus.

The Peculiarities of the Fetus in these Animals should be noted.

If not of the Shark Tribe, take out such Parts from the Abdomen as are uncommon.

If of the Ray Kind, cut the Fish through transversely, at the lower Part, above the
Anus.

Anus. Thus a Portion, with the principal Parts concerned in Generation, will be saved.

The Tail may be cut off, some Inches below the Anus.

The Stomach, and Intestines, may be saved, if any Thing particular be observable in them.

The Eyes of many Fish are proper Objects for Preservation.

Separate the Head of such Fish as have any Thing singular about the Teeth, or Gills, and are too large to be preserved entire.

If there be small Ones of an interesting Kind,
keep

keep them whole ; but still preserve such Parts of the large Ones as are curious.

Young Turtles are to be saved.

When Alligators, or Crocodiles, are too large to be preserved entire, some Parts, as the Head, the Whole of the Viscera, stripped down from the Neck to the Anus, and also the Anus, should be put into Spirit.

Lizards may be preserved whole.

Snakes are to be preserved entire, or in Part, according to their Size.

Of INSECTS.

MOST Insects, as Lobsters, Crabs, Beetles, Flies, Butterflies, &c., may be dried ; because
their

their external Covering is their hardest Part, and not capable of shrinking. This is to be done when the external Form and Parts are the only Objects of Scrutiny ; or when so very small as to admit of no other Examination.

When internal Parts are to be examined, which will shrink in drying, another Method of Preservation is to be followed.

In preparing them by drying, great Care is to be taken to preserve all their external Parts as perfect, and as expressive of progressive Action, as possible.

Lobsters, Crabs, and Crawfish, when dried, should be wrapt up in very soft Paper, and then packed in Cotton, so as not to allow them any Motion in the Case, nor to touch One-another.

Beetles,

Beetles, Butterflies, Moths, Flies, &c., should be pinned down upon a Board; or Piece of Cork; or upon Wax, melted, and run along the Bottom of a flat Box: the Pins should be greased or oiled, to prevent the Juices of the Animal from drying round them and producing Rust, which would render them difficult to be removed from the Insect. If they were pointed at both Ends they would more readily admit of being turned. The Pins must be made so fast, in either of these Substances, as to allow of the Motion of the Box in all Directions; and the Fastening must be in Proportion to the Weight of the Animal. To preserve them for anatomical Examination, they should be put into Bottles with Spirit.

Lobsters, Crawfish, Crabs, Beetles, &c., may be put into a Bottle together; or if each Class be kept separate, any Number of a Class may be kept together.

Butterflies,

Butterflies, Moths, &c. should be kept by themselves, for if put into the same Bottle with the Above, their Bodies would be injured.

Of E G G S.

To preserve the Eggs of Birds, with their Nests; each Nest should be put into a round Box, just large enough to hold it; some Cotton should be then laid upon the Eggs, to keep them from moving; and the Whole should be covered with the Lid.

If the Egg be very large, as that of the Ostrich, when near Hatching, it should be preserved in Spirit, on Account of the Peculiarities of the Fetus of this Class of Animals.

The

The Eggs of Turtles, Lizards, Crocodiles, Snakes, &c., should be collected, and, when near Hatching; preserved, for the Peculiarities of the Fetus ; as also the Eggs of all Sorts of Insects, on the same Account.

If a Perforation be made, by a Pin, at each End of the Egg, the Spirit would then have a Passage to the Inside, and the Contents would be more certainly preserved.

*Various OBSERVATIONS on the MEANS
of PRESERVING different ANIMALS.*

An Animal of the firmest Kind, in a temperate Climate, may generally be preserved by a Quantity of Proof-Spirit about equal to its own Weight.

D

Animals

Animals of the mixed Kind, neither hard nor soft, as some of the soft Fish, may perhaps demand rather more Spirit than their own Weight.

Soft or watery Animals, as many of the Sea, require Rectified Spirit, in nearly the same Proportion as the Above. But these are relative Circumstances, which will vary according to the Climate, and the State of the Parts at the Time: if the Climate be very hot; or, although not very hot, the Parts must remain in it for some Time; or the State of them be unfavourable; more Spirit will be required.

The Proportion of Spirit should be particularly attended to when Parts are large; for a very small Animal, or Part, generally obtains more than what is here directed, while a large One has less.

Animals which are termed firm, are those of the quadruped Kind, as Rats, Mice, &c., and indeed Snakes, Lizards, and all Land-Insects, (as far as respects the Quantity of Spirit,) may be considered in the same Class.

In the mixed Kind, are comprehended most Sorts of Fish ; there are however many Fish that will admit of being referred to the first Distinction.

Of the watery or pulpy Kind, are reckoned Blubbers or Medusæ, Echini, Starfish, and likewise all those that appear to be gelatinous; for their internal Structure is extremely tender.

If the Animal be small, as a Rat, or Mouse, it may be preserved, by immersing it in its own Weight of Spirit ; but if some Spirit be thrown into the Abdomen, so much the better.

If

If it be a large Animal, it ought to have the Thorax, and Abdomen, filled with Spirit; for before the Spirit can penetrate through the Skin, the internal Parts will become putrid. By large Animals are to be understood such as can seldom be brought Home entire.

A Trocar, and Syringe, will answer for filling both Cavities.

Large Fish should be preserved in the same Way.

In very soft Animals, the Spirit will generally penetrate sufficiently fast to preserve the Whole.

Animals preserved for their external Figure, should be suspended in the Attitudes in which they are designed to be kept.

Animals which are preserved merely for Dissection, may be put into a Bottle, or Cask, without Suspension ; and even more than one or two in the same Vessel ; paying strict Attention to the Strength, and Proportion, of the Spirit.

If it be intended, that two or more should be put into a Cask, they should however be kept apart for some Time ; as they would at first, when close together, make too large a Mass for the Spirit to penetrate.

More than one or two may be put into the same Vessel, when they are suspended ; because then they cannot press on One-another.

According to the proposed Proportion of Animal and Spirit, a Vessel may be half-filled with the former.

Birds

Birds are seldom so large but they may be kept in Spirit ; in which they should be suspended with Care, for the Preservation of external Appearances. Many may be put into one Vessel, but they must not be pressed upon One-another. The Mouth of the Vessel should be wide enough to let them pass, against the Direction of the Feathers.

If the Bird were put into a proper Position, and rolled up in fine Linen, the Feathers being made smooth, the external Form might be still better preserved.

If a Pipe were put into the Mouth of the Bird, and Spirit thrown down the Throat, it would pass through nearly the whole Body, by Means of the Air-Cells; and render unnecessary any Injection by the Anus or Abdomen.

Creatures

Creatures of the Lobster, or Crab Kind, may be put into a Vessel without Suspension; wrapped up in Linen, for the Sake of their external Form.

Animals of the soft, or pulpy Kind, should be kept apart from others which are hard, more especially if preserved on Account of their external Figure; and should not be crowded. If possible, they should be suspended: those not firm enough to support their own Weight upon Threads, should be put into separate Bottles.

Shell-Fish may be put into a Vessel in any Manner, as the Shell preserves them from Pressure; but if they died projecting out of the Shell, they should be suspended in the Spirit.

If of the spiral Kind, a small Piece of the
Shell

Shell should be broken off at the Tip, to allow the Spirit to enter the posterior Parts ; for the Body of the Animal filling up the whole Mouth of the Shell, the other End would become putrid before the Spirit could get to it.

Snakes should have some Spirit injected by the Mouth, and Anus ; as they are apt to become putrid, and lose the Skin about the Belly ; they should then be coiled up in close spiral Turns, round the Inside of a small Vessel.

Lizards may be suspended by the Tails, in long Bottles. Of those which are very long, the Tail may be bent upon the Body, or rolled in spiral Turns on the Inside of the Vessel.

The Echinus, with the Spines, should be wrapped up in Cotton, and either put into a
wide

wide-mouthed Bottle, or into a round Box, with Holes in it, so as not to touch nor press upon the Sides; the Bottle being then filled with, or the Box immerfed in, Spirit.

For Suspension in a Barrel, Animals may be fixed to Cords, stretched across its Mouth: the Top should then be put in, and the Spirit added afterwards.

The Barrels should, in general, be deep.

Animals, or Parts, which are put into Spirit, should have it changed; because the first Spirit, which enters the Substance of the Part to be preserved, will be considerably lowered, and discoloured, by the Juices of the Animal: it may not be necessary to change it oftner than once; the proper Period for doing which will be, about a Fortnight after the first Immersion;

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for

for by this Time the first Spirit will have united sufficiently with the Substance, and checked Putrefaction, so far as such diluted Spirit can effect that purpose; but it will not be sufficiently strong to continue the Preservation of the Part: the Time however will vary according to Circumstances. If in a hot Climate, the Spirit may require to be changed sooner; if in a cold one, later; if the Part be soft, or gelatinous, it will also call for earlier Attention than One which is hard, or firm.

Another Advantage arising from a Spirit sufficiently strong is, its own Preservation; for, when much diluted, and joined with the animal Juices, it will acquire an acid Quality, by which the Bones will be softened, and made unfit for a Skeleton.

The Glass or Jar, containing any Article in Spirit, should first be stopped with Cork; over
this

this should be extended a Piece of moistened Bladder, or of the recent Skin of an Animal ; the Whole of which, when dry, may be coated with Refin or Wax. But resinous, or waxen Matter, is not to be used to seal the Surface of the Cork itself; for, if that were done, the Spirit would penetrate and soften the Cement, and thus form a Varnish, which would mix with the Spirit, and adhere to the Substance preserved in it.

Animals which are dried, should be so packed or disposed, as to allow of being aired occasionally ; and, if likely to become mouldy, should be washed with Spirit by a Hair-Pencil, and thoroughly dried before they are shut up again.

An Acquaintance with the SYSTEM of LINNÆUS would greatly help every Endeavour to acquire, or promote, natural Knowledge.

Of *EXTRANEOUS FOSSILS.*

It is judged proper to add a few OBSERVATIONS on Extraneous Fossils; towards fulfilling the Intentions of MR. HUNTER—to display the Agencies of Nature, and their Effects, in all the Modes of Animal Existence; and also, (as manifested by very interesting Parts of his Collection,) through all the Changes of which Animal Bodies are susceptible.

By Extraneous Fossils are to be understood, animal and vegetable Substances, which, from long Residence in the Earth, have acquired fossil Characters.

The fossilized Remains of large Animals, which, of late Years, have engaged the Attention

tion of Naturalists, have been discovered, chiefly, in Parts contiguous to the Sea, to Rivers, or Lakes; although sometimes in high Places, remote from Water.

The Changes which happen Underground, are generally destructive of all the distinguishing Parts of an Animal, except Bone. Whenever, therefore, any soft Part, so termed, with its distinctive Characters preserved, is found, it is to be treated with the utmost Tendernefs and Care. It should be exposed as little as possible to the open Air; and, in packing, should be guarded against Attrition, first by the softest Paper, then by more resisting Materials, as Cotton, Tow, Wool, Flannel, Horse-Hair, Sponge, &c.

The Parts essential for Preservation, and anatomical Inquiry, on any Occasion, may be
understood

understood from the foregoing Directions, respecting the Organs of various Creatures. But the Specimens of Extraneous Fossils, of the animal Creation, are so few, of so little Variety, and it is so difficult to obtain the Whole, even of the Bones, of a fossilized Animal, that every explored Part, in whatever State, may be considered as worthy of Preservation.

With a View to the Knowledge of the Structure, and Economy, of an Animal of a Tribe extinct, of doubtful Existence, or of rare Occurrence, it is desirable that many Particulars, in Writing, should accompany its Bones, Skin, or other Fragments.

Upon the Discovery, therefore, of an Extraneous Fossil, every Circumstance which can tend to explain the Race of Creature to which it belonged; its primary Situation; Mode of
Subsistence,

Subsistence, and of Propagation ; its Instruments of Locomotion, and of Defence ; &c. ; ought to be noted. Also, Portions of the Stratum, from the Spot in which the Fossil lay, and from a Part several Yards beyond it, should be collected, for Analyses.

The following proposed Heads of Columns, would probably be favourable to Inquiry on the Subject, and to Perspicuity in the Arrangement of Facts.

Place where found. Distance from Sea, River, or Lake. Degree of Elevation. Latitude, and Climate. Distance from Forest, or Plain. Indigenous Trees, and Plants. Native Animals. Depth found. Strata, to the Part where found. Stratum in which discovered. Position, or Situation, in which it lay. Relicks of Extraneous Fossils observed with it.

Other

Other Discoveries of Extraneous Fossils, in the same Place, or its Vicinity. Miscellaneous Remarks.

But the Name of the Place, and the Kind of Matrix, in which an Extraneous Fossil is found, are the principal Points necessary to be determined : and it is hoped, that the College will not be deprived of any Extraneous Fossil, because, at the Time of its Discovery, other Particulars were not ascertained, or not recorded.

The preceding DIRECTIONS, and OBSERVATIONS, are designed, principally, for TRAVELLERS of Research and public Spirit.—These SUPPLEMENTARY REMARKS, claim the Attention, particularly, of SURGEONS, and other Persons conversant with Anatomy, zealous for the Improvement of the Healing-Art.

As

As the Provisions, and Resources, of Nature, shewn in extraordinary, or MONSTROUS FORMATIONS, assist in explaining her Intentions in the ordinary Structure of Organs, and elucidate the general Economy of Animals, such Productions are of valuable Consideration. No Occurrence of the Kind, therefore, should be neglected. If the whole Animal cannot be kept, the Parts, at least, which have immediate Relation to the Circumstance of Monstrosity, should be preserved.

A Sense of the Importance of Preparations of MORBID PARTS, to the Cultivation of the Knowledge of Diseases, it is expected will appear by liberal Donations. A short and plain Account of the Case, in which a morbid Change has happened in any Part, would add greatly to the Utility of a Preparation of the Subject.

ANIMALS frequently afford Instances of extraordinary Productions; and of Expressions of Deviations from the healthy Condition, and Offices, of Parts; useful in explaining Alterations in the human Organs, besides advancing veterinary Knowledge. Examples of such Productions, and Expressions, are therefore to be sought for, among Persons who have Opportunities of making Observations upon dead Animals.

Provision is made in the College, for recording, and handing down, all the Circumstances appertaining to every DONATION for the MUSEUM.

THE END.