with great Attention, Patience, and Sagacity. And it is to be wiſhed that he may continue thus diligently to apply himſelf to the Study of Natural Hiſtory.

VI. *Divers Means for preſerving from Corruption* dead Birds, *intended to be ſent to remote Countries, ſo that they may arrive there in a good Condition. Some of the ſame Means may be employed for preſerving* Quadrupeds, Reptiles, Fiſhes, *and* Inſects, *by M.* de Reaumur, *F. R. S. and Memb. Royal. Acad. Sc. Paris. tranſlated from the* French *by* Phil. Hen. Zollman, *Eſq; F.R.S.*

Read from March 10. 1747-8. *to* April 27, 1748.

PERSONS who have at Heart the Progreſs of Natural Hiſtory, and intend to facilitate the Study of it, muſt needs be deſirous to ſee the Collections of divers Sorts of Productions, which form the Objects of it, multiplied and enlarged, and therefore will be diſpoſed to contribute towards it with all their Ability. Thoſe Collections preſent together in one Place more different Sorts of Bodies of the Mineral, Vegetable, and Animal Kingdoms, there to be at Leiſure compared and examined one againſt the other, than one could hope to find ſucceſſively in the longeſt and moſt laborious Voyages and Travels. In order to render thoſe Collections as

as complete as poſſible, there ſhould be in all the Countries of the World Men zealous for their Improvement, who ſhould take Pleaſure in tranſmitting the particular Productions of thoſe Parts which they inhabit, to ſuch Repoſitories as they know to be already conſiderable, and intended to be rendered uſeful to the Public.

That Part of Natural Hiſtory which can offer to us the largeſt Series of agreeable Objects, and actually offers a vaſt Number which are not ſought after merely for the Pleaſure of looking upon them; *viz.* that Part which treats of Birds, has remained as yet very imperfect, nor has it yet made them ſufficiently known to us, becauſe no conſiderable Collections have hitherto been made of them; and thoſe who had begun to make any ſoon became weary of going on, having had the Mortification to ſee them every Day deſtroyed by ravenous Inſects, in ſpite of all the Care that had been taken to preſerve them againſt their Teeth. M. *Reaumur* having found eaſy Methods of preparing Birds which are intended for thoſe Collections, ſo as to put them out of Danger of being ſpoiled, and to make them look as if alive, has thus found what was ſtill moſt deſired, *viz.* the means of putting them out of Harm's Way from greedy Inſects. He intends ſoon to inform the Public how to render with Succeſs this ſort of Collections durable. He has had the Luck to make one, which is already very numerous, and has Room to hope that it will be ſtill larger. The Birds, for which he is obliged to ſeveral learned Men, Lovers of Natural Hiſtory, are an Earneſt to him that he ſhall owe Thanks to them

them for more, according as they ſhall find Opportunities to procure them for him: Beſides he is ſenſible how much he may depend on their good Diſpoſition to inſtruct him, for which he is very thankful.

However deſirous one may be of ſending Birds of the Country where one lives, to another, where the like are not to be ſeen, one may be at a Loſs how to ſend them on a long Journey without their being disfigured or falling to Pieces by Corruption on the Way. I am going to explain here the different Means one may have recourſe to, for keeping them from Corruption, and to make them arrive in a good Condition.

The firſt Way.

The Method hitherto practiſed to acquaint Natural Philoſophers of very remote Countries with Birds of another Country, is to ſend them ſtuffed, that is to ſay, to take off their Skin with all the Feathers upon it, from the Body and the Thighs, leaving the Legs, the Wings, and for the better Conveniency the whole Neck with the Bill ſticking to it. Filling afterwards the Skin thus taken off with ſome ſoft Stuff, either Straw, Hay, Wool, or Flax, *&c.* or even ſtretching it over a ſolid Mould of the Shape of the Bird, you give to this Skin, as near as poſſible, the Form of the Body of the Bird, which it had when it covered its Fleſh and Bones; in which one ſometimes ſucceeds tolerably well, by Attention, and ſome ſmall Proceſſes, the Particulars of which are not intended here to be entered into.

The

The ſecond Way.

The foregoing Way of preſerving the Shape of Birds requires a Hand uſed to it, and even falls ſhort of ſufficiently imitating Nature, unleſs with Care and Time. So it is certainly moſt convenient only to ſend the Bird as it has been received. There is no great Skill required for putting one or ſeveral into a Veſſel full of Spirit of Wine, or very ſtrong Brandy. It has been uſual for a long time to make uſe of thoſe Liquors with Succeſs for preſerving the Fleſh of dead Animals; and wherefore has this Method ſo ſeldom been uſed hitherto to prevent whole Birds from Corruption? Perhaps it is becauſe their Feathers do not ſhew thoſe various and bright Colours, which are natural to them, whilſt they are immerſed in ſome Liquor, and which appear no longer on the Bird's Feathers when taken out of it. Beſides, the Vanes of the Feathers are then diſordered, and glewed too much together. Upon theſe firſt Appearances, it was judged too haſtily, that ſpirituous Liquors changed the Colours of the Feathers, and hinder'd the reducing of them to the Order and Pliableneſs they had upon the Animal, when dry and living. However repeated Experiments have made M. *Reaumur* ſenſible, that the Colour of the Feathers is Proof againſt the ſtrongeſt Brandy, and even Spirit of Wine, and that after having dried the Bird that had been ſoaked, one may eaſily put its Feathers into their natural Order, and make it appear as it was when alive:

1. To preſerve Birds which are to be ſent far off, you are only to keep them in Brandy; the ſtronger it is the better it will be for producing the intended Effect: Spirit of Wine is even preferable. As for the reſt, it is indifferent whether the Brandy be diſtilled from Wine, Corn, or Sugar.

2. Though the Birds may be put into the Liquor ſo as one receives them, yet ſome ſmall Attention is to be had, and ſome Precautions to be uſed, before they are dipped in, which contribute towards preſerving them in a more perfect State. If any of the Bird's Feathers are bloody, you muſt waſh them from time to time with a wet Linnen, till they do not any longer leave a Mark upon that Linen, or in the Water in which they are ſoaked. Above all it is of Conſequence to hinder the Feathers from taking a wrong Bent, or rumpling. It is eaſy to put them into the Shape they are to be, by ſmoothing them with a Finger from the Head towards the Tail in ſqueezing them together. This helps the Feathers to take the Poſition which is moſt natural to them, and in this Poſition they are kept by wrapping the Bird up in a Rag, tying about the Neck and the Body ſeveral times a ſtrong Packthread: The Feathers on the Neck are chiefly thoſe which muſt be kept from turning aſide or backwards.

3. The Precaution of taking out of the Body the Inteſtines and other Parts it contains, is not abſolutely neceſſary; it is better however to do it: If afterwards one ſupplies their Place, by filling the Cavity of the Belly with all the Quantity it can contain of Wool, Hemp, Cotton, or other ſoft Matter; if you fill the Neck, though without diſ-

tending

tending it, with the ſame ſoft Matter, you will more ſurely preſerve the Shape and Dimenſions of the Bird. It becomes leſs big in the ſpirituous Liquor; not juſt becauſe the Fleſh ſhrinks or dries up, but becauſe the Parts which form the Cavities endeavour to contract them, and in effect will do ſo, if the Cavities do not contain a Matter which reſiſts.

4. After theſe plain and eaſy Preparations, you are only to put the Birds into the Veſſel containing the Liquor which is to preſerve them. This Veſſel may be a Jar of Glaſs, if it is only intended for receiving ſmall Birds; one may contain a great Number of them, which you may put in at different Times, accordingly as you get them, till it is quite full. Wooden Barrels however are preferable to Jars, as they are not liable to break in long Journeys; there are to be had very ſmall ones for ſmaller Birds, and ſome large enough for others of the talleſt Size. The Barrel is to have a Hole large enough for paſſing the Birds through: This Hole can be no other than the Bung widened, it will even be better placed in one of the Heads. It is unneceſſary to advertiſe that it ought to be kept ſhut up with a Stopple of a proportionable Diameter, except during the ſhort Time when it is opened for putting the Bird in.

5. The Birds may be ſent in the very Jars or Barrels where you have put them: But if they are to be on the Road for ſeveral Months, or for Years, you will renew the Liquor before you ſend them: That which has been poured on at firſt, may have

been weakened by Evaporation, and by the aqueous Juices extracted from the Fleſh.

6. If thoſe Birds are not to arrive by Sea to their Journey's End, if they are to be carried by Land for Part of their Way, one muſt contrive it ſo, that they may not be liable to be toſſed by much Jumbling; and they will be leſs ſo, if the Veſſel is ſo much fuller of them; they will cloſe the more together. In caſe they ſhould float too much in the Liquor, you need not ſcruple to preſs them with Hay or ſome other Stuff, which you thruſt into the Veſſel.

7. It is ſtill more eaſy to hinder the Birds from being toſſed, and they will even be the better preſerved, if before you ſend them you take them out of the Liquor, in which they have lain a ſufficient Time; it has made them fit to dry without any Danger of Corruption. Small Birds, ſuch as of the Bigneſs of Sparrows, and even of Black-birds, after having been cover'd 8 or 10 Days with ſtrong Brandy, may be taken out without any Fear of their being corrupted. Large Birds, and eſpecially ſuch as are very fleſhy, are to be kept longer in the Liquor; but there are none or few, for which it may not be enough to have lain in it a Month or five to ſix Weeks. According as you take them out, you muſt range them one next to the other, and upon one another in a Box, filling up the Intervals with a Matter eaſieſt to be had, as Chaff of Oats or Barley; that is to ſay, thoſe ſmall Shells in which the Grain was wrapped up whilſt it ſtuck to the Ear. This Chaff is the beſt Stuff for this Uſe: You may alſo uſe ſmall Hay, Moſs, Hemp, Cotton, &c. Far from its being neceſſary to leave the

the Birds to dry before ranging them in the Box, the beſt is to put them in quite dripping with the Liquor. Having filled the Box well, there remains only to ſhut it up.

8. Any Box, of what Form ſoever, may be fit for Birds which are to be on the Journey only for ſome Weeks or a few Months: Such as are to travel Years, require more Precaution; though they are not ſubject to Corruption, yet they may be torn to Pieces before their Arrival, if Inſects greedy of them can come at them, and multiply in their new Habitation. One may by Care ſo well cloſe up thoſe Boxes, as to render it impoſſible for thoſe dreadful Inſects to get to the Inſide; Paper glued over all the Joints will prevent it. But Barrels are preferable to Boxes, for ſuch Birds as are to remain ſhut up for a Year or longer; the ſmalleſt Inſects will not find a Paſſage for creeping into a Barrel, which will not permit the ſmalleſt Drop of Liquor to get out. Birds being put wet into the Barrel, keep from drying up too much, and keep one another the cloſer. As good Luck will have it, carnivorous Inſects are none of thoſe that will pierce Wood. So by uſing Spirit of Wine or ſtrong Brandy, as we juſt now ſaid, one will ſucceed in having thoſe Birds arrive in a good Condition at the remoteſt Places. There is ſtill another Way for it, which may appear more convenient, eſpecially for Birds of a large Size.

The third Way

Is to preſerve Birds by a ſort of Embalming, and even by actual Embalming, in Countries

where the Spices are cheap. Firſt, you begin with emptying the Body of the Bird, and then fill it with thoſe Powders I am going to ſpecify to you; you alſo fill its Neck with the ſame Powder, thruſting it in through the Bill. If the Bird is extremely fleſhy, you may make an Inciſion in the Fleſh of the thick Part of each Leg, and one in the Fleſh of each Wing; that is to ſay, two on the Breaſt, and one nearer the firſt and large Bone of each Wing, into which you put the Powder; having afterwards brought the Fleſh together again, and put the Feathers in Order, thoſe Inciſions will be hid ſo as not at all to disfigure the Bird. But there are very few on which it was neceſſary to make ſuch Inciſions; one may make ſome even inwardly, which will ſerve as well; having thruſt your Fingers into the Belly, you may tear the Integuments over-againſt the thick Part of the Leg, and in other Places, and make Cavities to be afterwards filled up with the Powder.

2. There are many Powders proper to produce the principal Effect intended here, which is to promote the Bird's drying before it be ſo far corrupted as to occaſion the falling off of the Feathers. All ſorts of Spices may be uſed for it with Succeſs; if there are any in the Country which are very cheap, you may uſe them. You may even make uſe of a Powder compoſed of as many Sorts of Spices as you will, the Reſult of which will be at leaſt, that the Bird, after being dried, will ſmell the ſweeter, and become as it were a Piece of Perfume. But inſtead of uſing reſinous Gums, as Aloe, Myrrh, Frankincenſe, and other Productions of Plants, as Cinnamon, Cloves, Pepper, Ginger, *&c.* which are dear Materials,

terials, you may content yourſelf with a Salt which is cheap in moſt Countries; it is ſufficient to fill the Cavity of the Body and of the Neck with Alum reduced to Powder. A Material ſtill eaſier to be had in all Places, and very cheap, and which works with great Effect, is Lime. If it can be had quite unſlack'd, you will take it preferably; however, without ſcrupling to take ſuch as is old, and which has been ſomewhat ſlackened by the Humidity of the Air.

After the Body and the Neck of the Bird have been filled up, either with pulverized Lime, Alum, or any other Powder, you put it into the Box or the Barrel, in which it is to be tranſported. You will take care, in placing it, to give a natural Poſition to the Neck, neither to give to the Legs any other Inflexion than they had when the Bird ſtood upon them alive. At the Bottom of the Box or the Barrel there is to be a Layer of the Thickneſs of an Inch, or thereabouts (if there be more there will be no Harm) of the ſame Powder with which the Cavity of the Body is filled, or of any of thoſe which are proper for it. You bury the Bird in this Powder, and put enough of it about it and upon it, ſo as to cover it with a Layer of the Thickneſs of an Inch or more. The outward Powder will make it dry the ſooner, and keep off voracious Inſects, which will not care to attempt to pierce through it in order to come to the Fleſh they are fond of. During the firſt Days, and even during the firſt Weeks, the Birds may caſt a bad Smell, which you need not be uneaſy at, for it will leſſen in proportion to the Bird's drying; and it will dry

ſo

ſo that none of the Feathers will come off; and when it is once dried, they ſtick faſt to it for ever. This Way of preſerving Birds, which is very ſimple, has procured to M. *Reaumur* ſome from very remote Countries, which arrived as wiſhed for.

The fourth Way.

This is one, by which Birds are more ſpeedily dried, than by that which is explained before; it is to dry them by the Heat of an Oven. You make uſe of that Heat which remains in it after the Bread is taken out of it; ſometimes it is then too great, but there is a plain Way to be ſure that the Degree of Heat is not too great, which is, to put Feathers into the Oven, and to take them out 5 or 6 Minutes after; if you find that they are not ſinged, nor turned red, you ought not to be under any Apprehenſion for the Feathers of the Bird, which is to be put into the Oven. Small ones need remain in it only one or two Hours to be ſufficiently dried; thoſe of a middling Size require a longer Time; and thoſe which are big, and very fleſhy, ought to be put in at ſeveral times. When they are grown cold, you may know whether they are dried enough, by preſſing with the Finger the Fleſh of the Legs and of the Breaſt; if it does not yield, or yields but little under the Finger, the Bird does not any more want to be put into the Oven. The Inconveniency attending its being kept there longer than is neceſſary, is, that ſome Parts of it, as for inſtance, the Neck and the Rump, are thereby render'd too brittle. You will prevent the Bird's Bulk ſenſibly diminiſhing

miniſhing in the Oven, if, before you put it in, you fill the Cavities of its Body and the Neck with ſome ſoft Stuff, like any of thoſe which we mention'd to be us'd for filling the Cavities of ſuch Birds as are intended to be preſerved by the means of Spirit of Wine, *viz.* Hemp, Flax, Cotton, *&c.* What is the moſt difficult in the Way of drying Birds in the Oven, is not hitting the proper Degree of Heat, and to know the Time how long they are to be kept in it: Here will be the Difficulty, how, as this Way of drying requires the Bird may be kept in a natural Attitude, before it is put into the Oven: If dried, it will be fixed for ever in that which it once received. There are ſeveral Ways, plain in themſelves, for putting and keeping the Bird in its natural Attitude, which however would be too long to be explain'd as to the Particulars; the little we ſhall ſay of them, will be ſufficient to induſtrious Perſons for their Uſe. The Bird may be kept in Order by the means of a Frame, made like a Farrier's Traviſe; it is compoſed of a ſmall Board, which forms the Baſis of it, the Length of which need not be greater than that of the Bird: On each Side of this Board riſes an upright Poſt of Wood; theſe four Poſts are ſecured by Traverſes fixed to them by ſmall Nails: The Uſe of thoſe Poſts and Traverſes is to keep fixed the ſmall Ribbons and Threads, which keep the Body, the Wings, and the Neck of the Bird in the Poſition it has been brought to. A Thread run through the Head of the Bird, with the Help of a Needle, enables you to place it as high or low as you pleaſe. There are various Ways of fixing the Feet on the Board, with the Claws extended;

extended; it may be done with ſmall Points of Nails. With a Wire only, and a ſmall Board, all may be done as well as with a Frame: This Wire is run through all the Length of the Body and of the Neck of the Bird, by inſinuating it through the *Anus*; but before doing ſo, you make a ſort of a ſtrong Knot to it, by twiſting it; this Knot is to touch the *Anus*; it afterwards hinders the Bird from ſliding: Cloſe by the Knot you bend down perpendicularly that Part of the Wire which is without the Body, and which is to be at leaſt of a Length equal to the Height which the Legs are to have; you make afterwards its End pointed by filing, if you have not already done it, and you run it into the Board. That Part of the Wire which then is out of the Body, ſerves for a Supporter, which keeps the Bird raiſed, becauſe it is continued to the reſt of the Wire which runs through the Body and the Neck: The Wire which runs through the latter keeps it in its bending Way, and the Direction that has been given to it.

Dried Birds ought to be ſent in Boxes or Barrels ſufficiently cloſed up, that Inſects may not ſlip in during the Journey; and you will take care to fill up all the empty Spaces left in the Barrel with ſome of thoſe ſoft Stuffs, which we have already pointed out for ſuch Uſes. Many Weeks, nay even Months, may paſs between the Time, when you have dried the firſt Birds you intend to make a Collection of for a Journey, and that Time when they are to ſet out: This Interval is dangerous. There are certain Worms, and certain Beetles, which are more greedy after thoſe dried in the Oven, than after thoſe dried

any

any other Way; if they meet with free Acceſs, they ſometimes ſeize the firſt Moments to ſettle under the Feathers, or in the Bodies, where they multiply.

You will put your Birds out of the Reach of the formidable Teeth of thoſe Inſects, if after they have been taken out of the Oven, you bury them in Sand contained in a large Box or a Barrel. You muſt take care in covering them with Sand, that they may not contract bad Attitudes, and that their Feathers be not ruffled. Slack'd Lime reduced to Powder, Chalk, and all earthy Powders, fine and dried, may be ſucceſsfully employ'd for the ſame Uſe. You will preſs with your Hand the Surface of the Powder, to render the uppermoſt Lay compact, which is very neceſſary. Laſtly, if from the falling of the Feathers it appears that the Inſects have defeated the Precautions taken againſt them, there is ſtill a Remedy left; you may ſtop the Progreſs of the Evil by putting the Bird again into the Oven, not hot enough to ſinge the Feathers, but hot enough to kill the Inſects in leſs than half an Hour.

Remarks that are common to the four Ways of preparing Birds.

1. It will not be amiſs to ſend two or three Birds of each ſort; and, as near as you can, let there be one Male and one Female.

2. One cannot help being curious to know the Name which each Bird bears in the Country where it was taken: You write it with common Ink upon a Slip of

Parchment, which you tie with a Thread to one of its Feet; the Writing will be preſerved, even when the Bird is in Brandy.

3. If you know of a Bird any thing beſides its Name, you may make a ſmall Note, ſhewing in what Places it lives; what it feeds upon; whether or no it ſtays all the Year in the ſame Country; how and where it makes its Neſt; how many Eggs it lays; the Wiles and Cunnings particular to it; whether it is good to eat; in ſhort, whatever is known of its Hiſtory.

4. A Collection of Neſts is a proper Repoſitory to be joined to that of Birds; it ſhews ſuch Works as hardly could be imitated by Men, admirable for their Form, their Workmanſhip, and the Materials employed in them: M. *Reaumur* has already made ſuch a Repoſitory. If one can have Neſts not too bulky for eaſy Tranſportation, you may be ſure to ſee them with Pleaſure joined to the Birds that have built them.

5. The Colours and Figures of the Eggs make alſo Part of the Hiſtory of Birds; Collections made of them will give Satisfaction to curious Minds: Thoſe which are to be ſent would be in Danger of being broken on the Way, by the very Subſtance they contain, if it comes to ferment. Before you ſend them therefore, you muſt empty them: To this end you make a ſmall Hole on each End, and ſhake them; and if this Shaking will not be enough, you blow into one of the Holes to force out through the other what liquid Matter remains in the Egg.

Quadrupeds.

Quadrupeds that are not of too large a Size, and particular to certain Countries, may be put into a State fit to be ſent to the moſt remote Parts, by one of the four Ways uſed to preſerve Birds: You may make durable Collections of them like thoſe of the latter. M. *Reaumur* has begun one, which makes Perſons who ſee it wiſh that there might be more complete ones of the ſame kind.

Fiſhes and *Reptiles.*

Fiſhes and Reptiles, which, as well as Quadrupeds, are engaging Objects for Naturaliſts, are eaſier to be ſent; it is ſufficient to put them into Barrels full of ſtrong Brandy. They may alſo be dried, either by Materials with which you may fill the Cavities of their Bodies, or by a gentle and well-manag'd Heat.

Inſects.

Inſects, which offer to us ſo many admirable Varieties, deſerve the Care of gathering them into Collections, which cannot but be precious to thoſe who have made thoſe little Animals their Study. All thoſe which are ſoft, as for inſtance Worms and Caterpillars, may be preſerved in Brandy. Their tender Colours will run leſs Hazard of being alter'd, if you put into the Brandy ſuch a Quantity of Sugar as it is able to diſſolve. Beetles may alſo be put into the ſame Liquor; but Butterflies and Flies would be ſpoiled in it: After having killed them, you muſt range them in Lays in Boxes, and ſeparate thoſe Lays with Beds of Cotton. Though one ought to collect in each Country, preferably, thoſe which ſtrike

moſt, either by the Variety and Luſtre of their fine Colours, or by their Size, or by their ſingular and odd Form, or by the Uſe one knows to make of of them; yet you ought not to neglect to collect and ſend ſuch as do not offer ſo remarkable Singularities, ſuch as even are moſt common. There are among the latter ſome, which have wherewithal to ſatisfy an Obſerver, who looks upon them with other Eyes than thoſe wherewith they had been regarded before, and with other Views.

VII. *A beautiful* Nautilites, *ſhewn to the* Royal Society *by the Rev.* Charles Lyttleton *LL.D. F.R.S. and Archdeacon of* Exeter.

Shewn May 5. 1748. THIS curious Foſſil ſeems to be compoſed of a ſtony Matter like Marble, which has penetrated the Cells of the *Nautilus* while in its natural State. The Diaphragms or Partitions remain ſtill diſtinct and viſible. The different Colour of the ſtony Matter in ſome Cells of a dark-brown or Hair-Colour, in others of a light-brown or Aſh-Colour, with the natural Poliſh of the Outſide, gives it a beautiful Appearance; as it is repreſented in the annexed Print (*See* TAB. *Fig.* 2.) where it is drawn of its natural Size in three different Views.

A ſhews the Side View of it.
B the fore Part.
C the back Part.

C. M.

It