



A PHYSICAL
DISSERTATION
O N
DROWNING:

IN WHICH

SUBMERSION, commonly call'd DROWNING, is shewn to be a long Time consistent with the Continuance of LIFE, from a Variety of unexceptionable tho' surprizing FACTS, related by the most eminent and judicious Authors, and confirm'd by incontestable Evidence; which FACTS are reconcil'd and accounted for, from the strictest Laws of the Animal Oeconomy,

To which is SUBJOINED,

The proper Measures for RECOVERY and RELIEF; the Obligations we lie under to practise them are clearly suggested, and strongly enforc'd; intended for the Good of Mankind, by restoring Life to many Persons, who are erroneously supposed to be irretrievably drowned. Recommended particularly, to the Consideration of the Surgeons of the Navy and Army, who have frequent Opportunities of practising the Methods recommended.

With an APPENDIX, containing some METHODS for the Recovery of those who hang themselves, and of Children supposed to be born dead.

By a PHYSICIAN.

L O N D O N:

Printed for JACOB ROBINSON, at the *Golden-Lion* in
Tudor-Street.

MDCCXLVI.



A

DISSERTATION

ON THE

Recovery of PERSONS drown'd.



AS Truth in general is of the last Importance, not only in affording a noble and exalted Satisfaction to the Mind, but also in forming the Morals, and by that Means, promoting the most valuable Interests of Society ; so nothing can be a greater Reproach to Reason, nor a more palpable Affront offered to its august and venerable Author, than that ignoble and unmanly Turn of Mind, commonly known by the Name of *Credulity*, which is no more than an implicit Contempt of Reason, and all the mental Powers, producing a Propensity to believe certain Tenets, Doctrines, or Facts, without that Degree of Evidence, which a Mind studious of Truth ought to require.

But however odious *Credulity* may appear, when painted in her native Colours, she is nevertheless,

if we may be allowed the Expression, a *Spectre*, which haunts the various Classes and Distinctions of Mankind, under a Form so infatuating and alluring, as to seduce them from the plain and amiable Paths of Truth, and bewilder them in the dark and gloomy Labyrinths of Ignorance, Error, and Confusion. This deplorable Observation is in no Instance more effectually verified, than in these very Men, who profess a sacred Veneration for Reason, and pretend to go wherever Truth shall conduct them; for, we frequently find, not only antient, but also modern Philosophers and Physicians, labouring with a pompous Shew of Learning and Ratiocination, to prove that Nature, by her stated and established Laws, was capable of producing certain Effects, which Time has afterwards discovered never to have had any Existence, except in the Imaginations of the Credulous, or in the chimerical Works of Authors, who forsaking Fact and Nature, have given a full Scope to their Fancy and Invention. Thus in former Ages it was keenly disputed, how it came about, that a small Fish, call'd the *Remora*, was capable of putting a speedy Stop to a Ship under Full-sail; but this pretended Fact has, by later and more penetrating Naturalists, been discover'd to be absolutely false. And, no doubt, the ever memorable Rabbit-Woman of *Godalmin*, would have made a considerable Figure in the Annals of the *Royal Society*, and afforded Matter to the Members for copious Dissertations on the Force of Imagination, if she had prudently ceas'd Breeding a Day sooner. This bad Piece of Conduct, has, however, thrown an almost irreparable Disgrace upon *natural Knowledge*, by inducing the sober and judicious Part of Mankind to imagine, that it was totally employ'd

in

in explaining Visions and Chimeras. Therefore, if we intend to philosophise in such a manner as not to disgrace Philosophy, we must have Facts duly ascertain'd, before we attempt to explain and account for them; since, according to *Kercher*, in his *Mund. Subterr.* Lib. 10. " 'Tis as absurd " in physical Matters, to philosophise without " Experience, as it is for a blind Man to pretend " to judge of Colours."

Tho' from what has been said, it sufficiently appears, that *Credulity* is fatal to Truth, yet we observe in the Minds of some Men, an arrogant and presumptuous *Scepticism*, which, admitting nothing but what is easy to the Conception of its Possessors, is no less prejudicial to the genuine Interest of Science, and Philosophy; for, as, by the former we are expos'd to the Danger of adopting Error as well as Truth; so by the latter our Minds are, as it were, manacled, and hinder'd from giving a rational Assent to Things and Facts cloath'd with the most striking and distinguish'd Characters of Evidence, for no other Reason, than that we cannot comprehend them. It is, for Instance, a culpable Diffidence, to disbelieve the Possibility of a Person's retaining a latent Principle of Life, after he has remain'd some Hours, Days, and even Weeks under Water, since numerous Facts, related by the best Authors, vouch'd by the most candid Witnesses, and recorded in the publick Archives of the most penetrating and sagacious Nations, concur to remove the smallest Remains of Uncertainty in this Point. Besides, I would have the Gentlemen of this Class remember, that their Conduct bespeaks an insupportable Degree of Pride, and amounts to a formal Declaration, that they themselves are blessed with Geniuses far superior to others, since nothing can

be true, but what is comprehensible by the vast Extent of their Capacities. And tho' Modesty and Common-Sense, should not direct them to this Observation, yet what the World calls *moral Evidence* stands upon Foundations, too stable and sure to be shaken by their frivolous Conceits, or ill-grounded Remonstrances. In a Word, the wise and thinking Part of Mankind will always be induc'd to give their Assent to Facts seen by a sufficient Number of Witnesses, who have Sense enough to guard against Imposture themselves, and Honesty enough to say nothing but what is Truth to their Neighbours. All these advantageous Circumstances attend the following Narrations, which, for the common Benefit of Mankind, have been collected from Authors of the greatest Veracity, in order to shew, that there is often a Possibility of restoring drown'd Persons to Life, after vulgar Prejudice, and a Want of sufficiently extensive Views with Respect to the Laws of the animal Oeconomy, have laid a Foundation for concluding them irretrievably dead, and past all Hopes of Recovery.

Dr. *Brubier*, an eminent Physician of *Paris*, well known to the learned World, and highly esteem'd for his Knowledge in his Profession, about three Years ago, publish'd a Treatise on the *Uncertain Signs of Death*, tending to prove, that many People are interr'd before they are really dead; and that there are frequent Instances of Persons who have liv'd many Days without Respiration, or any other apparent Signs of Life. This Doctrine he establishes by many incontestable Histories of People who have actually surviv'd their Funerals, and liv'd many Years after they had been buried, upon a Supposition, that they were actually dead. Hence he very judiciously infers, that

that 'tis not imprudent but inhuman, to suffer the Interment of our Friends and Relations, before we are convinc'd from the most evident Marks, that they are certainly and irrecoverably deceas'd; or till such time as the Beginning of Putrefaction convinces us, that no Hopes remain of a Revival.

In Confirmation of what this celebrated Physician has advanc'd, many Examples might be found in our own Country, which escap'd his Researches; and no doubt it happens much more frequently, than is generally imagin'd; especially in hysterical Women, in those who have contracted a Habit of drinking spirituous Liquors to Excess, but particularly in those who have been guilty (for so I can't forbear calling it) of taking frequent Doses of Opium, or its Preparations, so as to render Life insupportable without them, of which there are too many Instances.

This Doctrine, however true, is not altogether modern; for we learn from *Diogenes Laertius*, that the celebrated *Empedocles* acquir'd uncommon Honour, by restoring a Woman to Life who was thought to be dead many Days, and whose Disorder he discover'd to be only a Strangulation of the Uterus, that is, an hysterical Fit.

We learn, farther, that *Heraclides* of *Pontus*, a noted Philosopher, wrote a Treatise upon this very Subject, which he intitled, *Περὶ τῆ ἀπνῆς*, *Of the Distemper in which the Patient is depriv'd of Respiration*. In this he asserted, that the Disorder might continue thirty Days, during which there was no Respiration, or any other Signs of Life, without any Marks of Putrefaction; and that notwithstanding, the Patient might at last recover.

In Consequence of the frequent Interments of People before they were really dead, *Dr. Brubier*,
in

in 1745, publish'd a small Pamphlet, containing Proposals for the Regulation of Funerals, and the Prevention of such calamitous Disasters; which he endeavours to have confirm'd by the Legislature; for, says he, how many Women weary of their Husbands, and Husbands equally weary of their Wives; how many Children who have either a real or an imaginary Reason to be dissatisfied with their Parents; and, especially, how many covetous and necessitous Heirs, who have long waited for the happy Moment, which was to put him in Possession of an opulent Fortune, may not abuse the Liberty the Law affords them of burying their Friends at the End of twenty-four Hours, at which Time they may, possibly, be really alive, and capable of a Recovery. And to prove this Regulation the more necessary, he relates the following Histories.

A Woman about eighty Years old, being taken for dead, was about to be laid out as such, when a Person, who had perus'd his Treatise, oppos'd the Design. Next Morning the Woman was found recover'd from her profound Syncope, which, considering the intense Cold of the Season, had probably prov'd a real Cause of her Death, had she been taken out of her Bed.

It is also sufficiently known, that Cardinal *Spinosa*, first Minister to the King of *Spain*, being supposed dead, and committed to a Surgeon in order to be embalm'd, thrust away the Hand which conducted the fatal Instrument, which put a real End to his Life. But notwithstanding this Accident, the barbarous Surgeon proceeded to finish the Operation.

But as Submerſion, or Drowning, is the Subject of our present Enquiry, I shall only farther take Notice of the Histories relating thereto.

The

The celebrated *Kunckel*, in *Ephemerid. Nat. Curios.* informs us, that a young Man had the Misfortune to fall from a Boat into the Water, and sunk to the very Bottom, about fifteen hundred Paces, from the Shoar, which he did not reach till two Hours after. However, as it is natural for Persons to give an Account of the several Circumstances attending their respective States of Calamity and Distress, the young Man inform'd those who had the Curiosity to enquire into his Condition during that Time, that whilst he was making the most strenuous Efforts to preserve his Life, he thought of nothing but God, and the Means of recommending himself to his Favour and Acceptance ; that the Voice of his darling Sister, who wept bitterly on the Shore, for the Fate of her Brother, had serv'd to conduct him to the Land ; that the Disturbance of the Water by those who sought for him, and the Lamentations of the People on the Shore, were not only distinctly heard by him, but also prov'd extremely shocking and uneasy to him ; that he thought his Respiration was carried on, without his knowing in what Manner, that the Water had not penetrated into any of the Cavities of his Body ; and that he was hot, instead of being cold.

The same judicious Author informs us, that he had an Opportunity of examining a Fisherman, who fell from a Boat into the same Place, and was, by Means of the Ice, kept under Water for three Days, but upon his being found, appear'd full of Vigour, said that he enjoy'd good Health, and affirm'd, that the most remarkable Circumstance of which he had been conscious was, that a large Bladder had been form'd around his Head for his Preservation.

The memorable Accident which befel the *Swiss Diver* is so well attested, and accompanied with such a peculiar Train of Circumstances, that it cannot fail to make the most lively Impressions upon every Person capable of the smallest Degree of Reflection. As Necessity lays a Foundation for Industry, which frequently cannot be employ'd, but in a manner, which is either prejudicial to Health, or fatal to Life, so this adventurous Man follow'd the Business of plunging into the Water, and searching those Holes in which he imagined the larger and better Sort of Fishes were lodg'd. Accordingly, being employ'd as Dr. *Brubier* relates the Story, to furnish a Dish of Fish for a Company, who intended to regale themselves with a fine Dinner, he cheerfully undertook the Task. His Employers, in the mean Time, accompanied him to the Brink of the River, and seeing him plunge into the Water, retir'd, not in the least doubting but he would keep his Word. The *Swiss*, however, happening not to bring the Fish at the Hour appointed, the Company, when the Afternoon was pretty far advanc'd, went to the Banks of the River, in order to know the Reason of their Disappointment. As the Clothes of the Diver lay on the River-side, so they soon suspected his deplorable Fate, and accordingly order'd him to be search'd for with Hooks, in the Place into which they had seen him plunge. The Efforts for this Purpose were not in vain, for he was at last found, and taken out of the Water, tho' wounded in several Parts.

As this unfortunate Man had been under Water for nine Hours, so the Curate of the Place, whose Profession call'd for some Care of a Person in such a Situation, had a Mind that he should be forthwith interr'd; and he had been infallibly committed

ted to the Grave, had not the celebrated Mr. *Egly*, a Member of the Royal Academy of *Inscriptions*, who observ'd a Kind of Ebullition in the Water discharg'd from his Mouth, positively affirm'd that he was not dead. For that Gentleman justly ascrib'd this Ebullition to the languid and imperceptible Remains of Respiration.

This Conduct of Mr. *Egly*, however uncommon, yet made so deep an Impression upon the Spectators, that they carried the unfortunate Diver, into an adjacent House, where having laid him out at full Length, they compress'd his Abdomen, in order to procure a Discharge of the Water he had swallow'd. By this Means having in three Quarters of an Hour evacuated a considerable Quantity of Water, he mov'd one of his Legs, a Circumstance which sufficiently evinc'd that he still retain'd some faint Remains of Life. For this Reason he was, by Mr. *Egly*'s Orders, wrap'd up in warm Sheets, and gradually restor'd to a natural Heat. Then being laid in a warm Bed, and his Life becoming gradually more conspicuous, a liberal Venesection was made, which was succeeded by a Sigh, then by a slight Knowledge of what had befallen him, and soon after by a total Restitution of Health ; and tho' Gratitude is rarely to be met with in the Breasts of the Vulgar, yet this important Service, ever after touch'd the Heart of the *Swiss*, with the highest and most lively Sense of the Obligations he lay under to Mr. *Egly*.

Mr. *Durham*, a Gentleman sufficiently celebrated for his untainted Integrity, and extensive Learning, in his *Physico-Theology*, quotes the following History from *Pechlinus*, an Author of no less Candour and Reputation.

About eighteen Years ago, a Gardner of *Fronningholm*, now sixty-five Years old, and sufficiently vigorous and robust for a Person of that Age, made a generous Attempt to rescue an unfortunate Neighbour who had fallen into the Water; but being too fool-hardy, he ventur'd upon the Ice, which broke, and let him fall into the River, which at that Part was eighteen Ells in Depth: He went perpendicularly to the Bottom, in which his Feet stuck for sixteen Hours before he was found. He himself says, that he was no sooner under Water, than he became rigid, and lost not only the Power of Motion, but also all his Senses, except that of hearing, which was affected by the Ringing of some Bells at *Stockholm*. He at first, also perceived a Kind of Bladder before his Mouth, which hinder'd the Ingress of the Water by that Passage, tho' it enter'd freely into his Ears, and produc'd a Dulness of Hearing for some Time after. This unfortunate Man was in vain sought for during sixteen Hours, at the End of which Time he was taken up by Means of an Hook fix'd in his Head, and upon his total Recovery said, that he was sensible of that particular Part of his Fate. However, whether from the prevailing Custom of the Country, or the Persuasion of particular Persons, certain Attempts were made in order to restore him to Life: For this Purpose he was wrap'd up in Blankets, lest the Air entering too precipitately into his Lungs should prove fatal to him. In this Condition, being gradually warm'd by Means of Sheets, he was rubb'd and stimulated till the Motion of his Blood, which had been check'd for so many Hours, return'd. At last he was totally restor'd by Means of Cordials, and antiapoplectic Liquors. He as yet bears the Mark of the Hook, and says, that he is still subject to violent

lent Head-achs. This singular Accident, attested by the Oaths of Persons who had been Eye-witnesses to it, induc'd the Queen to give him an annual Pension, and he was introduc'd to the Prince, in order to give an Account of what had befallen him.

The celebrated *Pechlinus* has wrote the History of a Woman, who remaining under Water for three whole Days, was happily restor'd to Life, almost in the same manner as the Gardner. This Fact, was so notorious, that the learned *Tilafius*, Library-keeper to the King of *Sweden*, and in whose Time the Woman was still alive, gave the following Certificate of it, which is still kept in the Archives of the *Acad. Natur. Curios.*

There lately was in Dalia, commonly called Wormsland, a Woman of the Name of Margaret Larfsdotter, who having the Misfortune to be thrice drown'd, remain'd the first Time, she being then young, for three whole Days under Water, but the two other Times had more speedy Relief afforded her. She died in 1672, in the seventy-fifth Year of her Age. Telafius.

Tho' this Accident, and the Delivery from it, happening so many different Times to the same Person, may by some be look'd upon as fabulous and romantic, yet upon the whole it appears to be cloath'd with the most genuine Character of Truth and Evidence; for is it credible, that a Man of Probity, Candour, and Learning, as we may readily suppose the Librarian of a rich and powerful Monarch to be, should in a manner so positive and circumstantial, dare to affirm a Fact, which was only suspected, and much less one that was absolutely false? Is it probable that a Man of *Pechlinus's* Character, who is no less universally than justly

applauded for his extensive Erudition and consummate medicinal Knowledge, should compose an elaborate Treatise in order to explain the Possibility of this Fact, without taking due Pains to have its Reality sufficiently confirm'd and ascertain'd ? or, in a word, is it to be supposed, that this Physician, who was look'd upon as the Glory and Ornament of the *Swedish* Nation, should have the Impudence, to appeal to all the *Literati* of *Sweden*, for the Truth of a Fact, which had not the Sanction of sufficient Evidences ? Why should we be more scrupulous than *Pechlinus's* contemporary Authors, who never call'd the Truth of this Fact in Question ? The celebrated *Bartholin*, in *Act. Med. Hassn. Tom. 3. Obs. 42.* speaks of it in the following manner ; “ I can by no Means remain diffident with respect to the Truth of a Story confirm'd by the concurring Testimonies of so many Witnesses of Candour and Veracity ; and of which *Pechlinus* has demonstrated the Possibility by other Examples of a similar Nature : I am only surpris'd, that so singular a Narrative, should be so long buried in Oblivion, in a Nation otherwise so curious and fond of Discoveries.”

But we shall have no manner of Reason to doubt of this Fact recorded by *Pechlinus*, when we reflect, that other celebrated Physicians and Philosophers, assure us of the Truth of other Accidents highly similar and analogous to it. Thus *Alexander Benedictus*, Lib. x. Cap. 9. speaks in the following manner. “ Life has been frequently seen restor'd to Persons who have remain'd under Water during forty-eight Hours.” The same Author, for this very Reason, thinks it highly improper, to inter drown'd and hysteric Patients, till seventy-two hours after their suppos'd Death.

Borelli,

Borelli, in *Cant. 2. Obs. 2.* informs us, that, “ a certain Person of Distinction having remain’d for a long Time under the Water, was taken for dead when he was found; but proper Efforts being made to restore his Life, he was rous’d from his suppos’d Death, and long surviv’d his Misfortune.” Besides, the Credibility of the Fact, told by *Pechlinus*, is sufficiently confirm’d by the Suffrage of the learned and judicious *Zacchias*, who, in his 79th Consultation, wrote in order to determine, whether the Return of Life to a young Man who had remain’d an Hour under Water, was miraculous, and as some superstitious People would have it, to be ascrib’d to a Person of superior Sanctity, speaks in the following manner. “ This Event is so far from being miraculous, that it can hardly come under the Denomination of surprising, since vast Numbers of Persons have return’d to Life, after having been drown’d, or suffocated in any other manner, not only for some Hours, but also during one, and even three whole Days; because the Suppression of Respiration in the Water, had occasioned an Oppression of the Spirits, and had brought on an apoplectic Paroxysm, which render’d them apparently dead, tho’ their Lives were really preserv’d by Transpiration, which augmenting gradually, laid a Foundation for a free Respiration.”

The Possibility of retaining a Principle of Life for a long Time under Water, is still more surprisingly confirm’d by *Kunckel*, in *Miscellan. Nat. Curios. Decad. 3. An. 5 & 6. Obs. 71.* where he speaks in the following manner. “ I am sufficiently sensible, that in *Sweden*, no one Doubts of the Possibility of retaining Life under Water for eight Days; and that the following Accident is
“ by

“ by no Means call’d in Question by those who
 “ live near the Place where it happened. Some
 “ Time ago, about four Leagues from the Town
 “ of *Falung*, a Painter fell from a Boat into the
 “ Water in such a manner, as to remain upright
 “ with his Feet at the Bottom. He was in vain
 “ search’d for during eight Days ; at the End of
 “ which Time, he appear’d alive on the Surface
 “ of the Water. The Magistrate and Clergyman
 “ of the Place, ask’d him the following Questions.
 “ Whether he had respir’d all the Time of his
 “ Submersion ? To which he answer’d, He knew
 “ nothing of the Matter. Whether he had thought
 “ upon God and recommended his Soul to him ?
 “ To which he reply’d, Very often. Whether he
 “ could see and hear ? To which he answer’d,
 “ Yes, and said that he would often have laid
 “ hold of the Hooks employ’d in finding him, if
 “ he could have mov’d his Arms. He also, add-
 “ ed, that the Fish prov’d highly offensive and
 “ uneasy to him, by the Attacks they made on his
 “ Eyes ; and being ask’d by what Means he guard-
 “ ed against these Attacks, he answer’d, by mov-
 “ ing his Eye-lids. As to his Sense of hearing,
 “ he affirm’d, that nothing wrs more ungrateful,
 “ and even painful, to him than striking the Sur-
 “ face of the Water ; and that in a particular man-
 “ ner, he was affected with a violent Pain of his
 “ Ears, which was forthwith communicated to his
 “ whole Body, every Time People came to draw
 “ Water in Buckets. When he was ask’d, Whe-
 “ he had been sensible of Hunger, and discharg’d
 “ his Excrements ? He reply’d, that he had not.
 “ Being interrogated, Whether he had slept ? he
 “ answer’d, he knew nothing of it, but believ’d
 “ he had, because he was some times depriv’d of
 “ all Sensation and Reflection ; adding, that all
 “ the

“ the Thoughts he remember’d to have pass’d in
 “ his Breast, had only God, and the Means of
 “ his own Deliverance, for their Objects.”

The Nature and Circumstances of the Accident now related, lay a sufficient Foundation, for our believing the following memorable Event, especially as it happened to a Person of Distinction, and is attested as authentic by Men of Learning and Probity.

Gocellinus, a young Man, and Nephew to one of the Archbishops of *Cologne*, had the Misfortune to fall into the *Rhine*, and was not found for fifteen Days after; and being laid in an adjacent Church, in order to be interr’d, soon return’d to Life, and surviv’d the Accident a long Time.

As there are a great many secret Things in Nature, and probably numberless latent Circumstances in the animal Oeconomy, with which we are entirely unacquainted; and as Persons of a curious and attentive Turn of Mind, daily observe Accidents, which they before thought impossible, so we have no Reason to doubt of surprising Facts, related by Men of Learning and Candour, nor formally to deny the Truth of Events, which at first appear incredible. Of this Kind, is the following Narrative.

The celebrated Mr. *Burmann* assures us, that in *Boness* of *Pithovia*, he heard a funeral Sermon preach’d upon the Death of one *Laurence Jones*, a Man of seventy years of Age, who as the Preacher said, was drown’d when sixteen Years old; and continued seven Weeks under Water, notwithstanding which, he return’d to Life, and enjoy’d good Health. However visionary and romantic this Accident may appear, in the Eyes of those who pretend to have divested their Minds of vulgar Errors, yet it has met with Credit from the most penetrating

netrating and sagacious Authors who liv'd at the Time in which it happen'd. Thus the learned and judicious *Langelott*, in *Miscellan. Natur. Curios. Decad. 1. An. 6. Obs. 20*, not being able to conceive how a Person can preserve a Principle of Life so long, without the Assistance of the Air, in Waters so cold and full of Nitre, as those of *Sweden*, and not being satisfied with similar Accidents daily happening to some Birds and Insects, is yet so far from doubting of the Truth of this Accident, that he applies to the learned Members of the *Acad. Natur. Curios.* for their Opinion and Explication of it; by which Means he imagin'd that effectual Measures for restoring many drown'd Persons might be discover'd. Besides, it is by no Means probable that a Man of Mr. *Burmann's* Veracity would forge such a Story, in order to see what enormous Lengths Credulity was capable of carrying his Fellow-Creatures; nor is it possible that the Clergyman, should, from the Pulpit, assert this Fact as true, if it had not really been so, since *Laurence Jones*, was a Native of the Place, and well known to every one of his Audience.

But upon the Whole, granting that this Narrative of *Laurence Jones* was false, which however we have no Reason to believe, yet the Recital of it has a great Tendency not only to illustrate our Subject, but also to produce happy Effects in Life; for, 1st, It is certainly the genuine and uncontroverted Interest of the Public, to be appriz'd of the Possibility of a Person's retaining a Principle of Life for a long Time under Water; 2dly, The Conclusion to be drawn from this seemingly miraculous Effect is, that if after a long Time, a Body is taken out of the Water, without the Signs of Putrefaction, it is the Duty of those who find such a Body, to treat it as if there were still a Possibility

Possibility of restoring it to Life ; and 3dly, If it is certain from uncontroverted Facts, that Persons have retain'd Life under Water for several Days, there is no Reason, from the Laws of the animal Oeconomy, and the hitherto known Properties of the animal Fluids, to disbelieve that the like should happen to Persons who have also remain'd under Water for several Weeks.

As our Modesty ought always to be proportion'd to the difficult and intricate Natures of the Subjects we pretend to consider, so we frankly acknowledge, that these and other similar Accidents, as it were, bewilder the Mind, and perplex the most penetrating Capacities, when they attempt to account for them ; since we have never yet discover'd wherein the constituent Principle of Life exactly consists, and since there are various Properties both of the Solids and Fluids of the human Body, to which we are intire Strangers. Some however, affirm, that a Principle of Life may in the deplorable State of Submerision, be retain'd for a long Time, because the Coldness of the Water renders the Circulation slower, and suppresses the Transpiration of the vital Air contain'd in the Blood ; whilst at the same Time, some Portions of the Air lodg'd in the Water, probably penetrate into the Bodies of such Persons. But *Platerus* and *Bartholin* seem to account in a more rational and satisfactory manner for Phænomena of this Kind. The former of these Authors, in explaining how a Woman, who was drown'd in the *Rhine*, for murdering her own Child, return'd to Life after she was found, affirms, that this Accident was the Effect of a Syncope, in which Respiration and the Motion of

the Heart are stopt. Now 'tis certain from Experience and Observation, that these two Functions may be suppress'd without the actual Loss of Life, as is frequently obvious in violent Syncope, and hysteric Paroxysms, from which the Patients do not often recover in an Hour or more, during which Time, the slightest Indications of Life by the Pulse and Respiration, are not to be observ'd.

If any one should say, that it bespeaks an unpardonable Excess of Credulity, to believe that a Syncope may last for a Week or longer, and that consequently the Motion of the Heart and Pulse may be for that Time suspended, without necessarily producing Death; we may justly reply, that hitherto no Person has discover'd wherein the Essence and Principle of Life consists; and that there are in Nature various Phænomena, which seem to prove, that the Motion of the Heart, and the Circulation of the Humours, are rather palpable Signs of the Existence of Life, than its proximate and immediate Causes. This Doctrine we shall endeavour to establish, in a strictly analogical manner, by comparing those Events which happen to Vegetables and the Brute Creation, with similar Accidents which befall Mankind.

For this Purpose we shall first consider the State and Condition of such Plants, as retain a Principle of Life and Vegetation during the whole Winter. All the Difference, according to *Pechlinus*, between these, and the Plants of the animal Kind is, that in the latter the Principle of Motion is weaker, and the Texture of the Fibres less firm; whereas the former contain a much larger Quantity of Oil, and have the Spirit subservient to their Vegetation repell'd by the Cold, to the Bulbs, Roots,

Roots, and Seeds, where it circulates in a languid manner, without having Force to propel Buds, Flowers, and Blossoms, till the kind and genial Heats of the Spring, render it more powerful and active. Why may we not, therefore, suppose that something analogous to this may happen in some human Bodies, who have been under the Water for some Time.

This is not the only Instance in Nature, which we can bring in Confirmation of our Doctrine; for certain Insects pass the whole Winter in *Chrysalides*, or considerably hard Pellicules, without discovering the smallest Signs of Life, tho' 'tis certain they are not dead, since a small Degree of Heat only, is requisite to produce their last Metamorphosis. The Reason of this apparent Death, is the Cold of the Atmosphere, so inspissating their Fluids, as that they can only circulate in a faint and languid manner, round an highly minute and small Center. The Degree of Fluidity which they retain, is however, so considerable, that a more intense Cold than we perceive on the Earth, is incapable of totally coagulating them, as is sufficiently evinc'd by the curious Experiments of Mr. *Reaumur*.

This Phænomenon is not only observ'd in the *Chrysalides* of Insects, but the *Seminal Principle* is also preserv'd free from Coagulation, and without discovering the smallest Sign of Life, in Eggs, which may be consider'd as the *Chrysalides*, or Pellicules of Animals, whose Life is perceptible. Aquatic Insects, also, plunge themselves into the Mud, where they remain without Motion, till the Spring; which holds equally true of Frogs and Toads, according to *Valentinus*, in *Dissert. Epistol. 4.*

The like happens to some terrestrial Insects ; for Mr. *Reaumur* has by Experiment and Observation sufficiently evinc'd, that Ants during the whole Winter, remain apparently dead, till the Approach of the Spring.

A third and more powerful collateral Proof of this Doctrine, is drawn from the Consideration of some Animals, whose Blood is warm, and circulates in the same manner with that of the Human Species ; since in these also the Circulation and Respiration are suppress'd during the Winter, but return in the Spring.

Thus of Swallows it may be said, that during one Half of the Year they are dead, and the other alive. *Olaus Magnus*, and *Scheffer*, in a Letter wrote to *Hevelius*, affirm, that in some northerly Countries, it is very common for Fishermen to find in the Water large Clusters of Swallows, which in the Beginning of the Autumn, had thus pil'd themselves up. Those Authors also inform us, that some Species of Swallows, spontaneously seek a Refuge in the Waters, others take their Flight to foreign Climates, others conceal themselves in the Holes of old and decay'd Buildings, in the Sand, and in their own Nests ; and that others finding a Decay of Strength in their Passage to other Countries, plunge themselves into the Sea, where they remain till the genial Spring rouses their latent Principle of Life and Motion.

The celebrated *Kircher*, in *Mund. subterr. Lib.* 8. Sect. 4. informs us, that the Inhabitants of *Peloponesus*, and other Territories of the *Archipelago*, have told him, that every Year, they observ'd large Quantities of Storks and Swallows flying thro' their Countries from *Egypt* and the Coasts

Coasts of *Lybia*, and that these latter when fatigu'd with flying, plac'd themselves, to the number of five or six, on the Back of a Stork, whom they recompens'd by an uninterrupted and melodious Song. There, are, therefore, continues the Author, some Swallows which fly from one Country to another; but 'tis equally certain from Experience, that the Swallows of cold Climates make no such Voyages; but during the Winter conceal themselves in Caves, Lakes, Rivers, Seas, and the Cavities of Trees.

Olaus Magnus, in Lib. 15. Chap. 10. informs us, that such Swallows as are taken out of the Water before the due Time, do not live long; and adds, that the Inhabitants of *Tivoli*, when shewing him Mount *Scisso*, which Name it receives from a foolish Report of its being divided at the Crucifixion of our Saviour, assur'd him, that in the Winter-Season, large Quantities of Swallows apparently dead were to be found on it; whereas no such Animals are to be found there in Summer. He then quotes *Cysatus*, who in his Description of *Switzerland* affirms, that about *Christmas*, some Workmen when digging up the Earth for laying the Foundation of a public Edifice, found a subterraneous Cave, from which flew about twenty or more Swallows. Whence the Author concludes, that all these Birds do not pass the Sea at their Disappearance, but that some retire into the Cavities of Mountains, others in Hollow-Trees; but that this most frequently happens in northerly Climates.

Fortunus Licetus, in *Tr. de Feriis Altric. Animal. Disp.* 19. affirms, that in upper *Poland*, every Person may be experimentally convinc'd, that the
same

same Swallows which in Summer build their Nests upon the Tops of Houses, towards the End of *September* plunge themselves into Ditches and Rivers, where they remain conceal'd till about the Middle of *May*. He, also, informs us, that when the Inhabitants seeing Fish thro' the Ice, break it in order to catch them, they also frequently find Clusters of Swallows adhering to each other, without discovering the smallest Signs of Life, till they are brought to a Stove, where they soon return to Life. But what is still more remarkable is, that as soon as the *Polanders*, who imagine it unlawful to kill these Swallows, set them at Liberty, they forthwith fly back to the Water, and plunge themselves into it.

The celebrated *Huet*, Archbishop of *Avranches*, who travell'd thro' *Sweden*, informs us, that between *Caen* and the Sea, along the Shore of the River *Orne*, there are many Caves, in which, during the Winter, have been found large Clusters of Swallows, suspended like so many Bunches of Grapes; and that the like was long ago observ'd in *Italy*. For *Pedo Albinovanus*, in the Elegy he compos'd on the Death of *Mecænas*, speaks of the Retreat of the Swallows to the Rocks, as an infallible Sign of the Approach of Winter.

“ Congelantur Aquæ, scopulis se condit Hirundo.
“ Verberat egeledas garrula vere Lacus.”

Bodin, quoted by *Camerarius*, *Cant. 7. Hist. 71.* informs us, in the second Book of his *Theatre of Nature*, that when the People who inhabit the Coasts of the *Baltic* Sea, are employ'd among the Rocks in searching for yellow Amber, they frequently

quently find large Clusters of Swallows. *Camera-rius* subjoins, that some Authors affirm, that “ Swallows conceal themselves in the Bottom of the Sea, where they sleep till the Appearance of a proper Season for their quitting it; but this is impossible since they have Lungs, and for that Reason must necessarily perish in such a Condition.” But however specious and conclusive this Reasoning of *Camerarius* may appear, yet ’tis certain that the Truth of Facts, which have actually happened, can never be invalidated.

Franciscus de Frankenau in his Medicinal Satyres, confirms this Opinion with Respect to Swallows, by the Authorities of *Lauremberg*, in *Acer. Philol.* Lib. 3. Cap. 71; of *Isaac Vossius*, in his *Append. de Lucis Natur.* Cap. 1; of *Deusingius*, in *Vindict. Flet.* Sect. 5; and of *Fournier*, in his Geography, who in Part 1. Lib. 2. Cap. 5. informs us, that they are commonly found in the *Norwegian-Seas*, as also in the Lakes and Rivers of *Silesia*, *Poland*, *Bohemia*, and *Moravia*; and that in the Beginning of the Autumn, large Numbers of them plunge themselves into Wells. The same Author, also, establishes his own Opinion by the additional Suffrages of *Cromerus*, in *Hist. Polon.* Lib. 1; of *Hevelius*; of *Marcellus Donatus*, in *Hist. Med. Memorab.* Lib. 4. Cap. 12. and of *Helvicius*, in his Epigrams.

The celebrated Mr. *Falconet*, whose Judgment and Veracity render his single Word a sufficient Evidence, informs us, that being in the House of a Gentleman of *Brest* in the Winter Season, he saw a Servant bring in a Kind of Mass or Lump, which appeared to be Earth, and which some Fishermen had caught in their Nets. By washing it carefully,
in

in order to discover what it was, it was found to be a Group of Swallows, which resum'd Life by being expos'd to the Fire for some time.

Swallows are not the only Birds which conceal themselves in the Bottoms of Rivers, in order to pass the Winter; for *John Baptiste de Fulgosa*, formerly Doge of *Genoa*, affirms, that *Gervas Tiberius*, wrote to *Otho* the Fourth, that some Persons having thrown their Nets into a River of that Country in the Winter Time, they brought to Land a large Quantity of Storks, which were apparently dead, with their Beaks fix'd in each other's Fundament; but they were soon restor'd to Life, by means of Heat. The same Author adds, that in 1467, near *Metz* in *Lorrain*, a large Number of apparently dead Storks were found in a River, and that being put into a warm Bath, they recover'd Life.

The learned *Vossius*, in *Append. de Lucis Natur.* informs us, that at the Approach of Winter, Storks, Herons, and some other Birds of the like Nature, do not fly to *Egypt*, or into more temperate Climates, but plunge themselves into Ditches and Marshes.

The Possibility of retaining Life for a long Time under Water, is still farther evinc'd, by considering those Birds with which our Fields and Forests are richly stock'd in Summer; but which are not to be seen in Winter. If it should be said, that these, during the Winter, live upon the Stores they have amass'd in the Summer; I answer, that they are by no Means provident against future Want. Hence they must necessarily conceal themselves, in Places suited to their particular Natures; and as it is equally impossible for them, as for the human Species, to live
awake

awake without Aliments, 'tis more than probable that during the whole Winter, they are, as it were, lock'd up in so lethargic a Sleep, that they sustain no Loss or Dissipation of their Fluids, and consequently require no Reparation.

If it should be ask'd, whether these Animals, during such a State, retain a real Principle of Life? I answer, that the Thing is not only probable, but may be also evinc'd from Fact and Experience, since the most celebrated natural Historians and Physicians give us strong and uncontroverted Instances of this Kind. Thus in *Ephemerid. Nat. Curios.* we are inform'd, that a certain Gentleman in the Winter Season, order'd an hollow Trunk of a Sallow Tree, which by his Direction had been cut down the preceding Autumn, to be laid on the Fire; but a small Portion of it happening to be left in a Corner of the Room, he had the Curiosity to examine it, and upon his doing so, found Feathers arrang'd and dispos'd in a natural Manner: These he gently pluck'd off, and underneath found the Flesh of a small Bird which he believ'd to be dead, though he could not discover to what Species it belonged. However, with respect to this Circumstance, he was soon undeceiv'd; for having expos'd it to the Influence of the Fire, it soon discover'd palpable Signs of Life. Something similar and analogous to this, no doubt, happens with respect to many of those Quadrupeds which inhabit our Forests, for Want of a Nourishment proper to give their Blood that Degree of Fluidity, which is absolutely necessary to its Circulation, since it is certain, that a far smaller Number is to be seen in Winter than in Summer.

After these Examples of an apparent Death in Birds whose Blood is warm, we have no Reason to be surpriz'd at *Pecklinus*, when he affirms, that in

the Winter Time, Fishes not only appear dead; but are consequently cover'd over with a Crust of Ice in their Holes, without having the vital Principle destroy'd in them; for they begin to live afresh, when the Heat of the Atmosphere, or an artificial Fire, melts the Ice. The like, continues the Author, happens to Serpents, Toads, Frogs, Tortoises, and in a Word all amphibious Animals, when the Cold inspissates their Juices; which being naturally viscid, are consequently more proper to prevent the Dissipation of that vital Spirit, which is absolutely necessary to restore them to Life.

'Tis to be observ'd, that those Fishes which have been thus frozen, do not long survive their artificial Restitution to Life; because the Frost having alter'd the Principles of their Blood, the vital Spirit, when beginning to act and unfold itself, can no longer form a Mass of Fluids of an uniform Nature. Thus Wine when frozen, and artificially thaw'd, contracts a disagreeable Flavour, because the Solution being procur'd in an unnatural Manner, hinders the spirituous Part of the Wine from mixing with its other Principles, in the same Order and Proportion as before.

What *Pecblinus* advances with Respect to Fishes, is entirely conformable to the Opinion of *Theophrastus*, in *Tr. de Piscibus in sicco degentibus*, where we are inform'd, that the Inhabitants of *Pontus*, frequently find Fishes in the Ice, which discover no Signs either of Motion or Sensation, till they are put into a Fish-Back, or laid among Straw. This Circumstance, according to *Theophrastus*, happens particularly to the Gudgeon, and some other Fishes of a similar Nature.

The last Proof of the Possibility of a Person's retaining a Principle of Life for a long Time under Water, without a Supply of Aliments for the
Pur-

Purposes of Nutrition, is drawn from a Consideration of some Quadaupeds, as the Hedge-Hog, the Marmotte, the Dormouse, and some others, which in the Beginning of Winter concealing themselves in the Earth, are seiz'd with so profound a Sleep that they appear to be dead, since neither the Pulsation of their Arteries, nor their Respiration are perceptible. This Circumstance, no doubt, induc'd the celebrated *Harvey* in *Lib. de Generat. Animal. Exercit. 50*, to speak in the following Manner: "Some sanguineous Animals live long without any Pulse, and lie conceal'd during the Whole of the Winter, notwithstanding which they remain alive, tho' their Heart retains no Motion, and their Respiration stops, just as it happens to Persons attack'd with Synopes, and hystERIC Fits, whose Pulse is totally abolish'd." Tho' *Harvey* was the glorious Discoverer of the Circulation of the Blood, and may for that Reason be suppos'd to be a keen Advocate in its Behalf, yet 'tis sufficiently obvious from this Passage, that he did not believe it absolutely necessary to the Preservation of Life. But *Pecklinus*, whether from Prejudice, or rational Deductions from what he had observ'd, is of Opinion, that in these Animals, Respiration is carried on, by a Motion of the Diaphragm, so insensible as to escape the Eye of the Observer. He also observes, that in this State, it is necessary their Respiration should be such, because if it was perform'd in the usual Manner, the Motion of the Blood would be so likewise; in consequence of which, the Transpiration and Necessity for Aliments would be equally strong; a Circumstance incompatible with the Condition of these Animals, which lie hid under the Earth during the whole Winter.

Tho' these Relations may possibly appear very singular and surprising to Persons unacquainted with Natural History; yet they infallibly prove, that in the brute Creation at least, Respiration, the Circulation of the Blood, and Pulsation of the Arteries may cease for a long Time, without the total Extinction and Destruction of Life. Now is it not highly probable, or rather absolutely certain, that something similar and analogous to this may happen to human Creatures, who have the Misfortune to be drown'd, since in both, the Solids and Fluids act and move by the same Laws, so in both Suffocation must be the same Thing, and consequently its Effects remov'd by the same Means?

Besides, there is by no Means any Reason for believing, that an Instance of this surprising Abstinence and Want of Food, produc'd by such a profound and lethargic Sleep, as that of the Marmotte, is not to be found among the human Species; for in *Miscellan. Academ. Natur. Curios. An. 8. Obs. 67.* the celebrated *Ludovicus*, first Physician to the Duke of *Saxe-Gotha* informs us, that a young Girl, who for some Fault she had committed being apprehensive of a severe Chastisement from her Parents, retir'd to the most conceal'd Part of a Thicket, where, seven Days after her Elopement, she was found lying on her Belly with all the apparent Signs of Death, except that her Limbs were still flexible and pliant; her Visage was overspread with a viscid Phlegm, which was cover'd with an hoary Kind of Down, and with the falling Leaves which had adher'd to it. Her Mouth and Nostrils were entirely full of a thick Mucus: But notwithstanding these seemingly discouraging Circumstances, the Physician call'd to her Assistance, order'd her Body to be warm'd by Means of Friction; Then, with warm Water,

washing

washing away the Phlegm which cover'd her Face, and the viscid Mucus which obstructed her Mouth and Nostrils, he pour'd into her Mouth a Spoonful of Brandy, which seem'd to go down her Throat, and was the only Cordial he had at hand. Upon exhibiting a second Spoonful, she fetch'd a Sigh, and a third made her open her Eyes.

We now proceed to consider the most proper and efficacious Measure to be taken for the Relief of drown'd Persons; for which Purpose we shall previously investigate and ascertain the genuine Cause of Suffocation.

Not only the antient Schools of *Greece* and *Arabia*, but also most of the succeeding Physicians, till the Days of *Platerus*, imagin'd that the Suffocation was produc'd by the Water which enter'd into the Stomach, Breast, and Lungs; in Consequence of which false Notion they thought themselves fully authoriz'd to attempt its Discharge with all possible Expedition. For this Purpose they order'd drown'd Persons to be suspended by the Feet, or laid upon their Bellies, on a Hogshhead or Tub, which was to be agitated from one Side to the other, imagining that by this Position, the Abdomen and Breast being compress'd, and the Head hanging down, the Agitation of the Vessel, must necessarily facilitate the Evacuation of the Water, which they suppos'd was also favour'd by the declining Situation of the superior Part of the Body. With the same Intention, they also order'd such Measures as had a Tendency to excite Vomiting.

But as a false Theory never fails to lay a Foundation for a dangerous Practice, so we have just Reason to condemn this Method of Suspension, or hanging by the Heels; for the Water swallow'd by drowning Persons descends into the Stomach,
and

and not into the Thorax, so that it cannot prevent their Recovery. This Circumstance must happen, not only so long as a Person retains a Sense of his State and Condition, but also afterwards; for as the Water is hinder'd from entering into the Arteria Trachæa and Lungs by a mechanical Effort, in which Reason has no share, so the Lungs may in this State be compar'd to an empty Bottle plung'd in Water, into which the Fluid does not enter, because the Air it contains resists its Access, and this the rather happens, because the Motion of the Breast, destin'd to attract the Air, at that Time, totally ceases, and consequently nothing forces the Water to enter and fill up its Place. This Doctrine is not only evinc'd from the Structure of the Parts, but also confirm'd by Experience.

Thus the learned *Platerus*, in *Quest. 5.* positively affirms, that if drown'd Persons swallow any Water, the Quantity of it is too small to prove mortal to them; because he always found but very little of it in their Stomachs. He also adds, that most of the Water which appears to be discharg'd from the Mouths of Persons suspended by the Heels, really flow'd from their Cloaths.

Nymman, in *Tr. de Vita fæt. in Utero*, speaks thus, " Who could believe that a Fœtus so long included in the Uterus, where it moves all its Limbs, should yet never move its Jaw-bone, nor open its Mouth. Besides, it always has its Nostrils open, notwithstanding which it has never been observ'd that the Liquor of the Amnios has enter'd its Body. Thus it is with the Human Fœtus, as with those who are drown'd, since in dissecting many of these last, I have hardly found a Pint of Water in their Bodies."

In the *Miscellan. Nat. Curios. An. 2. Obs. 251.* *Wepfer*, gives an Account of the Anatomy of some

some Beavers, one of which was drown'd. The Author having open'd the *Arteria Trachæa*, no Water was discharg'd from the Lungs; but there were about four Ounces of Water, like the Washings of Flesh, found in the right Cavity of the Breast, and about three Ounces of the same Kind in the Left. This Extravasation the Author justly supposes produc'd by the Expression of a bloody Lymph from the Pores of the Bronchia of this Animal, which had for a long Time struggled against so violent a Death as that of Drowning. Neither pure Water nor Water ting'd with Blood, were observ'd either in the *Arteria Trachæa*, or in the *Bronchia*.

Bhonius, in the Appendix to his Treatise *de Renuntiat. Vuln. Diff.* 2. informs us, that in dissecting a great many Women drown'd for murdering their Children, he had shewn the Spectators, that there was little or no Water in their Lungs and Abdomen; and adds, that in order to render himself more certain with Respect to this Circumstance, he had drown'd several Animals, in whose Cavities, tho' drown'd alive, he had never perceiv'd any Water.

Detbardingius, at present Professor of Medicine in *Copenhagen*, in a Letter wrote when he was Professor at *Rostoch*, in 1714, gives us an Account of the Dissection of a Soldier, who attempting to make his Escape from a Garrison, was drown'd in a Ditch, and upon being open'd had in his Stomach only about a Pint of Beer, which he had drank some Time before. The Professor took care previously to apprise the Spectators, that there would not be a single Drop of Water in his Breast, which as well as his Abdomen, was very much elevated; and the Event verified the Prediction.

Johannes

Johannes Conradus Becker, in his *Treatise de Submers. Mort. Sin. Pet. Aq.* gives us the four following Histories. A Dog, says he, being drown'd and lying in the Water for an Hour, his Abdomen, Stomach, and Intestines, appear'd tumified and inflated, tho' a single Drop of Water was not found in them. The Lungs were, also, inflated, without containing Water, like those of hang'd Persons, but immediately collaps'd upon suffering the Air to escape thro' an Incision made in the *Arteria Trachæa*. The Author subjoins, that this Observation render'd the Doctrine of the Antients highly suspected by him.

The second, is the History of a Peasant, taken from the Water, after he had been some Weeks in it, and was entirely putrified. After opening his Duodenum, two Ligatures were made on that Intestine, which was very much inflated, and from the Aperture of which nothing was discharg'd, but a Liquor which was Chyle mix'd with Beer, of which the Peasant had, at a Market, drank so liberally, as to intoxicate himself. The Tumefaction of the Stomach, laid a Foundation for suspecting that it contain'd a large Quantity of Water, tho' upon laying it open, nothing was found but a Pint of a Liquor, whose Smell exactly resembled that of Beer. The Lungs were so much inflated, that when an Incision was made in the Breast, they burst out; but their Inflation was speedily dissipated, by making an Aperture in the *Arteria Trachea*, thro' which the Air was discharg'd with a considerable Noise. In cutting the Lungs into Pieces, no extraordinary Signs of Humidity were perceiv'd, nor were any preternatural Circumstances observ'd, except Spots of different Colours.

The third History, is that of a Woman drown'd in a Well, in whose Intestines nothing but Chyle was

was discover'd, neither was there any Water in the Lungs. The Intestines collaps'd upon making a small Puncture in them, and an Aperture being made in the Arteria Trachea, the Air escap'd thro' it from the Lungs with some Noise.

The fourth and last History related by *Becker*, is that of a Man who was found standing upright in a Bason, where he had remain'd under Water for five Days. His Stomach, which was large, was only inflated with Wind, and hardly contain'd six Ounces of a whitish Liquor. The Lungs being equally inflated, collaps'd upon cutting the Arteria Trachea, from which the Air was discharg'd with a considerable Noise. When he was found, two Spoonfuls of Water were not discharg'd from his Mouth. "He was, however, continues *Becker*, "every where furrounded with Water, but "that Element, notwithstanding the Minuteness "of its Parts, could not penetrate into the Arteria Trachea and Oesophagus, in order to fill the "Cavities of the Viscera; an evident Proof that "these Parts were so defended against every Thing "that made an Attempt to enter them, that the "Water itself could not force a Passage into "them."

From these Observations, the celebrated Author concludes, that the Absence of Water in the Lungs and Intestines, is not a Proof that a Person has been thrown into the Water after his Death. This Observation is of the last Importance to those whose Business it is to make Reports before Courts of Judicature, tho' it is contrary to that of *Rodericus à Castro*, adopted by many Philologists and Criminalists, and among others by *Feltman* in *Tr. de Cadavero inspiciendo*, Cap. 21. But as in the Opinion of *Becker*, the Lungs are not inflated in those who are thrown into the Water after Death, so we may

from their Inflation draw a Proof, that the Person was alive when drown'd, or put into the Water.

Since, therefore, it is sufficiently obvious, both from the Structure of the Parts, and the Authorities of the most penetrating Anatomists, that little or no Water enters the Bodies of drown'd Persons, so 'tis equally obvious, that the Practice of hanging by the Heels, is not only useless, but must also contribute to destroy those Remains of Life which may possibly be lost; for by such a Suspension, the whole Column of the Blood convey'd to the Heart by the inferior *Vena Cava*, will necessarily press upon that convey'd by the superior *Vena Cava*, where the Blood being interrupted in its Course, must necessarily regurgitate into the jugular Veins, and consequently into the Head, where, by its Quantity and Weight, it retards the Motion of the Spirits, whose free Progress is absolutely necessary to restore the Circulation of the Blood, on which Life in a great Measure depends.

As it is of great Importance, to know the Cause of the Inflation of drown'd Persons, since it is not produc'd by the Water they swallow, so the learned *Dethardingius* accounts for it in the following manner, " Those, says he, who die in the Water, " are not destroy'd for Want of Air, but by " means of too large a Quantity of it; they do " not die in Expiration, but in Inspiration; and " in a Word, nothing more resembles each In- " spiration, than the Phænomena observ'd in " drown'd Persons; for if we attentively consider " what happens to ourselves, we perceive that the " Breast is as it were lengthen'd, the Abdomen " elevated, and the Flanks inflated, and that this " State subsists, so long as we draw in the Air, or " retain it in the Breast. Now the same Things " happen in drown'd Persons, only with this Dif-
ference,

“ference, that in the latter, the Inspiration is
 “perform’d with Rapidity and Violence, whereas
 “in the former it is carried on quietly and without
 “any Effort. In Persons not drown’d, a Depres-
 “sion succeeds the Elevation; but in drown’d
 “Persons the Elevation of the Abdomen, and the
 “Elongation of the Breast subsist; by which means,
 “all the Parts continue in a State of Expansion.
 “This is, no doubt, the Meaning of those, who
 “look upon the Death of drown’d Persons as a
 “Suffocation, and pretend that the Cause of it,
 “and that of strangled Persons is the same; for
 “those two Kinds of Death have a great Resem-
 “blance and Analogy, as is sufficiently obvious
 “from the Elevation of the Abdomen, which in
 “hang’d Persons subsists after their Death.”

From this Theory ’tis sufficiently easy to con-
 ceive, that the Inflation of the Lungs, is the Cause
 of the Death of drown’d Persons; accordingly
Detbardingius from the preceding Doctrine draws
 the following Conclusions; “The Vesicles of
 “the Lungs are inflated by the Air, the Bronchia
 “are lengthen’d, the Blood Vessels distributed
 “thro’ the whole Body of the Lungs, are com-
 “press’d; and tho’ the Elongation of the Bron-
 “chia assists the Entry of the Blood into the large
 “Vessels, as well those proper to the Lungs, as
 “the bronchial Artery and Vein, as those which
 “are only subservient to the Circulation, as the
 “pulmonary Artery and Vein, yet the Circulation
 “is not carried on equally in the Capillaries; since
 “the Presence of a rarified Air in the Vesicles
 “compresses the Blood, and forcing it to stop
 “there, hinders it from passing into the Left Ven-
 “tricle of the Heart, in order to accomplish the
 “Circulation. Now as soon as there is a consi-
 “derable Retardation in this important Function,

“ the vital Motions also gradually cease, and
 “ Death approaches insensibly.”

After having thus discover'd the Reason of the Inflation of the Lungs, and of the Death which succeeds that Circumstance, we shall, with the same Author, investigate the Cause which hinders the Discharge of the Air from the Lungs and Breast. This is by no means a Topic of pure Curiosity, since, the Assistance to be afforded to drown'd Persons, can be of no Service, except in so far as it is proper to remove those Obstacles, which oppose and hinder the respective Actions of the vital Functions. Now *Detbardingius* and *Becker* pretend, that the *Epiglottis*, (which is a small Valve plac'd at the external Entrance of the Larynx, in order by its covering the Glottis, to hinder all solid or liquid Bodies which may be put into the Mouth, from descending into the Canal of Respiration) being exactly and strongly applied over the Glottis, proves the Obstacle to the Discharge of the Air from the Lungs. These Authors, also, affirm that such a strong and convulsive Application of the Epiglottis over the Glottis, arises from a preternatural Extension of the Fibres of those Membranes of the Larynx, which cover the Epiglottis. This preternatural Extension they attribute to the violent Inspiration excited by Fear, in Persons who run a Risk of being drown'd. Thus the incomparable *Detbardingius* reasons in the following Manner: “ If in all Kinds of Dread and Terror
 “ we observe, that Respiration is disorder'd; that
 “ is to say, that Inspiration is more quick, and lasts
 “ longer; and that, on the contrary, Expiration
 “ is intercepted, uncertain, and short, it follows
 “ of Course, that Inspiration must be much more
 “ strong, and the Air attracted in a far larger
 “ Quantity, when a Person perceives that he is
 “ threat-

“ threatn’d with Death by the Water, which must
 “ in a Moment fill the Space which ought to be
 “ occupied by the Air.”

It is pretty surprising that *Becker* and *Detbardingius* should only reason conjecturally in this Affair; since the Dissections they made of drown’d Persons, might have enabled them by their Eyes to judge of the Disposition of the *Epiglottis* in these unfortunate Creatures. But, be this as it will; certain it is that *Detbardingius*’s Method of affording Relief to drown’d Persons, is highly rational, and promises fair for restoring them to Life. It consists in four Things; the first of which is, to place the Body drawn from the Water in a proper Posture and Situation. The Second is to compress the Abdomen, at the same Time that Frictions are making on the Back. The Third is, to excite an Irritation in the Throat; and the Fourth to make an Incision in the *Arteria Trachea*.

As for the Situation of the Person taken from the Water, we have already shewn Suspension by the Heels to be prejudicial; tho’ *Becker* recommends it, because he thinks the Weight of the abdominal Viscera may thrust the Diaphragm into the Breast, compress the Lungs, and giving a greater Spring to the Air, make it act with such an Effort, as to raise the *Epiglottis*: But the judicious *Detbardingius*, sensible that this Method is sufficient to destroy Respiration in Persons alive, absolutely condemns it, and orders drown’d People to be laid with their Bodies so declining, as that the Head may be lowest. Besides, as he had observ’d that Respiration is more difficultly perform’d on the Belly, he directs drown’d Persons to be laid on their Backs, and a strong Compression of the Abdomen to be made, from the Region of the Pubes, as far up as the

the Stomach. He adds, that it is expedient, both for the Sake of the Frictions and the Compression, to rub the Hands with some Oil, proper to restore to the Fibres render'd rigid by the Cold and Spasms, that Suppleness and pliant State, which is necessary to them in order to perform the Motions of Respiration.

Pecklinus observes, that in *Sweden* it is customary to use Frictions on Persons taken out of the Water, and externally to apply hot and spirituous Remedies in order to reanimate the internal Heat, and more effectually excite the Effervescence of the Blood. *Borelli*, in *Hist. Cent. 2. Obs. 11.* orders the Skin to be render'd red by Means of Frictions in a warm Bed. Mr. *Joly*, a Physician of *Britany*, in the Observations inserted in the Historical Journal, for the Month of *November* 1743, advises Frictions before a large Fire with hot Cloths, with a View to restore the Person to Heat as soon as possible. *Dethardingius* orders these Frictions to be made from the Nape of the Neck down to the Buttocks, because, the Heads of the Muscles subservient to Expiration, are attach'd to the Spine of the Back, and their Tendons to the Ribs; and because, in his Opinion, Friction facilitates the Action of these Muscles, especially when made with Oils, which contribute to restore the Pliancy of the Fibres.

Besides Frictions before a Fire, with hot Cloths soak'd in Oils or spirituous Liquors, are beneficial in another Respect, because, the Spine of the Back is the Origin of a great Number of Nerves and consequently of the various Motions perform'd in the Body. This cannot fail to put all the vital Springs in Action; by restoring Suppleness to the nervous and muscular Fibres, and Motion to the
flow

flow circulating, or even totally coagulated Juices. This is the Reason, why Frictions and Pumping so often prove successful in Apoplexies.

We must, also, observe, that *Detbardingius*, approves of laying drown'd Persons on their Bellies over a Hogshhead, or round Vessel, which is to be agitated, not with a View to make them discharge the Water they have swallow'd, but to shake and compress the Abdomen, and thrust its Contents towards the Diaphragm. But *Forestus*, in *Observat. Chirurg.* Lib. 6. *Obs.* 33. & *Obs. Med.* Lib. 15. *Obs.* 26. condemns this Expedient as well as that of Hanging by the Heels, "because, says he, it has produced sudden Death in some Persons who could not bear the violent Motion, the Turning, the internal Parts of the Body topsy-turvy, and the Agitation of the Head, and Vomiting produc'd by this Means." Mr. *Joly* also condemns the putting drown'd Persons in a Hogshhead open at both Ends in order to be roll'd for some Time in different Directions.

Detbardingius seems not to have laid great Stress upon the *Swedish* Practice of defending the Bodies of drown'd Persons from the Contact of the Air, and of conveying them into warm Places. The first Step however taken by the *Sweaes* is, according to *Pecblinus*, to wrap such Bodies up in warm Cloths. *Langelotti* also, in *Miscel. Nat. Curios.* An. 6. *Obs.* 20. informs us, that this Method is among them universally put in Practice, because they have learn'd from long Experience, that no drown'd Person recovers, if he is left long expos'd to the free Air, Mr. *Joly* is, also, of Opinion, that drown'd Persons should be left upon the Shore no longer, than is necessary to pull off their Cloths, which may be cut off for the Sake of Expedition; "for, continues he, a single Moment
" often

“ often determines between a State of Death or
 “ Life. In consequence of this Principle, he
 adopts the *Swedish* Practice; “ for, *says he*, when
 “ the drown’d Person’s Cloths are taken off, he is
 “ to be wrapt up in the warmest Coverings or
 “ Cloths which can be then had. Then he is to
 “ be convey’d to the nearest House, where after
 “ Frictions before a warm Fire with hot Cloths,
 “ he is to be laid in a very warm Bed. Great
 “ Care is to be taken, to apply to his Feet, the
 “ Inner-sides of his Thighs, his Houghs, and his
 “ Arm-Pits, Flaggons full of boiling Water,
 “ wrapt up in linen Cloths.” For the same Pur-
 pose we may make use of Bricks. I must, how-
 ever, observe, that Mr. *Joly* recedes from the
Swedish Practice, in a Circumstance which to me
 appears to be of the least Importance; for the
Swedes do not warm the Bodies of drown’d Per-
 sons suddenly, but by little and little, before a
 gentle Fire. The Expedience of this may be e-
 vinc’d by considering the Effects of a too intense
 Heat upon Fishes found frozen in the Winter
 Time, which indeed recover for a Moment, and
 then die irretrievably. *Nymman* and *Ranchin* also
 order’d drown’d Persons to be laid in warm Places,
 especially in Winter.

As in drown’d Persons, a Defect of respirable
 Air produces a Suffocation, so it would be no
 less foolish, than barbarous, suddenly to expose
 them to the entire Action of the Atmosphere, since
 that Fluid entering precipitately into the Thorax,
 would produce, in the pulmonary Vessels, a Dila-
 tation, which instead of promoting the Passage of
 the Blood thro’ that Organ, would produce a
 fresh Obstruction in it, because the Action of the
 Heart is not strong enough, to surmount the Re-
 sistance which the Air makes to the Passage of the
 Blood;

Blood ; and this must the more inevitably happen, because the Lungs in such a State collapse, which is the unavoidable Fate of all Fibres depriv'd of the Influx of the Animal Spirits, which necessarily depends on the free Conveyance of the Blood thro' the whole Body, and the Velocity of its circular Motion. The Precaution, therefore, of wrapping Persons taken from the Water in Blankets, is highly proper, and excellently suited not only to this Species of Suffocation, but also of all others.

But it is not sufficient to guard drown'd Persons against the rude Impressions of the Atmosphere, since 'tis also requisite they should only be permitted the free Use of that Fluid by Degrees.

As the Decrease of the Circulation is necessarily succeeded by a proportionable Diminution of Heat, so 'tis justly to be expected, that the Bodies of drown'd Persons have lost the greatest Part of that Warmth, which is so necessary to the Support of Life. Hence 'tis absolutely requisite they should be warm'd. But it would be equally pernicious, suddenly to expose them at once to the Fire, or precipitately to exhibit Medicines, which by the Volatility of their Principles, might produce a Rarefaction of the Blood. 'Tis, therefore, far more safe and prudent, to begin with gradually augmented Frictions of the Extremities with warm Cloths, than all at once to expose such Persons to the Fire, or call in the Assistance of hot and volatile Medicines, both of which may be safely, tho' sparingly and gradually us'd, when the Circulation is so restor'd, that their bad Effects are no longer to be fear'd.

These Precautions are founded on physical Reasons, which tho' sufficiently known to Physicians,

may yet afford fresh Pleasure and Entertainment to Readers of another Class.

The Blood, then, of the *Vena Cava*, discharges itself into the right Auricle of the Heart, whose Contraction forces it into the right Ventricle, which in its Turn contracting itself, propels the Blood into the Pulmonary Artery. That those Operations may be perform'd, 'tis necessary the Quantity of Blood discharg'd into the right Auricle, should not over-power its Action; that the contractile Force of the right Ventricle should be sufficient to propel the Blood in the pulmonary Artery; and that in this Artery there should be nothing to obstruct or oppose the Distribution of the Blood, which ought to be made in it. Now according to this Theory, the Contractions of the right Auricle and Ventricle, are in such Cases extremely weakened, since these Muscles partake of the Relaxation of the whole System of the Fibres. The Lungs, also, collapse, and consequently oppose the free Circulation of the Blood, or its free Distribution thro' themselves. If, therefore, in affording Assistance to drown'd Persons, we should precipitately convey too quick a Motion to the Blood, we should by that very Circumstance produce invincible Obstacles to its Circulation, and consequently make the Means of recalling Life subservient to the Production of irretrievable Death; for the excessive Quantity of Blood which enters the right Auricle, will over-power and surmount the weak Force which resists it. Besides, tho' this Auricle had contractile Force enough to convey the Blood into the Heart, yet the Action of that Muscle will not be sufficient to propel the Blood into the Lungs, or at least to surmount the joint Resistance made by the collapsed State of the Lungs, and the Air compressing their Blood-Vessels.

Vessels. These Methods, therefore, of relieving drown'd Persons and restoring them to Life, are not only founded upon the animal Oeconomy, but are also absolutely necessary and indispensable.

'Tis, however, to be observ'd, that when the Circulation begins to be carried on freely, we may, if such Practice is indicated by any pressing Circumstances, attempt to reduce it to its natural State, by means of Cordials and anti-apoplectic Medicines; tho' these, especially the latter, as being most powerful, are in the Beginning to be us'd with the utmost Caution; and probably the safest Method is totally to abstain from the anti-apoplectic Medicines, and to begin with the mildest Cordials, whose most energetic Parts being diluted in a large Quantity of some proper Vehicle, may more insensibly mix themselves with the Mass of Blood, and consequently produce their Effects more slowly. 'Tis, however, to be observ'd, that the same Danger is not to be dreaded from the external Use of the most efficacious Remedies. Thus, for Instance, we need not hesitate to apply Topics to the Temples, the Nostriis, the Wrists, the Pit of the Stomach, and all those Parts, where the Arteries lying near the Surface of the Body, are expos'd to their Action and Influence. And as the Membranous Parts are none of the least considerable Instruments of the several Motions perform'd in the Body, so a very particular Regard ought to be had to them: Frictions, then, of the Hands and Feet, as well as the Application of spirituous Medicines to these Parts, are extremely beneficial; for tho' the Propriety of this Practice could not be demonstrated from Anatomy and Physiology, yet we might be fully convinc'd of it, by the Observation of *Deventer*, who orders Frictions with Brushes to be made on the Soles of the Feet of

G 2

such

such new-born Children, as discover no Signs of Life, in order to restore the Circulation of the Blood, which is the Foundation or first Beginning of it.

Deventer does not, indeed, advise the Application of spirituous Medicines to these Parts; but as 'tis sufficiently certain, that these, as well as all other Liquors, penetrate the Surface of the Body, and enter the Cavities of the Vessels, so their external Applications must necessarily produce very happy Effects. Besides, this Method of using spirituous Medicines, is of all others the safest; not only because their Mixture with the Blood is not so quick as when they are exhibited internally, but also, because, the Parts to which they are applied are most remote from the Center.

But we now proceed to consider the other Methods of affording Relief to drown'd Persons, beginning with the Smoke of Tobacco, the happy Effects of which are prov'd by various Observations. Thus Doctor *Mead* in his mechanical Account of Poisons, after mentioning that many who have been drown'd and dead to all Appearance, have been surprisingly restor'd to Life, speaks in the following manner, from the Memoirs of the Royal Academy of Sciences: " This Circumstance should
 " certainly encourage the Use of all Means, upon
 " such Accidents, especially as the Trial is not difficult. The first Step should be to blow the Smoke
 " of Tobacco up into the Intestines, then to warm
 " the Body by shaking and rolling about, and rubbing it with warm Cloths in a Bed. In a Word
 " to put the Blood into Motion all manner of
 " Ways, and not to be discourag'd tho' no Signs
 " of Life should be discover'd after an Hour or
 " two should be spent in this good Work; towards
 " the latter End of which, Spirits and volatile
 " Salts may produce a good Effect. Neither
 " should

“ should bleeding be omitted when the Blood is
 “ become sufficiently warm to drop out of the
 “ Veins.”

The happy Effects of the Smoke of Tobacco in restoring drown'd Persons to Life, are farther evinc'd from the following Narration of Dr. *Bruhier*. Mr. *Thomas* a profess'd Surgeon of *Paris*, being at *Passy*, waited in a Boat till the Number it was to take in should be completed. During this Time, he saw a Boat crossing the River, and when it arriv'd at Land, one of the Passengers stepping ashore, and missing his Wife, ask'd what was become of her; but no one could give him any Answer, except a young Child, who pointing to the River, said, she had hid herself in it. This Woman had fallen from the Stern of the Boat, without being perceiv'd by any of the Passengers, except the Child, who gave Directions to row to the very Part where the Woman fell from the Boat. The Husband finding her in a Place which was not very deep, but full of Mud, brought her to Land, and laid her out. Whilst some of the Spectators of this melancholy Accident were advising to hang her by the Heels, and others ordering different Measures to be taken, a Soldier with his Pipe in his Mouth, came to ask the Reason of such a Concourse of People; upon being inform'd of the Accident, he desir'd the disconsolate Husband to give over weeping, because his Wife would return to Life very soon. Then giving his Pipe to the Husband, he bid him introduce the small End of it into the Anus, put a Piece of Paper perforated with a large Number of Holes upon its Mouth, and thro' that blow the Smoke of the Tobacco into her Intestines, as strongly as he possibly could. Accordingly at the fifth Blast, a considerable rumbling in the Woman's Abdomen was heard, upon which

which ſhe diſcharg'd ſome Water from her Mouth³ and in a Moment after return'd to Life. This Practice, however inſignificant in the Eyes of the Vulgar, is nevertheless of the higheſt Importance; for the Irritation of the Inteſtines, excited by the Heat and Acrimony of the Smoke of the Tobacco, produces in the Muſcles ſubſervient to Expiration, ſuch a Reflux of the animal Spirits, as induces a Contraction of them ſufficient to ſurmount that Reſiſtance which the Air contain'd in the Breſt, found to its Diſcharge. This happy Effect of the Smoke of Tobacco is ſufficiently evinc'd by the preceding Hiſtory, ſince it made the Woman vomit up the Water ſhe had ſwallow'd. Now vomiting is excited by a ſtimulating Contraction of the Diaphragm, and of the tranſverſe Muſcle of the Abdomen, which contracting the Stomach, force it to diſcharge its Contents, where the leaſt Reſiſtance is found, and conſequently by its ſuperior Orifice. It is to be obſerv'd, that the ſame happy Effects are produc'd by the Smoke of all acrid Subſtances, ſince Mr. *Joly* affirms, that the ſame End is equally answer'd by the Smoke of Sage, and other Plants of a ſimilar Nature. It is alſo highly probable, that Clyſters prepar'd with Coloquintida or Tobacco, would produce Effects equally good; but on ſuch Occaſions, the moſt ready and expeditious Meaſures are always to be taken, ſince a very ſmall Delay may prove of the laſt Conſequence, by deſtroying a Life which might otherwiſe be preſerv'd.

In Caſes of Emergence, where proper Inſtruments are not immediately to be procur'd, the Preſcription of the Soldier in the preceding Hiſtory, may be follow'd; but it may loſe leſs Time to cover the Tobacco in the Bole of the Pipe, when lighted, with a ſilk Handkerchief, either ſingle,

or

or once doubled, than to wait till proper Holes are bor'd in a Piece of Paper, tho' this takes up very little Time. However, that no necessary Instructions might be wanted, I have given the Figure of an Instrument, contriv'd on purpose for impelling the Smoke of Tobacco into the Intestines. A. represents a Brass or Iron Box, capable of containing half an Ounce of the strongest Tobacco, which is to be lighted. B. is a common Clyster Pipe, to be introduc'd into the *Anus*, join'd to the flexible Tube D. D. made of Leather. C. is another Pipe, at which a Person blows forcibly, that the Smoke of the Tobacco in the Box A. may be impell'd thro' the flexible Tube D. D. and the Pipe B. into the Intestines. E. represents the Smoke. If one Clyster is not sufficient, another should be given soon after, and repeated till it answers.

These Clysters of the Fume of Tobacco, are of excellent Use in the Iliac Passion, and in an incarcerated Hernia; and no Apothecary or Surgeon ought to be without such an Instrument.

As the olfactory Nerves are of all others the most expos'd to the Action of Bodies, and have an intimate Connection with those subservient to the Motion of the Muscles destin'd for Respiration, it must of course be beneficial to irritate the Nerves of the Nose; so that what we call Sternutatories, or such Substances as excite Sneezing, produce happy Effects in restoring drown'd Persons to Life: *Indian* Marum or Euphorbium introduc'd into the Nose, or reduc'd into a Powder and blown up the Nostrils, will in all Probability produce salutary Effects, since if they operate they will excite a violent Expiration, sufficient to remove all those Obstacles which the Air finds to its free Discharge. Mr. *Joly* warmly recommends this Practice, as also Injections of spirituous Liquors. Thus the
In-

Injection of Spirit of Sal Ammoniac into the Nostrils, operates more powerfully than holding volatile Sal Ammoniac to them. Perhaps Vinegar will stimulate yet more strongly, and with better Effect.

All those Authors who treat of the Measures proper for restoring drown'd Persons to Life, order a Vomiting to be excited, in order to procure a Discharge of the Water contain'd in the Stomach. This is the Doctrine of *Codronchus*, *Forestus*, *Camerarius*, and Mr. *Joly*, who imagines that the Water in the Stomach of drown'd Persons, is one of the Causes of their Death. In order to excite this Vomiting, they order the Throat to be tickled with the bearded End of a Quill. *Becker* and *Detbardingius* order a Feather to be introduc'd into the Oesophagus, in order to excite such a Motion of the Epiglottis, as is sufficient to procure a Discharge of the Air contain'd in the Breast. Now 'tis sufficiently known to every Body, that the bearded End of a Quill excites Vomiting. We must here observe, that Mr. *Joly* only orders Vomiting to be procur'd after drown'd Persons return to Life. But it is certain, that vomiting can produce no happy Effects, if there is nothing in the Stomach, or only a Quantity of Water equal to that daily us'd by most People. As for liquid Emetics, their Effects appear to be highly dubious, since the Oesophagus may possibly be in such a convulsive State, as to hinder Deglutition. *Detbardingius* looks upon this Irritation of the Throat, as a Circumstance of the highest Importance; but for exciting it, prefers a certain Instrument invented in Germany, and describ'd by *Heister* in his Surgery.

According to *Pechlinus*, the *Swedes*, attempt to restore the Lives of drown'd Persons, by Means
of

of Fomentations, with anti-apoplectic Medicines; that is, such as are of an hot and spirituous Nature. *Borelli* in *Obs.* 11. *Cent.* 2. informs us, that he successfully us'd toasted Bread soak'd in warm Brandy, applied to the Region of the Heart, and frequently renew'd. *Nymman* in *Tr. de Apoplexia.* *Cap.* 44. orders us to apply to the Nostrils of drown'd Persons, odoriferous Substances, and such as are capable of putting the Spirits in Motion, and restoring the Action of the Heart, and the Functions of the Brain. Of this Kind are Penny-royal Rue, and Lilly of the Valley, soak'd in Vinegar. He, also, orders us to apply to the Region of the Heart, Epithems prepar'd of Baum, Rue, Marjoram, Amber, Cinnamon, and Lavender. Thus for Instance;

Take of the best Rose-Water an Ounce and an half; of Baum-Water two Ounces and an half; of Rosemary-Water one Ounce; of Malmsey Wine one Ounce and an half; of Lemon Juice one Ounce, of the Powder of Cloves one Scruple; of Theriaca one Dram, and of Camphire and Saffron each half a Dram. Mix all together, and in the Liquor soak a Sponge, to be applied to the Region of the Heart.

As the genital Parts of both Sexes have a near and intimate Correspondence with the Heart, as is obvious from the Effects of Cordials, applied to those Parts, in Syncope, Faintings, and other Affections of the Heart, so *Nymman*, in order to restore drowned Persons to Life, orders these Parts to be fomented with warm Wine, in which Cinnamon, Cloves, Musk, and Baum have been boiled.

But if any Success is to be expected from these Remedies, it is principally, when by the Assistance of Frictions, the most volatile Parts of Spirituous Liquors are made to penetrate into the Mass of

Fluids ; and it is highly probable, that independently of the Experience of the *Swedes*, this Method will answer the End proposed by *Detbardingius*, which is, the procuring of a free Expiration ; for, if the Admixture of the spirituous Parts of cordial Liquors restores the Course of the Spirits and Blood, it must necessarily follow, that both must be more copiously conveyed to the Muscles destin'd for the Purposes of Expiration.

It is also certain, from Experience, that one of the most efficacious Expedients for restoring drown'd Persons to Life, is speedy Venesection, especially in those Parts, most proper for relieving the Head, as the Ankles, for Instance, and the Jugular Veins. The Use of Venesection, in such Cases, must be sufficiently obvious to every one who considers, that drown'd Persons, as well as those who are hang'd, die of an Apoplexy of the sanguineous Kind, and not for Want of Respiration, or, as is commonly imagined, on Account of a Repletion, or choaking up of the Breast by Blood ; for when such Persons are laid open, the Breast is found almost entirely void of Blood, and the Brain extremely inflamed ; both which Phœnomena are highly agreeable to the Laws of the Circulation.

These are the most common and approved Methods of restoring drown'd Persons to Life ; but, if they should happen to prove ineffectual, the last Resource is, what we commonly call *Bronchotomy*, or *Tracheotomy*, which consists in opening the *Trachea*, in order to procure a free Access of the Air to the Lungs. This Operation is principally intended to remove the obstinate Adherence of the Epiglottis to the Orifice of the Glottis ; in consequence of which Circumstance, the Air contained in the Lungs is freely discharged. *Tracheotomy* was indeed originally intended for the Extraction of foreign Bodies from the *Trachea*, or
for

for the procuring an Access of the Air to the Lungs when the Inflammation of the Muscles of the *Larynx*, is so considerable in Quinsys, as to close up the Aperture of the *Glottis*.

Tracheotomy, according to *Dehardingius*, has all the Advantages which can be wished for, since it affords Relief *speedily, effectually, and agreeably: Speedily*, because there is no more expeditious Method of procuring a Discharge of the Air, which, by its natural Spring, and by the continual Compression of the Abdomen, must necessarily be evacuated in that Manner. Now the Air cannot escape from the Pulmonary Vesicles, without their collapsing and expressing into the Pulmonary Vein, the Blood which had entered the Pulmonary Artery, which cannot happen, without adding a greater Facility of Circulation to the arterial Blood. Now the Blood arriving at the left Auricle, and thence at the left Ventricle, produces a new Contraction of the Heart; upon which the Circulation is re-established, and Life discovers itself by manifest Signs, especially by Respiration.

Tracheotomy, also, affords Relief without Danger, because we are no longer afraid of making an Incision in those Cartilages, which the Ancients, in Consequence of their bony Nature, imagined incapable of Consolidation. We no longer dread the Hemorrhage, since only a few Drops of Blood are discharged in opening the Membrane, which unites the Ringlets of the *Arteria Trachea*; and since there are not contiguous to the Part, such large Blood Vessels, as being wounded would produce terrible Effects. There is no Danger of injuring the Voice by means of this Operation, since the Operator cannot hurt the Muscles of the Larynx; and since there are no Nerves, the Dilaceration of which should impair or destroy the Sensation of the Part.

In a Word, it is no difficult Task to heal up, and consolidate the Wound, for this is readily effected by means of a Plaister, or some balsamic Ointment.

Thirdly, *Tracheotomy* affords Relief *agreeably*, for it cannot possibly be painful to a drowned Person, whose Senses are so locked up, as to render him incapable of feeling Pain. Thus the Operation is performed, without being intercepted by the Cries, the Groans, and Motions, which Pain would produce.

Paulus Aegineta is the first Author extant, who describ'd the Operation of *Broncotomy*, from *Antyllus*. But the judicious and accurate *Heister*, in his Surgery, describes this Operation very distinctly. The Words *Bronchotomy*, says he, *Laryngotomy*, and *Tracheotomy*, are convertible Terms, and mean no more than an Incision of the *Aspera Arteria*, or what we commonly call the *Wind-Pipe*: and indeed various Causes and Circumstances concur, to render this Operation absolutely necessary on some Occasions; for, in the first Place, it becomes principally and indispensably so, when in a Quinsy, the Fauces are so terribly inflamed, that the Patient is in imminent Danger of having his Respiration quite stopt, and a total Suffocation brought on. *Secondly*, It becomes necessary, when a Bean, a Prune, a Cherry-stone, a Pea, or any other extraneous Substance falls into the *Aspera Arteria*, and seems to threaten a Suffocation. *Thirdly*, The *Aspera Arteria* is also to be opened, in such Persons, as have been suffocated, in Consequence of their being immers'd in Water, or as we commonly express it, in newly drowned People; for Respiration has been often restored to Persons in this Condition, by opening the *Aspera Arteria*, and by that means procuring a free Access of the Air to the Lungs. I am sufficiently appriz'd, that a great many forbid making

king an Incision in the *Aspera Arteria*, and consequently condemn this Operation; because they think it productive of Death, and are therefore prompted by an idle Zeal, to brand the Physicians, who approve an Operation, so dangerous in their Eyes, with the odious Appellations of barbarous and inhuman. But the Gentlemen, who are of this narrow and confined Way of Thinking, are grossly mistaken; for in this Operation, the small Incision made in the *Aspera Arteria*, is so far from killing the Patient, that it does not produce that Effect when made considerably large; and *Garengeot* gives Examples of various Cures performed by this Operation; so that we think ourselves autoriz'd with *Casseri*, in *Tr. de Vocis, Auditusq; Organis*, to pronounce those Men unskilful, timorous, and even cruel, who in the Cases now mentioned, foolishly neglecting this Operation, which is not only safe, but also attended with the most speedy and salutary Effects, suffer the Patients to die for Want of this seasonable Assistance. Instances of this Nature may be seen in *Nicolai Fontani Observat. Rarior. Analect.* and in *Casseri*.

When *Bronchotomy* is to be perform'd, that Part of the *Trachea* seems most proper for making the Aperture in, which is situated between its second and third cartilaginous *Annuli*, or Ringlets. The Incision, may, however, be made a little lower, without any Danger. The Method of performing the Operation, especially when a foreign Substance falling into the *Aspera Arteria*, and threatening a Suffocation is to be extracted, is thus. The Patient is first of all to be situated in a reclining Posture, either in Bed, or in some convenient Chair, and his Head is to be held firm by an Assistant standing behind his Back. Then a longitudinal Incision is to be made, thro' the Skin, Fat, and Muscles,

from

from about two Fingers Breadth below the *Cartilago Thyroides*, or Scutiformis, or the *Pomum Adami*, in the middle of the *Trachea*, down to the very Sternum, so that the Length of the Incision may be two, three, and in tall Patients, four Fingers Breadth in Length.

Then an Assistant is carefully to draw the Lips of this Orifice from each other, either with proper Hooks, or with his Fingers; and having absorb'd and wip'd away the Blood, either by a Sponge or Linnen Cloth, so that the *Aspera Arteria* may be seen, three or four of the Annuli or Ringlets of that spiral Pipe, are to be cut in such a Manner, that the Incisions made in the Whole, may form one continued Line, and thus whatever Substance may have slip't into it, is to be artfully and cautiously extracted, either by a Probe, Hook, or Forceps. This being done, the Wound is to be cleans'd, with a Sponge, and its Lips being kept in Contact by adhesive Plaisters, a proper Compress and Bandage are to be applied. It is afterwards to be carefully agglutinated, by means of vulnerary Balsams, as in other Wounds of the *Aspera Arteria*. By this very Method, continues *Heister*, I myself in *Helmstadt*, happily extracted a Piece of boil'd Mushroom from a Patient, who happening to laugh while he was supping Broth, in which among other Things there were Mushrooms, had the Misfortune to have a Piece of one of them slip into his *Aspera Arteria*, by which means he was in Danger of being suffocated. *Ravius*, continues *Heister*, also inform'd me, that by this very Method, he happily extracted a Bean from the Throat of a Patient. Some in order to induce a more speedy and seemly Cicatrix on the Wound recommend Conglutination by Suture as in the Hare Lip. But 'tis certainly absurd to follow a Practice attended with

with so much Pain to the Patient, whilst Methods equally good, and at the same Time far milder may be pursu'd.

But in all Cases where a Suffocation is either dreaded, or actually present, *Tracheotomy* is absolutely necessary, and may be perform'd in three different Manners. In the first of these the Patient is to be plac'd in a Bed or Chair, with his Head reclin'd at the Operator's Discretion, and held firm by an Assistant, as before directed. Then let the Surgeon make an Incision in that middle Part of the Throat, and in the same Manner as before order'd, till he reaches the *Trachea* itself, if he thinks proper; the Skin on both Sides is to be laid hold of by the Assistant; then it may be rais'd and cut longitudinally. After these Measures are taken, the Fat and Muscles lying above the *Trachea* are to be cut. Some would have these Muscles first disengag'd from the *Trachea*, or cautiously separated from the others; but there is no Occasion for all this Labour, since they may be cut safely and without any Danger. Then the Operator is to cleanse the Wound with a Sponge wrung out of warm Wine, or warm Spirit of Wine for stopping the Blood more effectually. The Assistant is, in the mean Time to separate and retract the Lips, either by Hooks, or by his Fingers. Then the Surgeon is to pass his Knife between two of the Annuli of *Trachea*, or he may even pass it in such a Manner as to cut one of them, since by that means a silver or leaden Pipe either round or flat, furnish'd with *Ansa*, or a Rim, so as to prevent its falling into the *Trachea*, may be conveniently inserted into the Wound. But before the Surgeon withdraws his Knife, some proper Probe ought to be inserted in the Wound, by the Side of the Knife, that by its Assistance a Pipe may be more commodiously and easily

put into it. This Pipe is fix'd in the Wound by means of a Ligature pass'd thro' its Annuli or small Holes in the Rim, and carried round the Neck, as also by means of a perforated adhesive Plaister: But great Care is to be taken that the End of the Pipe which is inserted into the Wound be not permitted to touch the posterior Part of the *Aspera Arteria* lest by this means a troublesome Cough should be excited. But that the Lungs may not be injur'd by external Cold, or any Filth falling upon them, it is highly proper, to lay upon the Pipe, a Sponge, often impregnated with warm Wine, and again wrung out; or as *Garengeot* advises, a thin Linnen Cloth, and afterwards a perforated Plaister. These Directions being duly observ'd, Blood is to be taken either from the Veins of the Neck or Feet, those under the Tongue, or those situated in the Neck. When Respiration is totally restor'd, which is most quickly discover'd by stopping up the Pipe with one Finger, the Pipe is to be taken out, and the Wound agglutinated in the Manner above directed. But when the Difficulty of Breathing at the Mouth is considerable, the Pipe is to be left for some Time longer in the Wound, and the other Medicines continued.

Another and more expeditious Method of opening the *Trachea*, is this, a two edged Knife is applied to the abovemention'd Part of the Throat, and cautiously pass'd thro' the Skin, Fat, and Muscles, into the Cavity of the *Trachea* itself, and a Pipe is forthwith inserted into the Wound, and carefully secur'd in the Manner before directed. This Manner of Operation is not only quicker, but also produces a smaller Cicatrix than the former.

The third and last Method of performing this Operation is, with an Instrument call'd a *Trocar*,
us'd

n tapping for the Dropsy, which no Surgeon ought to be without. This Instrument applied to the Middle of the *Trachea*, may, as it were, at one Thrust be pass'd thro' the Skin, Fat, and Muscles, into its very Cavity. Then taking out the perforating Part, let the Pipe remain in the Orifice till the Patient recovers. This Method of Operation, seems in one Respect, to have the Advantage of all the rest, which is, that it is soon over, and the Pipe at the same Time introduc'd into the Wound with far less Pain to the Patient, than by any other Method : But even in this Case the same Caution ought to be us'd, and the same Directions follow'd, which we have above specified.

If Persons drown'd, continues *Heister*, are but just dead, their *Aspera Arteria* is to be open'd with all Expedition, either with an Incision-knife, or any other Instrument the Surgeon shall judge proper. Then it is expedient strongly to blow into the Orifice, either with the naked Mouth, or by Means of a common Pipe, the Shank of which is to be introduc'd into the Wound, whilst the Assistant blows into the Bole. The learned *Dethardingius*, in a Dissertation on this very Subject, informs us, that by this Method, if speedily put in Execution, Life returns to the suffocated Patient, with the injected Air, and that he is in a Manner miraculously rais'd from the Dead. For this Reason the Operation should in such Cases be perform'd with the greatest Haste and Expedition imaginable.

Mr. *Sharp* our Countryman, in his Surgery, assures us that this Operation is absolutely void of all Danger, and describes it in the following Manner.

Bronchotomy is perform'd, by making a longitudinal Incision thro' the Skin, three Quarters of an Inch long, between the third and fourth Ring-

lets of the *Trachea*, when the Operator has his own Choice of the Place; it is always advis'd to pinch up the Skin in this Operation, which however may be left to the Discretion of the Surgeon, who when the Skin is cut thro', must make a small transverse Incision into the Wind Pipe, and immediately introduce a crooked *Canula*, near half an Inch long, of Silver or Lead, with a Couple of little Rings at the Top of it, thro' which a Ribband may be pass'd round the Neck, to keep it fix'd in the Wound.

Some have prescrib'd making an Incision thro' the Skin and *Trachea* at once, with a Lancet or Knife as the more easy and expeditious Manner, and says the Author, I once saw it perform'd in this Way, but it prov'd very inconvenient; for the Wind-pipe, in Respiration moving up and down, slipp'd from the Orifice of the Skin, and made it very difficult to introduce the *Canula*, and afterwards maintain it in its Situation. Wherefore I think it absolutely necessary to make an external Incision longitudinal, and even pretty large, as I have directed above.

The Caution of raising the *Sternohyoidei* and *Sternothyroidei* Muscles before opening the Wind-pipe is not to be regarded; and as to the Division of the recurrent Nerves, and large Blood Vessels, so much dreaded in this Operation 'tis not in the least to be fear'd, since they are quite out of the Reach of the Instrument, as any Person skill'd in the Anatomy of these Parts, must very well know.

The Method of dressing is easily understood; since after the Patient can breath by the natural Passage, if we withdraw the Pipe, the Wound becomes a simple one, and notwithstanding its Penetration thro' a Cartilage, into a large Cavity, requires only a superficial Application.

Upon

Upon the Whole it appears beyond all Contradiction, that *Bronchotomy* is a safe Operation, and has been so often perform'd with Success, that no Surgeon has any Reason to hesitate in performing it, in Cases where particular Circumstances indicate its Propriety. For this Reason 'tis sufficiently obvious, that this Operation ought with all Expedition to be perform'd on drown'd Persons, many of whom have been happily restor'd to Life by this very Means. It is carefully to be observ'd, that this Expedient, is far more efficacious than blowing into a Person's Mouth, as is confirm'd by the following Experiment made by *Becker*. This Physician hang'd a Dog, till no more Motion of his Heart was perceiv'd, and having left him dead on the Ground for half a Quarter of an Hour, he to no Purpose blow'd Air into his Throat. Then he perform'd the Operation of *Bronchotomy*, and having thrice blown the Air into his Lungs, the Breast of the Dog began to elevate itself, and at the fifth Blast, he mov'd his Feet. After this he was blooded in the Throat to give Vent to the Blood, and at last gave some howling Barks, but surviv'd the Accident for several Years. Now as the Cause of Death is the same in drown'd as in hang'd Animals, why should not the same Means restore them both to Life.

I have been very particular with respect to the Operation of *Bronchotomy*, because it is of great Importance, and of singular Use in more Cases than one; and that no one might be ignorant of the Methods of performing it. In the Case before us, that of drown'd Persons, it may frequently be necessary where no Surgeon is to be procur'd soon enough to retrieve the Misfortune and preserve Life. In this Situation, as there is no great Danger of injuring a Person, who appears to be dead, and must be

absolutely so without immediate Relief, any common Person, tho' not bred a Surgeon, may by these Directions, be enabled to perform the Operation, by making a Perforation in the Place above directed, with any Sharp pointed Knife. Then instead of a Canula or Tube of Metal, if that is not at hand, a Tobacco Pipe may be broken about three Quarters of an Inch, or an Inch, from the Bole, and the Part contiguous to the Bole may be introduc'd into the Perforation, taking Care not to break it within the *Trachea*; and then by blowing into the Bole, the Lungs may be inflated.

After having thus collected every Thing of any Importance upon the present Subject, we must beg Leave to observe, that, tho' with Respect to Matters of Religion and Conscience, it is not only extremely absurd, but also highly cruel and barbarous to invoke the Assistance and Interposition of the secular Power. Yet in the present Case, such an Attempt is so far from being either absurd or barbarous, that it bespeaks Compassion and Humanity; for we may safely appeal to Experience how many worthy Members of Society, generous Friends, affectionate Husbands, tender Parents, and dutiful Children, have in foreign Countries been restor'd to Life by these very Means; whereas in *England*, Persons of equal Worth, have for Want of proper Care, been laid in their Graves, at a Time when they might, for many future Years have prov'd the common Blessings of the various Communities of which they were Members.

This melancholy and deplorable Consideration, will sufficiently authorise me to propose a Regulation to the Legislature of *England*, whose principal Aim seems ultimately to terminate in the greatest and most extensive Happiness of the Subject. It

is, that this Treatment of Persons suppos'd to be drown'd, may be enforc'd by all the Authority of the Law; and that no one may be suffer'd to be buried without it; and this under severe Penalties; for otherwise I am afraid these Endeavours of mine, however well intended, will not have the desir'd Effect, nor be attended, to so much as the Subject deserves.

A N

APPENDIX.

Concerning the Methods of restoring hang'd Persons to Life, and Children suppos'd to be born dead.

AS *England* is above all other Nations in the World, justly branded with *Suicide*, commonly known by the Name of Self-murder, and as our Countrymen frequently make Choice of a Rope for that Purpose, we shall briefly point out the Methods of restoring hang'd Persons to Life.

'Tis certain then, that hang'd Persons die of an Apoplexy of the sanguineous Kind, produc'd by an Obstruction of the Blood, by the Rope, in the jugular Veins, whilst the Arteries being freer from this Compression, continue to convey the Blood to the Brain. We may form a Judgment of the Effects produc'd by a Compression of the jugular Veins, from the following Passage of *Alexander Benedictus* in *Lib. 2. Cap. 33.* " When, says that judicious Author, a Redundance of Blood obstructs the
" arte-

“ arterial and venous Canals, and intercepts the
 “ free Circulation of the Spirits, the Patient falls
 “ down in the same Condition as if he was hang’d.
 “ The *Assyrians* sometimes put sound Persons into
 “ a similar State, when for Instance they intended
 “ to circumcise Adults or Children. Thus having
 “ laid them on their Backs in a Bath, they com-
 “ press’d their jugular Veins, so as speedily to pro-
 “ duce a Privation both of Motion and Sensation;
 “ and taking the Advantage of this Circumstance,
 “ cut off the Prepuce with as much Ease as if the
 “ Patient was in an Apoplexy. The same is the
 “ Condition of those who having attempted to
 “ hang themselves, are found suffocated, tho’ their
 “ Feet touch the Ground.”

Nymman, also, in *Tr. de Apoplexia*, cap. 14. de-
 clares his Sentiments on this Subject in the follow-
 ing Manner. “ The Functions of the Brain, says
 “ he, are destroy’d without any Lesion of the a-
 “ nimal Spirits and Nerves, as appears in a Syn-
 “ cope. The like happens to hang’d Persons,
 “ who are no sooner hung up, provided an expert
 “ Executioner exactly brace up the Vessels of the
 “ Neck, with the Rope, than they become immove-
 “ able as a Log of Wood, without even so much
 “ as moving their Feet, notwithstanding which Phæ-
 “ nomena, the Brain and Origin of the Nerves suf-
 “ fer nothing in such Persons; since those Parts are
 “ defended by the Cranium and Vertebrae, which
 “ can never be injur’d by the Rope. Nor is the
 “ Interception of Respiration to be accus’d as the
 “ Cause of Death in hang’d Persons, since tho’ we
 “ closely shut up the Mouth and Nostrils of an
 “ Animal so as to hinder the Access of Air into
 “ the Breast, yet as the Brain still retains its vital
 “ Spirit, it powerfully opposes the imminent Dan-
 “ ger of a Suffocation, by a violent Agitation of
 “ the

“ the Body, and an excessive Motion of the Feet,
 “ which Circumstances are never observ’d in
 “ hang’d Persons.”

From these Authorities we evidently see the speedy Effects produc’d by the Compression of the jugular Veins. This Doctrine is farther illustrated by *Bartholine* in *Cent. 1. Hist. 32*, “ In dissecting,
 “ says this Author, a Man of a tall Stature, of a
 “ sanguine Temperament, and vigorous Constitution, who was hang’d for a Robbery, I found
 “ his Lungs preternaturally large, blewish, streak’d
 “ with different Colours, light and spungious, and
 “ so full of a frothy Blood, that every where on
 “ the Membrane which covers them, the Veins
 “ not only appear’d turgid, but the Lobes were
 “ also so large as to embarrass me in dissecting the
 “ Heart. The Ventricles of the Brain were full
 “ of Water, as also the Origin of the Nerves
 “ which enter the Spine. The *Plexus Choroïdes*,
 “ also, besides the Inflation of its Vessels, contain’d a great many Vesicles.”

The Loss of Knowledge in hang’d Persons, also, proves the Truth of this Doctrine, and this Loss is sufficiently attested by *Camerarius* in *Cent. 7. Hist. 40*. where we are told, that a Robber being hang’d and falling into the Hands of the Surgeons for Dissection, was nevertheless restor’d to Life, notwithstanding his Mouth was full of Froth, which is generally look’d upon as an infallible Sign of irri- trievable Death, especially where it continues long, as it did in the present Case, and notwithstanding he had before his Execution been seiz’d with a Fit of Madness. When this Man, however, was restor’d to Life, he said he remember’d nothing of what had pass’d on that Occasion, except that he was conducted to the criminal Chamber, after which he was insensible of every Thing. This
 Robber

Robber was hang'd a second Time for committing fresh Robberies, a convincing Proof, that he did not look upon the first as a formidable Punishment. *Camerarius* in *Hist.* 38. mentions another, who was twice hang'd; and in *Hist.* 39. another who was restor'd to Life by the Physicians of *Vienna*, after he had been hang'd.

Lord *Bacon* in his History of Life and Death, relates an Accident, which like that of *Camerarius*, proves the Loss of Knowledge in hang'd Persons. A young Gentleman of some Distinction, curious to know the Pain suffer'd by hang'd Persons, having fix'd a Rope about his Neck, threw himself from a low Stool upon which he imagin'd he could easily put his Feet again: But his Attempts of this Kind were in vain, and he had been irretrievably suffocated, without the Assistance of a Friend who had the Curiosity to be present at such an unaccountable Experiment. Upon his Recovery, his Friend asking him if he had felt any Pain; he answer'd that he had perceiv'd none in any Part of his Body; but added, that at first he observ'd before his Eyes, a Species of Fire or blazing Light; then an extreme Darknes, and last of all a pale Blue, or a Sea-green, like that which frequently presents itself before the Eyes of those who fall into Deliquiums. Lord *Bacon* subjoins, that he heard a Physician of Candour and Worth, assert, that he had restor'd Life to a Man who had been hang'd half an Hour, affirming at the same Time, that by proper Means the same Effect might be produc'd upon others, who had hung no longer, provided the Effort of their first Fall had not luxated the Vertebrae of their Necks.

After having thus discover'd the Cause of Death in hang'd Persons, we are the better able to form
an

an Estimate of the Means most proper to restore them to Life.

Frictions then, and hot Baths, by restoring the Motion of the Blood, and resolving its Coagulation, must for these very Reasons produce happy Effects on hang'd Persons. *Pecklinus* in *Tr. de Aer. & Aliment. Defect. cap. 7.* relates an Observation, which sufficiently evinces the Efficacy of Sal Ammoniac on similar Occasions. “ I knew, says he, a Woman hang'd, who after she had remain'd for some Time without Pulse and Respiration, with her Lips cover'd with Froth, which is look'd upon as an infallible Sign of the total Privation of Life, and in a Word, after she appear'd to be the necessary Victim of Death, was yet restor'd to Life, by a Physician who coming accidentally to the Place where she lay, made her swallow a considerable Quantity of the Spirit of Sal Ammoniac.” As the Activity of this acrid volatile Liquor, and its Propriety to resolve coagulated Blood are sufficiently known, it is by no means surprising, that it should on similar Occasions produce such happy Effects. “ *Pecklinus* subjoins, I don't in the least doubt, but if proper Measures were taken in due Time, a great many hang'd Persons might be restor'd to Life, even after those who have an Opportunity of seeing them, think they have all the Reason in the World, to conclude them really and irretrievably dead. This Effect is most commodiously produc'd by restoring the Circulation of their Blood, by means of Frictions, Venesections, and the Exhibition of hot and spirituous Remedies, or of some other analogous Substances.”

It is sufficiently easy from what we have before said, to conceive, how Venesection is excellently calculated for restoring Life to hang'd Persons;

and as for spirituous Liquors, they act at once on the Blood and Vessels, by attenuating the former, and restoring the proper Spring and Tone of the latter. The Remedies of this Kind are before specify'd.

Schenkius in *Observat. Art. de Suffocat. ex Laquea*, orders that drown'd Persons should be made to swallow Vinegar and Pepper ; or Oxymel mix'd with the Powder of Penny-royal. He, also, advises to excite a Vomiting by means of a Feather dipt in Oil, and to wrap up the Patient's Neck in a Woollen Cloth dipt in warm Oil, especially the Oil of Orris.

The Virtues of Oxymel, or of simple Vinegar with Pepper, are sufficiently evinc'd by *Christopherus de Vega Art. Med. Lib. 3. Sect. 5. Cap. 8.* All Physicians are sufficiently appriz'd, that Vinegar moderately us'd, is a powerful Resolvent, whilst Pepper is an acrid Substance, equally proper to dissolve the Coagulations of the Juices, and reanimate the Fibres, by the Irritation it produces in them. The Powder of Penny-royal is, also, an acrid Aromatic, whose Effect must of course be nearly the same with that of Pepper.

As for exciting a Vomiting in hang'd Persons, I think it more dangerous than in those who are drown'd ; for the Contractions of the Muscles subservient to Expiration, may serve to restore that Function as we have already observ'd, since the Inflation of the Abdomen and Breast of hang'd Persons, is a Proof that their Inspiration is forc'd and unnatural, yet in such Circumstances it seems dangerous to convey a greater Quantity of Blood to the Head which is before overcharg'd with it, as is sufficiently obvious, not only from the preceding Histories, but also from the livid Colour of the Countenance. It is, however, certain, that the Shocks given to the Parts by means of the Vomiting, are very proper

proper to dissolve the Coagulations of the Blood, though I would never advise the Use of this Method, till after a previous Venesection.

The Topic mentioned above, which *Schenkius* orders to be applied to the Neck, may produce very happy Effects, by resolving the Blood collected in the Skin and Muscles of the Neck, and relaxing the Parts which had suffered most immediately by the Rope.

Gesner, for a Girl who hang'd herself, successfully ordered Powder of Castor, which he forc'd down in warm Broth. This Remedy is also of a volatile and resolvent Nature. *Joubert. in Lib. 4. de Effect. Thor. Cap. 1.* informs us, that he restored many hang'd Persons to Life, without such a Multiplicity of Expedients; since he used no other Method than Venesection, and forcing into their Stomachs a due Quantity of good Wine.

Ranchinus in Tr. de Morb. subit. Cap. 12. orders Oil of Orris, or of Lillies, to be applied to the Necks of hang'd Persons, whilst their Mouths are to be gargariz'd with Syrup of Violets, dissolved in warm Water, or Barley-water. He also prescribes Vomiting, excited by a Feather, in order to enlarge the Passages more. The same Author also recommends Pepper and Penny-royal, either in Vinegar, Oxymel, Wine, or the *Aqua Cælestis*. But Venesection is the Expedient on which he depends most for happy Effects. The Oils and the Syrup are only intended to procure a Relaxation; and as for the Gargarism, it cannot be us'd till the hang'd Person is previously restored to Life. The Pepper, Penny-royal, and other Substances mentioned by him, are design'd to re-animate and restore the natural Heat.

Aelius in Tetrabibl. Serm 8. Cap. 49. orders us to add to the Pepper and Vinegar, Nettle-seeds, which are also of an highly acrid Nature. The same

Author affirms, that when the Redness round the Neck of hang'd Persons is dissipatèd, they open their Eyes, and the Parts are relaxèd. He is also of Opinion, that we ought not to spare Fomentations of the Neck, with warm Oils, Cerate, or Woollen Cloths.

Ranckinus, from other Authors, greatly extols a Remedy which most People will think as singular in itself as disagreeable to the Person who administers it. It consists of blowing into the Mouth of hang'd Persons, provided the Administrator has in his own Mouth, a bruis'd Nutmeg, Cinnamon, Cloves, or Carraway-seeds. As it is certain, that these Aromatics produce no other Effect, than impregnating the Air with some volatile Parts, proper to restore the Motion of the Fluids, so 'tis equally certain, that the principal Efficacy of this Practice depends upon the *Blowing*, which in this Case must infallibly produce Salutary Effects; as is obvious from the following Experiments, recorded in N^o. 28. of the Philosophical Transactions of the Royal Society of *London*.

First then, Doctor *Croon*, Professor of *Gresham-College*, in the Presence of the Royal Society, strangled a Pullet, in such a Manner, as that it discovered no more Signs of Life; but by afterwards blowing into the *Arteria Trachea*, he so effectually restored the Motion of the Lungs, that the Pullet returned to Life.

Secondly, Doctor *Walter Needham*, in the Presence of Mr. *Boyle*, and other *Literati*, hang'd a Dog, till the Motion of his Heart was no longer to be perceiv'd, after which he open'd the Abdomen of the Dog, and blowing into the Thoracic Duct, restored the Motion of the Blood, upon which the Heart began to beat, and the Dog returned to Life.

Thirdly,

Thirdly, Doctor *Hook*, in the Presence of the Royal Society, cut the Ribs, the Diaphragm, and Pericardium of a Dog, after which, making an Incision in the superior Part of the *Trachea*, he introduced into it the Pipe of a Pair of Bellows; then he blow'd the Air into the Lungs, and the Dog returned to Life; but died when he ceased to blow: By which Expedient he made him live and die alternately, as long as the Company pleas'd.

A *fourth* Experiment is that of *Becker*, by which he restored a hang'd Dog to Life, by opening his Larynx, and blowing the Air into his Lungs, through the Incision made; so that the Practice enjoined by *Ranchinus*, is by no Means to be neglected.

Upon the whole, the first and fourth Experiments are absolutely the same with the Practice recommended by that Author. Now, Why may not that which has succeeded twice, succeed oftener? Though the other Experiments doe not so directly prove the same Truth, yet it may be easily deduc'd from them; for from the second it follows, that the Air is not only necessary to the Circulation, because by dilating the Lungs it gives a free Passage to the Blood, from one Ventricle of the Heart to the other, but also is requisite to keep the Blood in such a State of Solution, as Circulation requires. Now, by blowing Air into the Lungs, we inflate their Vesicles, which is the first Advantage produced by Respiration; and the Air by this Means insinuating itself into the Blood, resolves its Coagulation. By means of this Explication, 'tis easy to comprehend how Doctor *Hook's* Experiment favours the Doctrine of *Ranchinus*.

From what has been said, we may therefore conclude, First, that blowing in the Mouths of hang'd Persons is a proper Method of restoring them to Life;

Life; Secondly, That if this Method does not succeed, we are to perform the Operation of *Bronchotomy*, and by that Means blow Air into their Lungs: *Thirdly*, That we ought not to be discouraged at some fruitless Attempts, because a Practice, which with *Becker*, did not succeed till the fifth Time, may perhaps, in other Circumstances, not succeed till later; *Fourthly*, That we must not at the same Time, neglect these other Means, which have a Tendency to restore the lost Fluidity of the Blood: *Fifthly*, That if Death does not succeed Strangulation, this is rather the Effect of the Stiffness of the Cartilages which compose the Larynx, or according to some, of the Slackness of the Rope, than of the easy Disposition of the Blood to resume its Fluidity: *Sixthly*, That it is highly probable, that an efficacious Method of restoring drown'd Persons to Life, would be, to inject Air into the Blood, by introducing a small Pipe into some of the larger Veins, for that Purpose; For what Difference is there between making the Air enter the Blood by the Thoracic Duct, or by any other Part. The only Caution which I think ought to be given, is, to make choice of those Veins most contiguous to the Heart; so that for this very Reason, as well as for their Largeness, and the Facility of finding them, I judge the external Jugulars most proper for this Purpose,

Having already observed, that as the Cause of Death is the same in hang'd and drown'd Persons, so the Measures taken for the Relief of the one, may be also used for restoring the Lives of the others, We proceed to give some Histories of Facts, which prove the Possibility of restoring suffocated People to Life.

Mr. *Falconet* then, a Gentleman of strict Probity and Candour, told Dr. *Brukier*, That his Father had

had a fool-hardy Coachman, who falling into a Quarrel at Lyons, killed a Man, and being apprehended on the Spot, was forthwith condemn'd to be hang'd, which Sentence was accordingly put in Execution. The Surgeons of the Town having obtained his Body, in order to make a Skeleton, brought it into a Surgery, where they left it upon a Table; but when they came next Day to dissect it, they were surprized to find the Man not only alive, but in good Health, and pissing in the Chimney, for want, as he said, of a Chamber-pot.

This Man had stood in no Need of Remedies, certainly, for no other Reason, but because the Circulation of the Blood had not been so long suppressed, but that it could of its own Accord restore itself.

Oswaldus Gabelchaverus relates, in one of his Observations quoted by *Schenkius*, the History of a Merchant of the Name of *Landtblaler*, who was hang'd on a Tree for some Villanies he had committed: He hung for a whole Hour, and the Servants who had Orders to inter him, having cut the Rope, perceived, as they thought, some Marks of Life in him, upon which they put him in a Cart, convey'd him to a proper Place, and soon restored him to Life. He afterwards us'd to say, that he was sensible of no Pain in hanging, except in his Eyes, and the Extremities of his Toes. About eighteen Years after, however, he began to follow the same Practices, for which he had been hang'd before; but *Prince Charles of Aremberg* ordered him to be hang'd a second Time, in such a Manner, that he never returned to Life.

Cæsariensis in Illustr. Mirac. Lib. 6. Cap. 24. relates the History of a certain Robber, who had been hang'd a little before a Servant belonging to a Canon of Cologne happened to come up to the Gallows,

Gallows. The Servant imagining there were still some Remains of Life left in him, cut the Rope, and restored him to Life, by some cold Water taken from an adjacent Rivulet. The Robber, in the mean time, gradually resuming his Strength, followed his Deliverer, who was going to the next Town, and just as they were talking with each other, the Robber laid hold of the Bridle of the Servant's Horse, cried out aloud, that the Horse belonged to him, and swore that the Servant had robb'd him of him : This Debate having drawn together a large Concourse of People, their Indignation was so strongly moved against the Servant, that without hearing what he had to say in his own Justification, they were determined to drag him to the Gallows from which he had lately cut down the Robber: but luckily for the Servant, some Inhabitants of the neighbouring Town, seeing a Concourse of People going to the Gallows, which belonged in common to both Towns, came to see what the Matter was : then the Crowd suffering the Servant to speak, he related his Adventure, and the Manner in which the Robber had recompenc'd his Service. The Robber being at last known, was a second Time hung upon the same Gallows, in such a Manner as not to return to Life.

Though the Ground-work of the following History resembles the preceeding, yet it differs from it in many Circumstances, the most considerable of which is, the long Time the Criminal continued hang'd.

A Miller near *Abbeville* in *France*, happening to goe near the Place where a Robber had been hang'd the Day before, suspected that he was not dead. Compassion having induc'd him to satisfy his Suspicion, which was well-founded, he cut him down, laid him in a Cart, convey'd him to his own House,
and

and used such effectual Means to restore him to Life, that in fifteen Days the Robber recovered perfect Health. The Miller upon this intended to give him a little Money, and take his Leave of him; but delaying for some Time to put that Intention in Execution, he left him one *Sunday* alone in his House; the miserable Wretch forgetting what he owed to his Deliverer, broke open a Cupboard, and carried off all the Plate and ready Money he could find. The Miller, upon coming home, and finding his House robbed, easily concluded, that his Guest was the Person who had done it: accordingly the Miller, his two Sons, and a Cart-driver, pursuing the Robber, overtook him about a League off, and dragging him to the Gallows, whence he had been cut down, hung him up a second Time, and gave him such Shocks, that they put it out of his Power to commit any more Robberies. It is about forty Years since this Accident happen'd, and Doctor *Brubier* informs us, that it is attested by Persons of the best Reputation in *France*; and a Pardon was actually procured for the Miller, his Sons, and Servant, who took the Liberty of executing the Robber, without legal Authority.

Before we put an End to this Treatise, which we intend for the common Good and Benefit of Mankind, we shall say something with Respect to the Methods of preserving the Lives of Children, who appear dead when born. No two Abuses then, are more prejudicial to Society, contrary to Humanity, or inconsistent with Reason, than to inter Women big with Child, without performing the *Cæsarian* Operation upon them; and without any Attempts of Relief, totally to abandon Children who seem to be born dead.

The former of these Abuses is founded on two Errors; the first of which is, that the Infants do not survive their Mothers, when they die near their

Time ; and the second, that the Lives of Children depend absolutely on those of their Mothers. Now these two Errors are destroyed by several Histories, which prove, that the Death of the Mother does not necessarily produce that of the Child.

Caspar Reies, then, in his *Campus Elysus Jucundarum Questionum*, relates from *Cornarius*, “ That
 “ a Woman of *Madrid*, of the illustrious House
 “ of *Lasso*, being reputed dead, after remaining
 “ three Days, in the utmost Agonies, was put in-
 “ to the Tomb belonging to the Family, which
 “ being open’d some Months after, her Corps was
 “ found, with an Infant tenderly grasped in her
 “ right Arm ; for, continues the Author, the
 “ Woman was pregnant, and near her Time,
 “ when she was interr’d as dead.”

The following History is also related, by the same Author, and attested by some of the most learned and judicious Men in *Spain*.

“ The Wife of *Francis Arevallo de Swaffo*, fell
 “ ill in the City of *Segovia*, during the last Months
 “ of Gestation: However, as she died, or rather
 “ was taken for dead, in a few Days she was in-
 “ terr’d, according to the Custom of the Place.
 “ The Husband, in the mean time, who was sent
 “ for to a Place at a considerable Distance, whi-
 “ ther he had gone about some Business, came
 “ home about the Middle of the Night, and being
 “ informed that his Wife, whom he loved to Ex-
 “ cess, was dead and buried, he would at any Rate
 “ have the Satisfaction of seeing her once more :
 “ For this Purpose, he went to the Church, and
 “ ordered her to be raised from the Grave ; hard-
 “ ly was the Coffin open’d, till the Cries of an In-
 “ fant were heard ; the By-standers were astonish-
 “ ed, a Justice was called, the Priests, and a great
 “ many others got Flambeaus, and attended the
 “ Husband ;

“ Husband ; the Shroud was lifted up immediately, upon which appeared the Head of an Infant, making a vigorous Effort to disengage the Rest of its Body from the Vagina. This Infant was not only extracted, sound, and alive, but also lived to be Lieutenant-General of the City of *Cherez*. The surprizing Manner in which he came into the World, laid a Foundation for his being called, *The Son of the Earth*.

From these Histories, *Caspar Reies* draws the following Consequences. “ ’Tis evident that Children dont die with their Mothers when the latter die near the Periods of their Deliveries. *Sennertus* affirms, not only that they live for some Time after their Mothers are dead, but also that we may, and even ought, to extract them alive from the Uterus. *Vincelius* has compos’d two Treatises in order to prove these Truths, which are also sufficiently establish’d in the Dissertations of *Nymman*, *De Vita Fetus in Utero*, where, as well as in other Authors we find a great many similar Histories; and others of Women who have been deliver’d of live Children after their own Death. The Reader may also consult *Raynaud de ortu Infantum contra Naturam*. Hence ’tis obvious, that we ought not to be too rash and precipitate in burying pregnant Women who die near their Times. I am not certain whether these Women were dead or alive at the Time of their Interment, tho’ it appears evident from the Circumstances, that the first was buried alive; for *Horstius* proves from another Fact, that dead Women may be deliver’d of Children. Thus he informs us that a Woman big with Child, being hang’d along with her Husband by the *Spanish* Soldiers, be-

“ tween *Deventer* and *Zutphen*, was four Hours
 “ after her Death, deliver’d of live Twins.”

Thomas Bartholin in *Act. Hafn. An. 1673* relates
 an History which proves the same Truth, and which
 is, “ That of a Child born two Days after the
 “ Death of its Mother, which happen’d in a La-
 “ bour, in which three Midwives had employ’d all
 “ their Art and Skill. Thus ’tis certain from Ex-
 “ perience, that dead Women may be deliver’d of
 “ live Children, and this has perhaps laid a Foun-
 “ dation for the whimsical and superstitious Practice
 “ of putting into the Coffins of Women who die
 “ big with Child, a Needle, a Thread, and a Pair
 “ of Scissars, as if the Manes stood in Need of
 “ those Instruments to tie and cut the umbilical
 “ Chord of the Infant about to be born. In short
 “ it has been observ’d, that Infants have been
 “ born in the Coffins of their Mothers.

The same Author also mentions a Woman who
 in 1635, on *Thursday* about 9 o’Clock at Night
 died of Epileptic Fits. On the *Friday* the Foam
 was discharg’d from her Mouth, Cries resembling
 those of an Infant were heard, and a sensible Mo-
 tion was observ’d in the Abdomen of the Mother.
 On *Saturday* about 10 o’Clock in the Morning, the
 Woman discharg’d a great deal of Blood, so that
 on changing her Linnen, her Infant still warm, was
 found lying betwixt her Thighs. *Bartholin* adds,
 that the Physicians of the Town were of Opinion
 that the Mother had only died when her Mouth be-
 came full of Froth, without which Circumstance
 the Infant could not probably have liv’d.

In the *Miscellanea Naturæ Curios.* we have In-
 stances of Women who have died near their Time,
 and been deliver’d sometimes of dead, sometimes
 of live Children, sometimes one, two, and three
 Days after their Deaths. These Instances are re-
 corded

corded by *Refler*, first Physician to the Prince of *Brieg* in *Obs.* 318. *An.* 3. By *Polifius* in *Obs.* 42. *An.* 4. By *Doleus* in *Decur.* 2. *An.* 5. *Obs.* 137. By *Hoyer* in *Decur.* 2. *An.* and lastly by *Hartmanus* in *Observat.* 83. of the same Volume.

From what has been said 'tis sufficiently obvious, that those Persons are greatly mistaken who suppose that the *Fætus* does not survive its Mother; for it is evinc'd from a Number of Observations, that the Life of the *Fætus* is sustain'd by a Circulation peculiar to itself; that the umbilical Arteries, which terminate in the Placenta, convey thither a Quantity of Blood, which is carried back by the umbilical Vein, without passing to the Mother; and that, if this Blood undergoes any Change, it is only from a lymphatic or lacteal Liquor, which the Roots of the Placenta imbibe from the uterine Vessels. These Truths are at present universally agreed upon; so that before the Death of the Mother can destroy the Life of the Child, 'tis necessary to prove, First, That the lacteal Liquor ceases to be filtrated immediately after the Death of the Mother: Secondly, That the Suppression of this Filtration is an infallible, or even necessary Cause of Death. In Consequence of this, we must prove, that at every Circulation, the Juices of the *Fætus* have their nutritive and vivifying Principles exhausted; and that the *Fœtus* is incapable of sustaining in the Uterus a Degree of Fasting, which it often supports for several Days after it is brought into the World. Now, as these Propositions cannot be proved, so it cannot be evinc'd, that the Death of the Mother is necessarily succeeded by that of the *Fætus*; so that 'tis certain, we commit manifest Homicide, by interring pregnant Women near their Time, without performing the *Cæsarian* Operation upon them.

This

This is no new Doctrine, since in the *Digest* Lib. 4. Tit. 8. these Words occur ; “ A Royal Edict prohibits the Interment of dead pregnant Women, before we have delivered them, by Means of the *Cæsarian* Operation. Those, who do otherwise appear, to have destroyed with the pregnant Woman the Hope of obtaining a living Man.” It is highly to be lamented, that this Law is not universally put in Execution, since it is a Principle founded on the eternal and unalterable Nature of Things ; *That we kill those whom we do not preserve, when we have it in our Power.*

If it should be objected, that this Operation would, if not always, yet at least very often, prove an useless Attempt. I answer, that it is, an easy Operation, since it is performed by two or three Strokes of the Bistoury, and a few Stitches of a Needle. Besides, though Children after this Operation should appear dead, yet we are not to trust to those Appearances, unless Putrefaction should remove all Doubt.

Bbonius informs us, that the Faculty of Medicine at *Wurtemberg* being consulted, in a criminal Process rais'd against a Mother for killing her own Child, answered, that Children were sometimes born so weak, as to appear for a considerable Time without Sensation, Motion, and Respiration ; and that it was necessary to use vellications, Fomentations, Aspersions of Wine, Spirits of Wine, or *Aqua Vitæ* ; as also to make them swallow aromatic Liquors, or blow spirituous Liquors into their Mouths and Nostrils, till they begin to cry, which is an infallible Mark that the Air has entered the Lungs.

As to these Measures, we have before shewn, that they have an evident Tendency to restore Life. But we must not here pass over a Practice, which,
of

of all others seems to be of the greatest Importance to still-born Children, which is, the sucking the left Nipple of the dead Fœtus. This Method, as we are told in *Ephemerid. Natur. Curios. Dec. 2. An. 5.* prov'd successful, after vellications, Frictions, spirituous Liquors, and other Methods had been tried in vain. Various other Instances of the Success of this Practice are found in the same Work, and in the Writings of other practical Authors. Though this Method may at first seem ridiculous, yet it will appear of the last Importance to the Anatomist, who knows the Sensibility of the Breast, all whose Nerves center in the Nipple. *Hannemaun* also, orders a Sponge dipt in Red Wine, or *Aqua Vitæ*, to be applied to the left Breast, and Pit of the Stomach, of still-born Children. *Heister*, when speaking of such new-born Children, as are excessively weak, or hardly appear to be alive, orders a robust, sound Man to breath into their Mouths, immediately after he has drank a Dram of Brandy.

The last Method of restoring still-born Children to Life is, to blow into their Mouths, as is obvious, from various well-attested Observations, with two of which we shall put a Period to this Work.

Borelli in Hist. Cent. 3. Observ. 58. relates, that a Servant returning from the Fields, and finding his Master, whom he greatly lov'd, lying dead, he embraced him for a long Time, and by accidentally breathing in his Mouth, gradually restored him to Life.

The learned *Grubelius*, in *Miscellan. Nat. Curios. Dec. 2. An. 10. Obs. 44.* informs us, that whilst a Physician was preparing the Remedies proper to restore to Life, a Woman, who had fallen into such a *Syncope*, that she was thought dead, her

her own **Servant**, who had a great Attachment, to her, restored her to Life by blowing in her Mouth. But 'tis probable, that this Method produces its happy Effects, rather by restoring the Motion of the Blood and Lungs, than by Means of that vivifying Principle, which some superstitious Authors suppose to be lodg'd in the human Breath.

F I N I S.

