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Contributors

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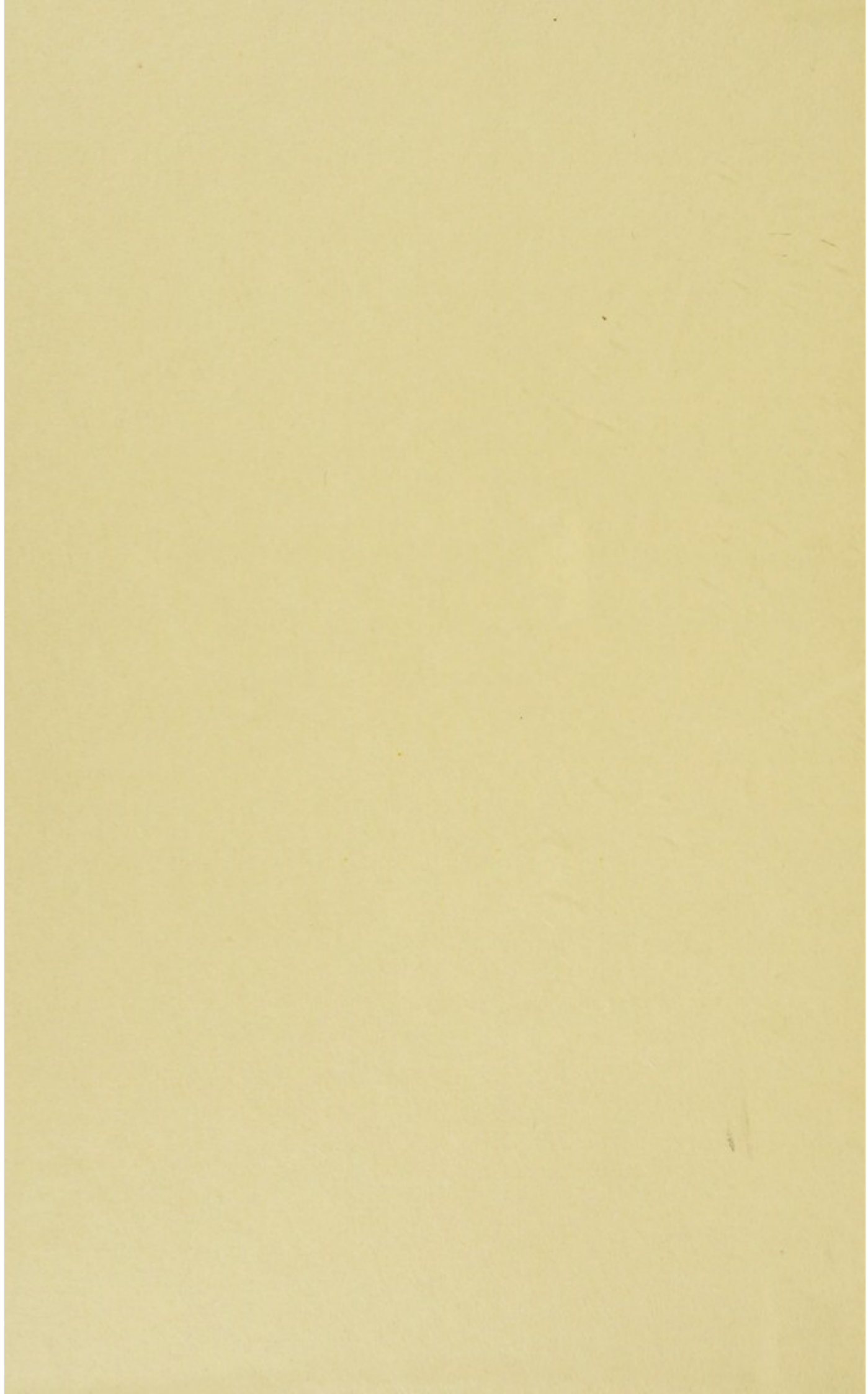
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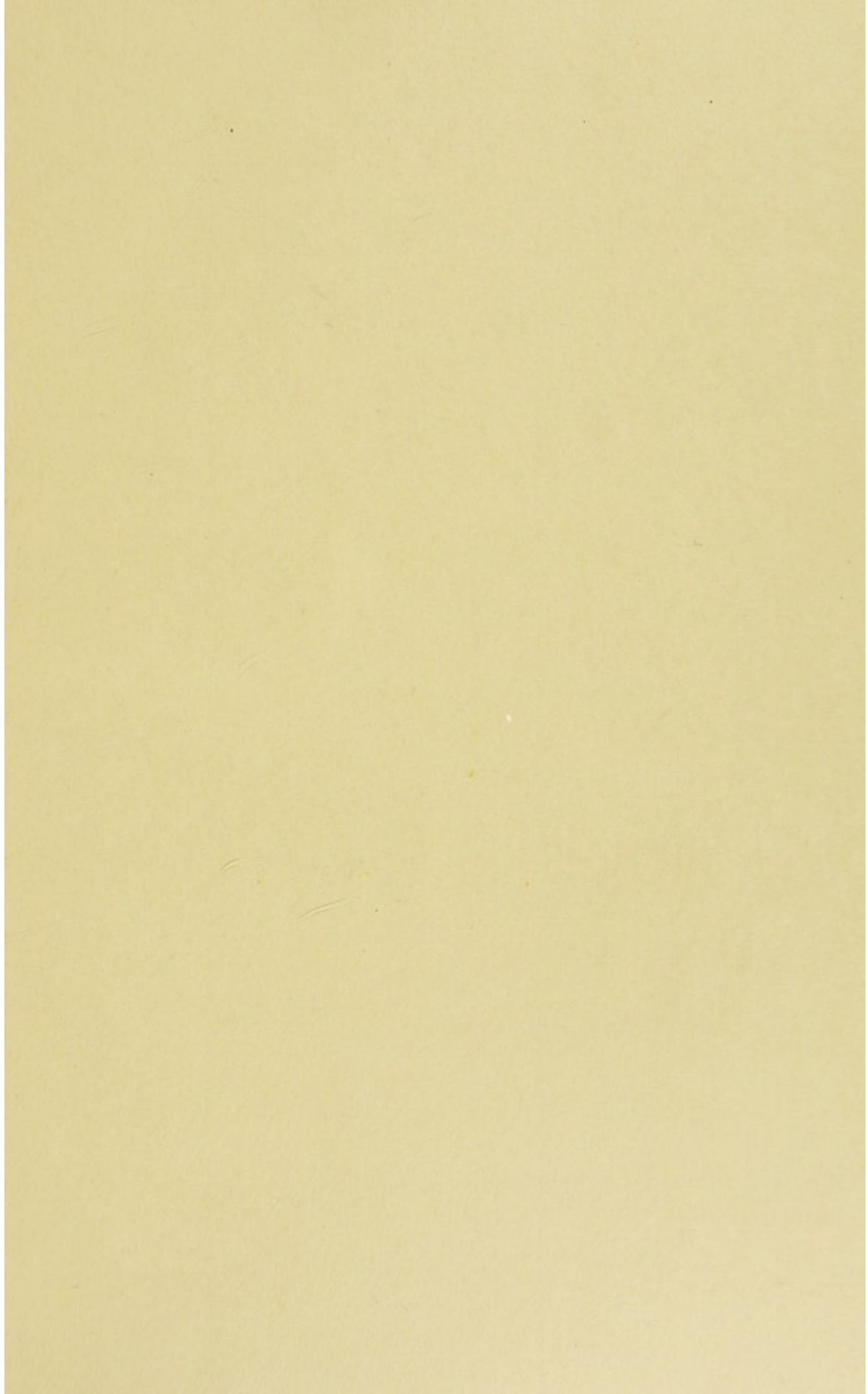
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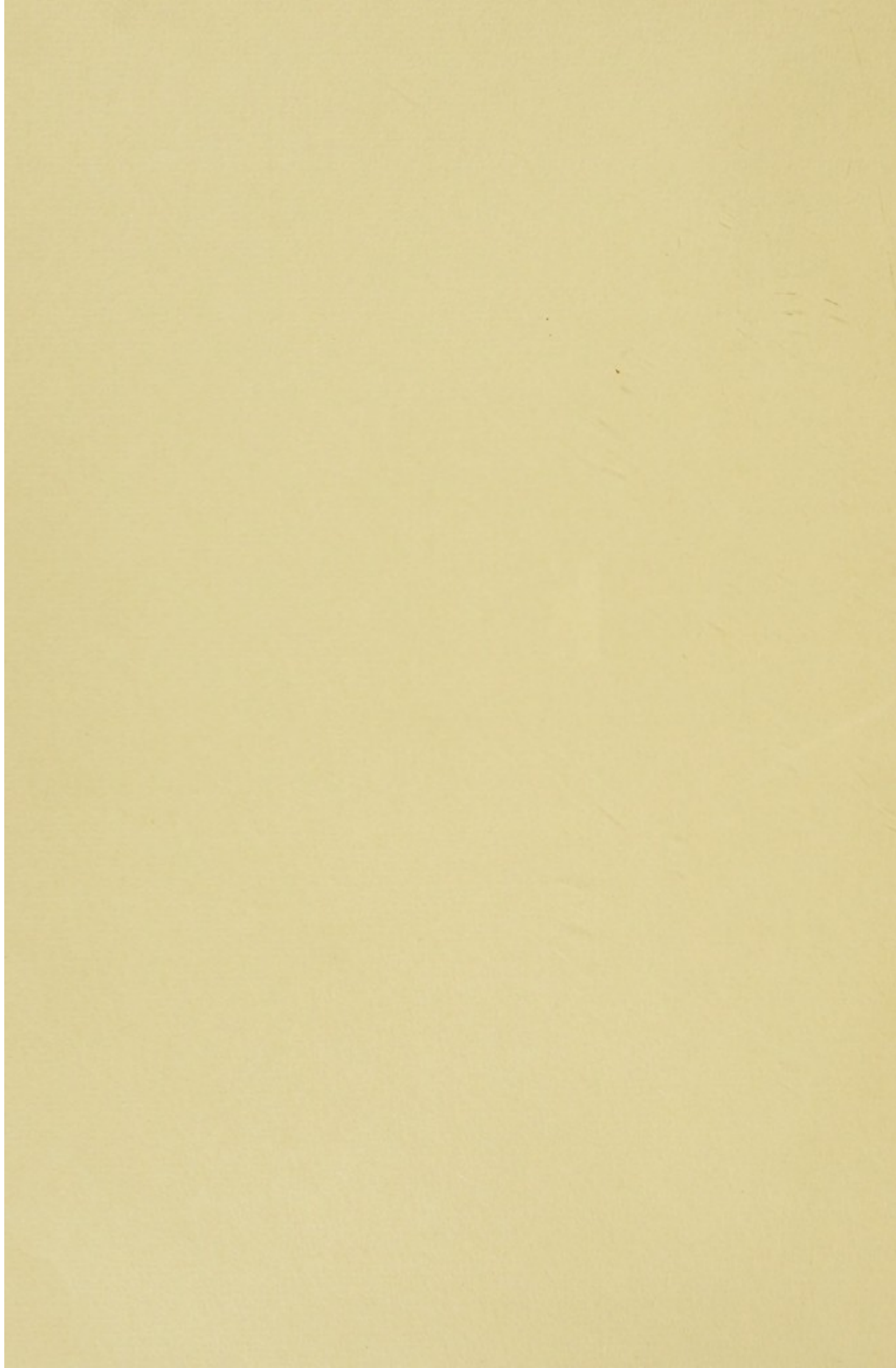






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Frontispiece



A
KEY TO PHYSIC
AND THE
OCCULT SCIENCES.

OPENING TO MENTAL VIEW,

The SYSTEM and ORDER of the Interior and Exterior HEAVENS;

The ANALOGY betwixt ANGELS and the SPIRITS of MEN;

AND THE

SYMPATHY between CELESTIAL and TERRESTRIAL BODIES.

FROM WHENCE IS DEDUCED,

An obvious Discrimination of Future Events, in the Motions and Positions of the Luminaries, Planets, and Stars; the Universal Spirit and Economy of Nature in the Production of all Things; the Principles of ethereal and atmospherical Influx, in constituting the proper Recipient of Life; the active and passive Tinctures requisite in the Generation of Men and Brutes; the Properties of Vegetable, Mineral, and ANIMAL MAGNETISM; the fundamental Causes and Qualities, visible or occult, of all DISEASES, both of Mind and Body; and the simple Modes prescribed by NATURE for their Prevention and Cure.

TO WHICH ARE ADDED,

LUNAR TABLES, calculated from Sidereal Motion; exhibiting, upon the most simple yet unerring Construction, the actual Moment of the CRISIS of every DISEASE, and the consequent Termination thereof, whether for LIFE or DEATH.

THE WHOLE FORMING

An interesting Supplement to CULPEPER'S FAMILY PHYSICIAN, and Display of the OCCULT SCIENCES. Published for the good of all who search after Truth and Wisdom; to preserve all the Blessings of Health and Life; and to give to all the Knowledge of Primitive Physic, and the Art of Healing.

By E. SIBLY, M.D. F.R.H.S.

The SIXTH EDITION. Illustrated with elegant COPPER PLATES.

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1821.

DEDICATION,

TO THE NUMEROUS

SUBSCRIBERS TO MY FORMER WORKS.

THE Liberality, Attention, and Confidence, I have received from YOU, demand the earliest fulfilment of my Promise, in publishing the following Sheets. Not conscious of having deviated from the line of REASON or TRUTH, not challenged by Critics, nor accused by the Faculty, of leading you astray, I feel more than common Gratification in submitting myself once more to your Patronage; and no longer than I can render myself useful to SOCIETY, and worthy of YOUR Protection, do I wish to retain the Power of subscribing myself

Your much-honoured Brother,

Friend, and Servant,

*No. 1, Upper Titchfield-street,
Cavendish Square.*

E. SIBLY.

DEDICATION

TO THE MEMBERS

SUBSCRIBERS TO MY FORMER WORKS

THE Liberalive, Attention, and Confidence I have received from YOU, demand the earliest fulfilment of my Promise, in publishing the following Sheets: Not conscious of having derived from the pen of REASON or TRUTH, not challenged by Critics, nor accused by the Faculty, of pushing you away, I feel more than common Gratification in submitting myself once more to your Patronage; and no longer than I can render myself useful to SOCIETY, and worthy of YOUR Protection, do I wish to retain the Power of superseding myself.

Your much-honoured Brother,

Friend and Servant,

A. S. B. 17

A

KEY TO PHYSIC

AND THE

OCCULT SCIENCES.

WISDOM is the Light of Reason, and the Bond of Peace. It assimilates Man to God, and elevates his mind above unworthy pursuits. It is the principal excellence which distinguishes him from brutes, and the chief ornament that dignifies his character. Whatever is found in Wisdom's laws defies the mouldering hand of Time, and ranks with immortality. Hence it is that a thirst after knowledge is natural to man; and, if the cares and follies of this world could be estranged from his concerns, his desire of information would be inseparable from his existence. Ignorance and Superstition may be considered as the curse of God, which chains its votaries to unworthy objects; whilst, on the contrary, Wisdom and Understanding provide us with wings, whereby to soar above the earth; to contemplate the works of creation; to discern the mysteries of divinity, and converse with angels.

The beautiful description given by Solomon of his acquirements in wisdom, is highly deserving the attention of all men; but particularly of those who profess the science of physic, and the cure of souls. *I prayed, says Solomon, and understanding was given me; I called upon God, and the spirit of wisdom came to me. All good things came with her, and innumerable riches in her hand.* Wisd. vii. 7, 11. What greater reward could any one desire? And though the intellectual faculties of all men are not alike strong and apt for occult speculations; yet it is manifest

that all persons are capable of deriving great improvement from reading; and, that it is not so much the want of natural ability, as of industry and application, that so many men disgrace the image of the Deity, and degrade the venerable professions of Divinity, Physic, and Law.

It rarely happens that the want of intellect, or natural endowments of the mind, are the rocks on which men split in their professional character. Indocile and unapt indeed must that man be, whom education, experience, observation, reading, or enquiry, will not set generally right in his progress through life. Yet, without industry, and an anxious desire of knowledge and improvement, neither education, nor all the advantages of natural ability, can save us from the wreck of error, or the disgrace of ignorance. Obstinate men, though of the first capacity in the world, are a forlorn hope, and often irrecoverably lost, by unadvisedly pursuing the phantom of their own brain; whilst others, enriched by dignity of sense, and qualified by depth of understanding to form the brightest characters amongst society, surrender up their talents for discernment and enquiry, and content themselves with taking upon trust whatever they see or hear; particularly in the practice of physic, in the law, and in the church. The mischiefs attendant on this general conduct of mankind, are great and many; for by thus implicitly subscribing to the vague notions, and false doctrines, of others; by shutting their eyes against the light of reason and enquiry, and refusing to receive the conviction of their own senses, they transfer error from one generation to another, until the unlettered multitude, dazzled by the splendid ignorance of the learned few, become disciples to their mistakes, and make error and enthusiasm an hereditary disease.

Hence, then, we see the necessity of consulting our own reason, and employing our own understanding, in the discrimination of all our temporal and eternal affairs; and of acting and judging for ourselves on all occasions which immediately regard our health, our happiness, or our life; and under all those afflictions and misfortunes wherewith we struggle in this world, in our passage to a better; to one more glorious and permanent; the ultimate end and reward of all our labours! Our senses, on these occasions, are ever ready to support our endeavours, and perform their office; and it is unquestionably the duty of all men to exercise, to improve, and employ them. Yet it is astonishing in general to see how distrustful we are of those very faculties Nature has given us for our guide, and how fondly we submit to the opinions of others, whose nerves cannot feel for us, and whose judgment is often founded upon erroneous principles, and sometimes on no principles at all. This, however, is a conduct by no means fitted to the dignity and office assigned to man; who, being placed at the head of all God's works upon earth,
walking

walking in his image, and exercising dominion over his creatures, is bound to improve that intellect of reason and understanding, whereby he is to govern and direct them, according to the dictates of truth, of justice, and of mercy. For this purpose he ought, like Solomon, to study the occult properties and qualities of all things: "from the cedar-tree that is in Lebanon, even unto the hyssop that springeth out of the wall;" with whatever relates to a proper knowledge of himself, "and of beasts, and of fowls, and of creeping things, and of fishes"—not to worship the sun, nor the moon, nor the stars, nor any of the host of heaven; but to consider, to admire, and to investigate their characters, fixed by the hand of God for signs and for seasons, and for days and years. They, in fact, contain no more than what every man ought to be acquainted with, to the best of his abilities; because they lead to a comprehensive idea of those occult causes and effects, which act the most, though they are the least seen; and whereby the human understanding is enlightened and improved, and the mind enriched with those divine precepts, which lead to a manifestation of that FIRST and Omnipotent CAUSE to whose power all second causes are subservient, and operate but as the agents of his Will; and under whose provident care and sufferance we see, feel, move, speak, and have our being! The ten thousand blessings which result from this study, are found in our enquiries after truth, and the mysteries which surround us; of the astonishing sympathy and antipathy betwixt heavenly and earthly substances: of the wonderful harmony and construction of the celestial bodies; of the nature and qualities of our own existence, and the propagation of our species; of the occult properties implanted in all created beings; and the end for which they are and were created!

To such enquiries all men are alike competent, and may boast the same pretensions, unless obstinacy or indolence be substituted to prevent them. There is certainly implanted in the human mind, a power which perceives truth, and commands belief, in all the occult properties of nature, not by the force of argument, nor learning, nor science; but by an instantaneous, instinctive, and irresistible, impulse, derived neither from education nor from habit, but from the peculiar gift of Providence, acting independently of our will, whenever these objects are presented, bearing evidence of their reality, even when the pride of our external deportment, and our very words, affect to deny them. This is an intellectual sensation, which, I will venture to affirm, is felt more or less by all mankind; and I know the hearts of all my readers, if not their tongues, will admit the fact. It is therefore evident that the humble cottager, the classical curate, the regular physician, and the village doctor, stand on the same level in this respect. The study of Nature's laws, of the occult properties in medicine, and in the frame and temperature of our bodies, is no less

less simple, than important to our welfare; and without knowing these, we know nothing that can place us beyond the sagacity of the brute creation. We can neither foresee danger nor shun it when it is near—we are subject to misguided treatment, and mistake, in our medical applications, and advice—we receive intuitive signs and tokens of misfortune or advantage, without knowing how to benefit by the admonition.—In short, without this study, our enquiries are vain—our perceptions are clouded—our views limited, and all our pursuits are vanity, vexation, and disappointment. The weakness of our reason, and the avocations arising from the infirmities and necessities of our situations, require the most powerful instructions, and the clearest perceptions of heavenly and earthly things, for the preservation of our souls and bodies, and for the illumination of our minds; advantages that can in no wise be more completely obtained than by an intimate acquaintance with the Occult Sciences; or, in other words, by a contemplation

OF GOD.

THOUGH God has given us no innate ideas of himself, yet, having furnished us with those faculties our minds are endowed with, he hath not left himself without a witness; since we have sense, perception, and reason, and cannot want a clear proof of him, as long as we carry any thought of ourselves about us. To show, therefore, that we are capable of knowing, that is, being certain, that there is a God; and how we may come by this certainty, I think we need go no farther than ourselves, and that undoubted knowledge we have of our own existence. I think it is beyond question, that man has a clear perception of his own being: he knows certainly that he exists, and that he is something. In the next place, man knows, by an intuitive certainty, that bare nothing can no more produce any real being, than it can be equal to two right angles. If, therefore, we know there is some real being, it is an evident demonstration, that from eternity there has been something; since what was not from eternity had a beginning; and what had a beginning must be produced by something else. Next it is evident, that what has its being from another must also have all that which is in and belongs to its being from another too; all the powers it has must be owing to, and received from, the same source. This eternal source of all being, must be also the source and original of all power; and so this eternal being must be also the most powerful.

Again, man finds in himself perception and knowledge: we are certain then that there is not only some being, but some knowing intelligent being, in the world. There was a time when there was no knowing being, or else there has been a know-
ing

ing being from eternity. If it be said, there was a time when that eternal being had no knowledge; I reply, that then it is impossible there should have ever been any knowledge; it being as impossible that things wholly void of knowledge, and operating blindly, and without any perception, should produce a knowing being, as it is impossible that a triangle should make itself three angles bigger than two right ones. Thus, from the consideration of ourselves, and what we infallibly find in our own constitutions, our reason leads us to the knowledge of this certain and evident truth, that there is an eternal, most powerful, and knowing, being, which whether any one will call God, it matters not. The thing is evident; and from this idea, duly considered, will easily be deduced all those other attributes we ought to ascribe to this eternal Being.

From what has been said, it is plain that we have a more certain knowledge of the existence of a God than of any thing our senses have not immediately discovered to us. Nay, I presume I may say, that we more certainly know that there is a God than that there is any thing else without us. When I say, we *know*, I mean, there is such a knowledge within our reach, which we cannot miss, if we will but apply our minds to that, as we do to other enquiries.

It being then unavoidable for all rational creatures to conclude, that something has existed from eternity, let us next see what kind of thing that must be. There are but two sorts of beings in the world, that man knows or conceives: such as are purely material without sense or perception; and sensible perceiving beings, such as we find ourselves to be. These two sorts we shall call cogitative and incogitative beings; which, to our present purpose, are better than material and immaterial.

If then there must be something eternal, it is very obvious to reason, that it must necessarily be a cogitative being; because it is as impossible to conceive that bare incogitative matter should ever produce a thinking intelligent being, as that nothing of itself should produce matter. Let us suppose any parcel of matter eternal, we shall find it in itself unable to produce any thing. Let us suppose its parts firmly at rest together; if there were no other being in the world, must it not eternally remain so, a dead unactive lump? is it possible to conceive that it can add motion to itself, or produce any thing? Matter then, by its own strength, cannot produce in itself so much as motion. The motion it has, must also be from eternity, or else added to matter by some other being, more powerful than matter. But let us suppose motion eternal too; yet matter, incogitative matter, and motion, could never produce thought. Knowledge will still be as far beyond the power of nothing to produce. Divide matter into as minute parts as you will, vary its figure and motion as much as you please, it will operate no otherwise upon other bodies.

of proportionable bulk than it did before this division. The minutest particles of matter, knock, repel, and resist, one another, just as the greater do; and that is all they can do: so that, if we suppose nothing eternal, matter can never begin to be: if we suppose bare matter without motion eternal, motion can never begin to be: if we suppose only matter and motion eternal, thought can never begin to be: for it is impossible to conceive, that matter, either with or without motion, could have originally, in and from itself, sense, perception, and knowledge; as is evident from hence, that then sense, perception, and knowledge, must be a property eternally inseparable from matter, and every particle of it. Since, therefore, whatsoever is the first eternal being, must necessarily be cogitative; and whatsoever is first of all things, must necessarily contain in it, and actually have, at least all the perfections that can ever after exist; it necessarily follows, that the first eternal being cannot be matter. If, therefore, it be evident, that something must necessarily exist from eternity, it is also as evident, that that something must be a cogitative being. For it is as impossible that incogitative matter should produce a cogitative being, as that nothing, or the negation of all being, should produce a positive being, or matter.

This discovery of the necessary existence of an eternal mind sufficiently leads us to the knowledge of God; for it will hence follow, that all other knowing beings that have a beginning, must depend on him, and have no other ways of knowledge or extent of power, than what he gives them; and therefore, if he made those, he made also the less-excellent pieces of this universe, all inanimate bodies, whereby his omniscience, power, and providence, will be established; and from thence all his other attributes necessarily follow.

Thus, a manifestation of the Deity is visible in all his works. There is not the smallest part of that immense space our eyes behold, or our imaginations conceive, that is not filled with His presence. The worlds which revolve with so much order, beauty, and harmony, through the immensity of space, the sun, moon, stars, and planets, are upheld by the light of his countenance; but for which they would drop from their orbs, and, plunged into the vast abyss, would return to their primitive chaos. To the mercy of God we owe all the blessings of this life, as the reward of good and virtuous actions. To his anger, we justly attribute all violent concussions of the elements, famine, plague, pestilence, &c. brought on a wicked and abandoned people, like the storm of fire and brimstone on Sodom and Gomorrah. The vengeance of the Deity cannot be more awfully described, than by David in his Psalms; which should act as a timely warning to those atheists and unbelievers, and to those wicked, idolatrous, and polluted, countries, against whose detestable crimes these terrible scourges have been so often sent. The shaking of the earth; the
trembling

trembling of the hills and mountains ; the flames of devouring fire darting through the firmament ; the heavens bending down with forked thunderbolts ; their riding on the clouds, and flying on the wings of a whirlwind, the bursting of the lightnings from the horrid darkness ; the tremendous peals of thunder ; the storms of fiery hail ; the melting of the heavens, and dissolving into floods of tempestuous rains ; the earth opening and swallowing up her inhabitants ; the rocks and mountains cleaving asunder, and disclosing their subterraneous channels, their torrents of water, and bituminous fire, at the very breath of the nostrils of the Almighty ; are all of them circumstances which fill the guilty mind with horror and dismay, and admirably express the power, the presence, and the omniscience, of God !

To what has been stated above, I would earnestly recommend an attentive perusal of what I have written in the first volume of my Complete Illustration of the Occult Sciences, from page 61 to 71 ; whence it will be manifest to the full conviction of the most obstinate atheist, (if such a thing can really exist,) that there is a God, all-powerful and intelligent ; supremely perfect ; eternal and infinite ; omnipotent and omniscient ; who endures from eternity to eternity, and is present from infinity to infinity !

But though, from the nature and perfections of the Deity, he is invisibly present in all places, and nothing happens without his knowledge and permission ; yet it is expressly revealed in Scripture, and admitted by all wise and intelligent authors, that he is visibly present with the angels and spirits, and blessed souls of the departed, in those mansions of bliss called Heaven. There he is pleased to afford a nearer and more immediate view of himself, and a more sensible manifestation of his glory, and a more adequate perception of his attributes, than can be seen or felt in any other parts of the universe ; which place, for the sake of pre-eminent distinction, and as being the seat, and centre, from whence all things flow, and have their beginning, life, light, power, and motion, is called the *interior*, or *empyrean*, Heaven.

The position and order of this interior heaven, or centre of the Divinity, has been variously described, and its locality somewhat disputed among the learned ; but all agree as to the certainty of its existence. Hermes Trismegistus defines heaven to be an intellectual sphere, whose centre is every-where, and circumference no-where ; but by this he meant no more than to affirm, what we have done above, that God is present every-where, and at all times, from infinity to infinity, that is to say, without limitation, bounds, or circumference. Plato speaks of this internal heaven in terms which bear so strict a resemblance with the books of Revelation, and in so elevated and magnificent a style, that it is apparent the heathen philosophers, notwithstanding their worshipping demi or false gods, possessed an unshaken confidence

fidence in one omnipotent, supreme, over-ruling, Power, whose throne was the centre of all things, and the abode of angels and blessed spirits.

To describe this interior heaven, in terms adequate to its magnificence and glory, is utterly impossible. The utmost we can do, is to collect from the inspired writers, and from the words of Revelation, assisted by occult philosophy, and a due knowledge of the celestial spheres, that order and position of it, which reason, and the divine lights we have, bring nearest to the truth. That God must be strictly and literally the centre, from whence all ideas of the Divine Mind flow, as rays in every direction, through all spheres, and through all bodies, cannot admit of a doubt. That the inner circumference of this centre is surrounded, filled, or formed, by arrangements of the three hierarchies of angels, is also consonant to reason and Scripture, and forms what may be termed the entrance or inner gate of the empyrean heaven, through which no spirit can pass without their knowledge and permission; and within which we must suppose the vast expanse or mansions of the Godhead, and glory of the Trinity, to be. This is strictly conformable to the idea of all the prophets and evangelical writers. From this primary circle, or gate of heaven, Lucifer, the grand Apostate, as Milton finely describes it, was hurled into the bottomless abyss; whose office, as one of the highest order of angels, having placed him near the eternal throne, he became competitor for dominion and power with God himself! But,

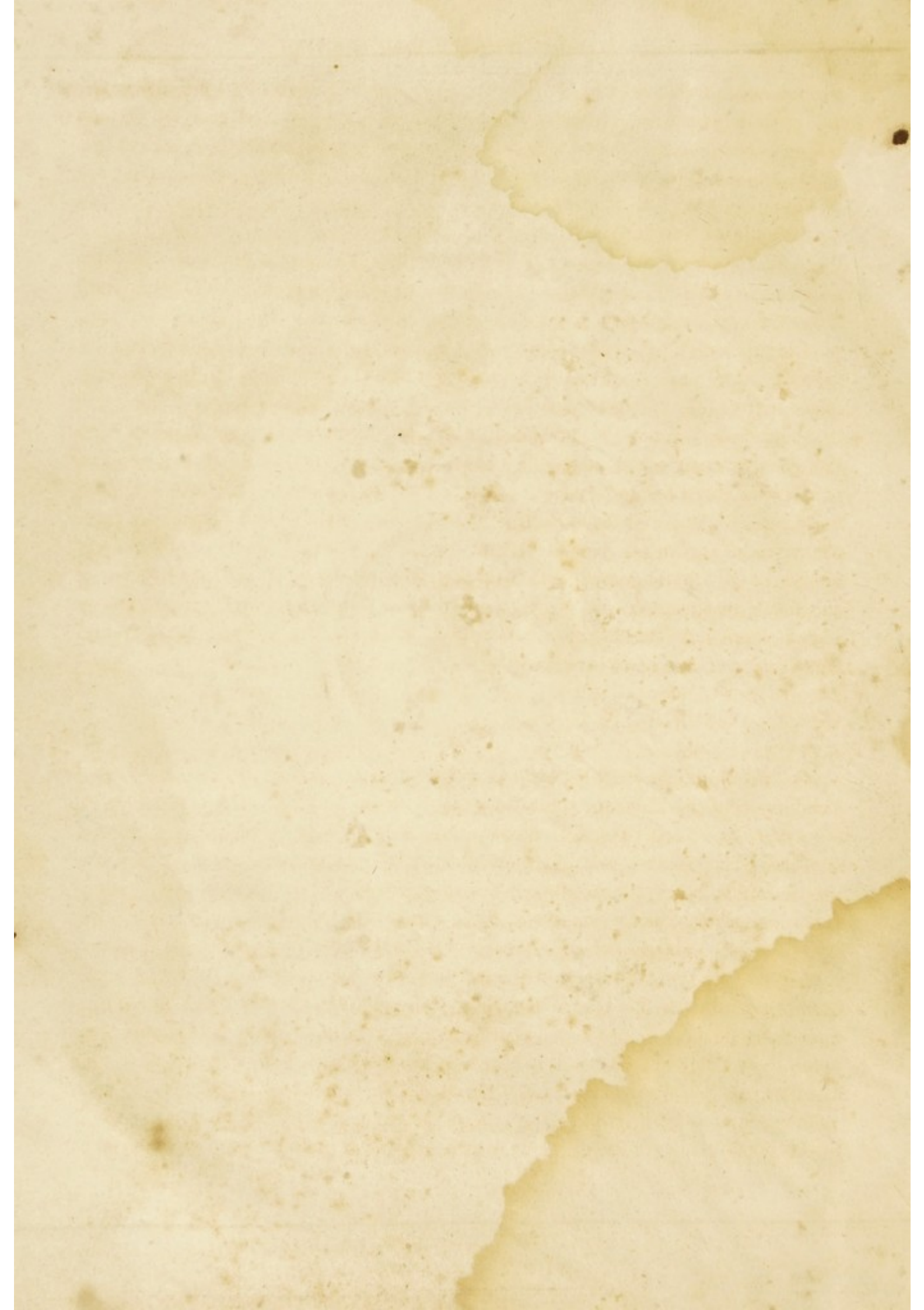
Him the Almighty Pow'r
Hurl'd headlong flaming from th' ethereal sky,
With hideous ruin and combustion, down
To bottomless perdition, there to dwell
In adamant chains and penal fire!

Milton, Parad. Lost, b. i. l. 44, &c.

The circles next surrounding the hierarchies, are composed of the ministering angels and spirits, and messengers of the Deity. In positions answering to the ideas of the holy Trinity, and intersecting all orders of angels, are seated, in fulness of glory and splendor, those superior angels, or intelligent spirits, who answer to the divine attributes of God, and are the pure essences or stream through which the will or fiat of the Godhead is communicated to the angels and spirits, and instantaneously conducted to the *Anima Mundi*. Round the whole, as an atmosphere round a planet, the *Anima Mundi*, or universal Spirit of Nature, is placed; which, receiving the impressions or ideas of the Divine Mind, conducts them onward, to the remotest parts of the universe; to infinity itself; to, and upon, and through, all bodies, and to all God's works. This *Anima Mundi* is therefore what we understand of Nature, of
Providence,



delin. *System of the Interior, or Empyrean Heaven,* Prallent scul.



Providence, of the presence of God, and the fountain or seat of all second causes, being, as it were, the Eye of God, or medium between God and all created things. Next to the *Anima Mundi*, is that vast region or expanse, called the ethereal heaven, or firmament, wherein the fixed stars, planets, and comets, are disposed; and wherein the celestial bodies, and the comets, move freely in all directions, and towards all parts of the heavens.

To illustrate what has been stated above, I have subjoined a plate of the Interior Heaven, with the different orders of the Spirits and Essences of the Divine Mind, distinguished by their proper names and characters, in the original Hebrew text, as pointed out in Holy Writ, and in the manuscripts of ancient and learned philosophers. As these names and characters are printed at length, and fully explained, in the first volume of my Illustration of the Occult Sciences, p. 69, 70, and 71, it is unnecessary to repeat the same here; but for a more perfect explanation of what is there written, the annexed plate is absolutely necessary to assist the inquisitive reader in forming a competent understanding of the subject. It will also appear from this plate, in what manner the rays or beams of Divine Providence pass from the centre or seat of the Godhead, through all the different orders of angels and spirits, to the *Anima Mundi*, and from thence to all the celestial bodies, planets, and stars; to our earth, and to the remotest parts of infinite space, constituting what is termed *celestial influx*, or that faculty in nature by which the quality and temperature of one body is communicated to another.

OF NATURE.

No one expression, used by authors, or spoken amongst men, is in general more variously applied, or so little understood, as the word Nature. When speaking of the *nature* of a thing, we most commonly mean its essence; that is, the attributes or causes which make it what it is, whether the thing be corporeal or not; as when we attempt to define the nature of a fluid, of a triangle, &c. oftentimes we confound that which a man has by nature with what accrues to him by birth; as when we say, that such a man is noble by nature. Sometimes we take nature for an internal principle of motion; as when we say, that a stone by nature falls to the ground. Sometimes we understand by nature, the established course and order of things. Sometimes we take nature for an aggregate of powers belonging to the same body, especially a living one; in which sense physicians say, that nature is strong, weak, or spent; or that, in such and such diseases, nature left to herself will perform the cure. Sometimes we use the term nature for the universe, or whole system of the corporeal works of God; as when it is said of a phoenix, or any imaginary

being, that there is no such thing in nature. Sometimes too, and that not unfrequently, we express by the word nature, a kind of semi-deity, or supernatural spirit, presiding over all things.

This general abuse of the word nature, is by no means peculiar to the English people or language; it prevails more or less in all countries, and amongst all sects; and seems to have been copied from the fabulous ideas of the ancients. Aristotle has written a whole chapter, expressly to enumerate the various acceptations of the Greek word *φύσις*, rendered in English *nature*; and, among Latin writers, there are no less than fifteen or sixteen different acceptations of the same word, with advocates out of number for their interpretation. The bulk of them insist, that the word nature radically means the system of the world; the machine of the universe; or the assemblage of all created beings; in which sense they speak of the Author of Nature; and call the sun the *eye* of nature, because he illuminates the universe; and the *father* of nature, because he warms the earth, and makes it fruitful. Others, understanding the word in a more confined sense, apply it to each of the several kinds of beings, created and uncreated; spiritual and corporeal; thus they say *divine* nature, *angelical* nature, and *human* nature, meaning all men together who possess the same spiritual reasonable soul. In this sense the schoolmen and divines say, *natura naturans*, and *natura naturata*; speaking of God, who is the *natura naturans*, as giving *being* and *nature* to all others; in opposition or distinction to the creatures, who are the *natura naturata*, as receiving their nature from the hands of another.

Nature, in a still more limited sense, is used for the essence of a thing; according to which the Cartesians say, it is the nature of the soul to think; and that the nature of matter consists in extension. Others more properly use the word Nature for the established order and course of material things; the series of second causes; or the laws which God has imposed on every part of the creation; in which sense it is they say, *nature* makes the night succeed the day, *nature* has rendered respiration necessary to life, &c. According to which, St. Thomas speaks of nature as a kind of divine art, communicated to beings, which direct and carry them to the ends they were intended for; in which sense nature can be neither more or less than a concatenation of causes and effects, or that order and œconomy which God has established in all parts of his creation. Others still more strictly consider nature as the action of Providence, and the principle of all things; or that spiritual power or being, which is diffused throughout the creation, and moves and acts in all bodies, and gives them peculiar properties, and produces peculiar effects. In this sense, our modern philosopher Mr. Boyle considers nature as nothing else but God, acting

acting himself according to certain laws he himself has fixed. This corresponds very much with the opinion of a sect of ancient philosophers, who made Nature the god of the universe, *Τὸ Πᾶν*, whom they conceived to preside over and govern all things; but this they acknowledged to be only an imaginary being; and that *Nature* meant no more than the qualities, or virtues, which God implanted in his creatures, but which their poets and orators had figuratively personified as a god. Hence F. Malebranche was aggravated to say, "that the *Nature* so much spoken of in the schools, is only fit to lead us back to pagan idolatry; since it taught us to understand something, which, without being God, acts continually throughout the universe;" according to which, he supposes Nature would be adored as an idol, conceived to possess an actual principle, which, in concurrence with God, was the next and immediate cause of all the changes which befall matter.

Aristotle, with a view of concentrating these ideas of nature into one point, as best adapted to the works of an infinitely-perfect and all-powerful Being, defines Nature, *principium et causa motus et ejus in quo est primo per se, et non per accidens*; which definition being mistaken by the Peripatetics and Stoics, they from hence conceived the principle of nature to be a certain spirit or virtue diffused throughout the universe, which gave every thing its motion by the invariable order of an inevitable necessity, without liberty or knowledge. This induced the idea of a *plastic nature*, which several learned modern writers have described to be an incorporeal created substance, indued with a vegetative life, but not with sensation or thought, penetrating the whole created universe, being co-extended with it, and, under God, moving matter so as to produce the phenomena which cannot be solved by mechanical laws; active for ends unknown to itself, not being conscious of its own actions, and yet having an obscure idea of the action to be entered upon. In support of this *plastic nature*, Dr. Cudworth argues thus: "Since neither all things are produced fortuitously, or by the unguided mechanism of matter, nor God himself may reasonably be thought to do all things immediately and miraculously, it may well be concluded, that there is a *plastic* or *formative* nature under him, which, as an inferior and subordinate instrument, executes that part of his providence which consists in the regular motion of matter; yet so as that there is also, besides this, a higher providence to be acknowledged, which, presiding over it, doth often supply the defects of it, and sometimes over-rule it, forasmuch as this plastic nature cannot act electively, nor with discretion." This doctrine, he conceives, had the suffrage of the best philosophers of all ages, Aristotle, Plato, Empedocles, Heraclitus, Hippocrates, Zeno, and the Stoics, and the latter Platonists and Peripatetics, as well as the chemists and Paracelsians, and several modern writers.

Now

Now I am clearly of opinion, that, notwithstanding these great authors have so obstinately contended for the definition of the word, and for the principles and construction of Nature, yet they all in reality meant one and the same thing, only giving different explanations of the same ideas; and if their arguments are closely pursued, and compared with each other, they will all tend to show, that the *anima mundi*, or soul of the universe, was what they meant by Nature.

This *anima mundi*, as we have before seen, is a medium investing the whole interior heavens, and consists of a pure ethereal substance, or spirit; which, as it more immediately resides in the celestial regions, is the second or next cause, under God, that moves and governs the heavens, and heavenly bodies, stars, and planets; which bodies, having received their first existence from the fecundity of the same spirit in the act of creation, are by an influx of sympathetic rays, and by light, heat, gravity, and motion, nourished and sustained, upheld and continued, in the same regular course, and in the beautiful order we see them. From the celestial regions, the same influx of pure ethereal spirit descends into every part of the immeasurable space, and is diffused through the mass of this world, informing, actuating, and uniting the different parts thereof into various substances; and being the primary source of life, every-where breathing a spirit like itself, it pervades all elementary bodies, and, intimately mixing with all the minute atoms thereof, constitutes the power or instrument we call Nature, forming, fashioning, and propagating, all things, conformably to the ideas or will of the Divine Mind in the first act of creation. And so the poet:

*Spiritus intus alit, totosque infusa per artus
Mens agitat molem, et magno se corpore miscet.*

The only thing that has been objected to the notion of an *anima mundi*, is, that it mingles the Deity too much with his creatures; confounds, in some measure, the workman with his work, making this, as it were, a part of that, and the several portions of the universe so many parts of the Godhead.—Yet is the same principle asserted by Seneca, Epist. 92. *Totum hoc quo continemur, et unum est, et Deus. Et socii ejus sumus, et membra.* M. du Hamel thinks, that those who deny it, object without a reason; of which every one will be sensible, who reads the description above given, since it in no respect confounds our comprehension of an infinitely-wise and Supreme Being with that of the *anima mundi*; but, on the contrary, proves it to be as distinct from the Deity as are the angels and spirits in heaven. And we may further observe, from what is above premised, that those who deny the *anima mundi* on one hand generally admit it on the other. Thus the Peripatetics

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have recourse to celestial influxes, which is partly the same thing, in order to account for the origin of forms, and the occult power of bodies. The Cartesians have their subtle matter, which answers to the active spirit of the *anima mundi*. Others suppose an actuating spirit to flow from the sun, and the other heavenly bodies, which is diffused over all parts of the world, and is the source or principle of life, motion, &c. which is still the same thing. Some philosophers, in the place of these, have substituted the idea of fire, or an ethereal elastic spirit, diffused through all parts of space, as the medium by which elementary bodies are nourished and sustained; which nearly comes to the same thing. Even those who have contended for a *plastic* nature, fall in with every principle of the *anima mundi*; only they insist that the *formative* power is lodged in the earth; whereas the truth is, that it dwells in the heavens, and is conveyed to the earth, to the elements, and into all matter, by the medium I have described.

I shall conclude this definition of Nature with remarking, agreeable to the opinion of the ingenious Mr. Boyle, that, in order to regulate our conceptions of the word in common, and to render the application of it less ambiguous, we should distinguish between the universal and the particular nature of things. *Universal nature* we should consider to be the aggregate of all the bodies that make up the world, under the *anima mundi*, considered as a principle by virtue whereof they act and suffer, according to the laws originally prescribed by the Author of all things. And this makes way for the other subordinate notion; since the *particular nature* of an individual consists in the general nature, but only applied to that distinct part or portion of the universe; or, which is the same thing, it is a particular assemblage of the mechanical properties of matter, motion, &c. of that subject which immediately engages our attention.

Of the VISIBLE and OCCULT PROPERTIES of NATURE.

HAVING thus far explained the foregoing subject, we come next to an investigation of *Causes*, and their *Effects*, or the means whereby Nature acts in the fructification of the universe. We derive the idea of causes and effects from our observations of the vicissitudes of things, while we perceive some qualities or substances begin to exist, and that they receive their existence from the due application and operation of other beings; in all which circumstances, that which produces is the Cause, and that which is produced is the Effect. There is such a relation and connection between the cause and the effect, that we cannot have a true notion of the one, unless at the same time we have a conception of the other. So in general we say that a cause is nothing else but that which gives being to

another thing, which is the effect of it, which way soever it happens, according to the various causes.

The *First Cause*, which acts of itself, and of its own supreme power and will, is GOD. This is a truth so evident, and so conspicuous, that it cannot be denied. The existence of a First Cause may be deduced from the certainty of our own existence; for that we exist in the world, is a self-evident truth; but that we came into it of ourselves, or by casualty, necessity, or chance, is absolutely impossible. The source of our existence must therefore be derived from some being, who, as the author, must also be the free principle, of that essence, or life, we possess. To say that we ourselves were the cause of our being, would be ridiculous; because from thence it would follow that we existed before we had a being; that we gave ourselves that which we were not in the possession of; and that the cause and the effect were one and the same thing; which is likewise impossible. It is no less an error to affirm that we are in the world by necessity; for, if such were the case, our existence would have never had a beginning, and we should have been immutable and independent, and infinite in every kind of perfection; but, as these qualities are only applicable to a first cause, it follows that such cause must be Almighty.

Those who are convinced of the existence of a first cause, must necessarily attribute to it all the perfections which are or can be in the world; that it is not only most perfect, and most noble, but also, that all the effects which it hath produced, or is capable of producing, are contained within itself, in the utmost perfection; and that every one of them is infinite, in the unity of its being; for it is necessary it should possess the perfections of those beings it hath or can produce, otherwise it would be said to communicate that which it neither hath nor can have. The first cause would not be absolutely perfect, if it was not Eternal; for so it would have had a beginning, and might have an end; and then it could not have been the first cause, inasmuch as it derives its existence from that which was pre-existent to it; and by consequence this cause, which we suppose to be the first, would be a second cause, limited in its being and perfections, as in its duration; and it would seem to have a dependence upon another; whereas, when we suppose it to be the first, all others must depend upon, and be subordinate to it. Whence it follows, that these qualities must be inseparable from it, independence, eternity, infinity, and supreme authority; and that we cannot conceive any first cause, but at the same time we must acknowledge the existence of God.

This *first cause*, which is God, must necessarily have that *perfect unity*, which admits no multiplication either of nature or perfections. Certainly if God was not one in his being, but had several natures, the number of them ought to be infinite,

and yet none of these beings in particular would be infinite, because, when the perfection of one cannot be the perfection of another, there will not be one to be found but will stand in need of the other, that is, in whom there would not be requisite that perfection which the other beings possess. Therefore we may add, that all these supposed beings would be opposite, independent, and all supreme, which is impossible; or that all would be subject to one or other of them, which is ridiculous; whence it follows, that there is but one only God, who is one in his existence, incapable of any multiplication, and who is the primary and universal cause of all things. The great number, or rather the infinity, of perfections which we apprehend to be in the first cause, is not repugnant to the Trinity, because that does not divide the being: and these perfections are but one and the same thing, though we give them several names, and consider them under several ideas, which we are forced to correct; since without that unity there would be necessarily a composition of parts, which would be the materials of the whole compound, and would precede its existence; therefore could not be the ingredients of that composition, without something else intervening. They may also be divided and separated; so that, by the dissolution of the parts, the compound would cease; which is plainly inconsistent with that idea we have of God, who is not simple in his nature, independent in his will, and every way incorruptible. The first cause is only one, and without its like, in its essence, but also one sole, and without a second, in that action by which this world was produced; and for this reason the action is called *creation*, supposing nothing but mere nothing, out of which all things were made, by the only power of God, without the help of any other, having either the quality of an agent or a subject. The world, being produced by this first cause, remains subject to the will and pleasure of it; and, in the same manner as it was produced by the sole act of this first cause, so it is preserved in the same state, by the sole influence of the same cause; which, as it did not want any help in the creation of the universe, so neither doth it stand in need of any assistance in the conservation of it. If the first cause was free in the creation of the world, thence it follows that all things were made by direction of reason and understanding, and by consequence according to a certain idea and rule: and, since the first cause operates after an independent manner, it could not have the type of its production any where else but from itself; neither could it act by a rule distinct from its own being; so that in truth God is not only the first, but the exemplary, cause of all things. For the same reason it may be said, that the first cause, which is God, is the final cause of all things; for when he, as an intelligent and free being, produced this world, he proposed to himself an end answerable to his dignity, that is, to himself and his own proper glory. So that

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the First Cause is, necessarily, the ultimate end of all its effects. This is a nice subject, wherein all preachers and writers seem at a loss; but the case is clear and beautiful to those who pursue the lessons of wisdom and science.

Second Causes are those which derive the power or faculty of acting from the influence of the First Cause. Hence the *anima mundi* is the seat of all second causes, which are also termed natural causes, because they have implanted in them, by the First Cause the occult power of diffusing through all space, and of communicating to all bodies, that universal soul, or ethereal spirit, whereby every particle of matter is moved, and made to act upon one another, so as to produce the various phenomena in nature, in the animal, vegetable, and mineral, worlds; in the elements, and in the firmament of heaven. This universal spirit or cause acts universally with particular causes; but after a manner agreeing with the nature of every particular thing, and according to the power which was given it when it was created; which neither alters the quality of the causes, nor the necessity or liberty of their actions. This power of acting, which is communicated by second causes, is not a quality different from those things impowered to act; whence the power which the atoms have of moving in all directions doth not differ from the atoms themselves; the power of burning or heating doth not differ from the fire to which it is inherent, unless it be in the manner of our conceiving things, or of speaking of them according to our conceptions. So it is of an action which terminates from the cause to the effect, and which is nothing else than a certain relation, or an actual subordination, which is always found betwixt the cause and the effect. Hence we perceive that second causes are what all philosophers, ancient and modern, have contended for under different forms; and are neither more nor less than that universal spirit, or inherent law, implanted in nature at the creation, whereby all God's works are regulated and preserved, and the ends and purposes of that creation conducted to God's glory and manifestation, and to the good of all his creatures, the study of which opens our eyes to the bright beams of true wisdom; to the mutual harmony and dependence one thing has upon another; to the sympathy and antipathy of material bodies; to the perceptions of sense, reason, and intellectual vision; to the nice faculties, and exquisite connection of soul and body; and ultimately to the knowledge of ourselves, of our progress through this world; of our sublunary fate and fortune; and of the things calculated to preserve life, or to destroy it.

Efficient Causes are all those actions of bodies or things, which are the agents or direct means whereby any effects are produced. Thus a painter, painting a picture, is an efficient cause; and the picture itself, when finished, is the effect thereof. Efficient causes comprehend a number of compound or subordinate causes, which

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also contribute towards the production of their effect. If the efficient cause acts by a power proper to itself, then it is called the principal cause; but, if only by the force and strength of another, then it is termed the instrumental cause. So we distinguish between the painter and the pencil, though both contribute to the production of the picture. Again, the subject whereon the agent works, or whereof the thing is formed, is called the *material* cause; thus the marble out of which a statue is carved, is called the material cause; as is likewise the paint and canvass of a picture, as being the matter, or materials, of which they are made; the sculptor and painter being the efficient causes. There is also an efficient cause in the sun, moon, stars, and elements, whereby they act upon sublunary matter, and produce a variety of effects in the fructification and phenomena of this world. From these arise necessary and free causes: the first of which act necessarily and without choice; as fire, the sun, and all created beings, except angels and men; for they act by a free will, wherein consists the essence of liberty. The efficient cause is likewise either physical, or moral; the *physical* is that which produces a sensible corporeal effect, and acts obviously and immediately; thus fire is the physical cause of burning, and the sun the physical cause of heat. The *moral* cause also produces a real effect, but in things immaterial; thus, repentance is the moral cause of forgiveness. Again, we define a *physical* cause to be that which produces its effect by a physical virtue; and a *moral* cause, that which *determines* the physical cause, though not *necessarily*, to produce the effect: thus, the sun is the physical cause of light; a stone that falls from an eminence, and fractures the skull, is a physical cause of death; and thus the advice, intreaty, commands, or menaces, which determine us, though not *necessarily*, to do, or not to do, any thing, are moral causes. In this sense it is obvious a moral cause is only applicable to a free intelligent agent; and it is this notion of a moral and physical cause that is the most just, clear, and distinct.

Whenever the efficient cause applies to a free intelligent being, and acts from knowledge, all the subordinate causes concur to the production of one and the same effect; as for example, the painter drawing his picture is the principal cause; the pencil the instrumental; the end proposed by the painter is the final cause; the idea directing the performance is the exemplary cause; the form and disposition of its parts is the formal cause; the colours and the canvass are the material cause, as being the constituent matter of the work; and if the artist, by any accidental touch, improves his picture, like Agillaus, who labouring many days to draw a foaming horse, and could not, in a passion flung his brush at the painting, and the thing he wanted was thus accomplished when it was not intended—it is termed an accidental cause. So that we see all subordinate causes are in effect under the efficient cause; and are subservient to it, when applied by reason, and directed by skill.

Form and *formal cause* is one and the same thing: and, when we say there are two sorts of forms, that is only according to our manner of conceiving things; so we say there are two sorts of formal causes, the substantial and accidental. But all forms are imaginary; neither do true philosophers acknowledge any other substance to be in natural compounds than matter, except only in man; nor any other form than the disposition of the parts, because all these forms are altogether useless. Moreover, the exemplary cause may be referred to the formal, because it is the idea and inward form of that which we frame in our spirit; so the formal cause of a picture is the disposition of its parts, according to the disposition and ordination which it then had in the mind of the painter. The same may be said of all rational agents which are endued with understanding.

There is no difference betwixt matter and a material cause; and there are two sorts of material causes, as well as of matter. This is the *first matter* out of which all bodies are composed, and into which, by an universal division, they may be reduced; the second is nothing else but bodies made of the first, and upon which the efficient causes exercise their action. Therefore it is apparent, that there is nothing in the world but what is a compound, and that there is no compound without matter. It is also certain that there is nothing made without an efficient cause, which acts upon compounds, and destroys them, that of them others may be made; because the matter of the first serves for the composition of the second. The matter which goes to the composition of the first and second is the *first matter*, or material cause, of the compound; and that matter which serves the efficient cause for a subject and patient is called the *second matter*. Both of them may be an efficient cause; for compounds act upon one another like the elements, which drive one another backwards and forwards. That which drives another is called the agent, as that which is driven is called the patient; and if there be any thing which resists it, and drives back another, this regress of the motion is called *re-action*. So that one and the same thing may be the subject and cause of motion; and that, to give and receive being the principle of agent and patient, both may happen at the same time, but in divers respects.

Efficient causes, in solid and fluid bodies, we often see, act in a most wonderful manner; and, if they were not visible to our eyes, we should scarcely believe any of these occult properties existed in them. Thus, the action of oil, in stopping the violent ebullition of various substances, is truly surprising. It is well known, that if a mixture of sugar, honey, or the like, be boiling on the fire, and in danger of rising over the sides of the vessel, the pouring in a little oil immediately makes it subside. In many cases the marking a circle round the inside of a vessel, in which a liquor of this

this kind is to be boiled, with a piece of hard soap, shall, like a magic ring, confine the ebullition to that height, and not suffer it to stir any farther. This is wholly owing to the oil, or fat, contained in the soap: but there is, besides these, another very important use of oil, on a like occasion, which is the pouring a little of it on any metallic solution while making: this restrains the ascent of the noxious vapours; preserves the operator from danger; and, at the same time, by keeping down the evaporating matter, gives redoubled strength to the menstruum. Pliny has mentioned an extraordinary effect of oil, in stilling the surface of water when it is agitated with waves, and the use made of it, by the divers, for this purpose: *Omne*, says he, *oleo tranquillari, &c.* lib. ii. cap. 103. And Plutarch, in *Quæst. Natur.* asks, *Cur mare oleo conspersum per lucidum fit et tranquillum?* Pliny's account seems to have been either discredited or disregarded by our writers on experimental philosophy, till it was confirmed by several curious experiments of Dr. Franklin, which were published in the year 1774. The property of oil above mentioned has, however, been well known to modern divers and dredgers for oysters at Gibraltar, and elsewhere. The divers in the Mediterranean, in particular, descend, as in Pliny's time, with a little oil in their mouths, which they now and then let out; and which, on rising to the surface of the sea, immediately renders it smooth, so as to permit the light to pass through the water undisturbed by various and irregular refractions. The Bermudans are enabled to see and strike fish, which would be concealed from their view through the roughness of the sea, by pouring a little oil upon it. And the Lisbon fishermen effect a safe passage over the bar of the Tagus, by emptying a bottle or two of oil into the sea, when the surf is so great as to endanger its filling their boats. Our sailors have also observed, that the water is always much smoother in the wake of a ship that hath been newly tallowed than it is in one that is foul. Dr. Franklin was led, by an accidental observation made at sea in 1757, to attend particularly to Pliny's account; and the various informations which he afterwards received relating to it induced him to try some experiments on the subject. Standing on the windward side of a large pond, the surface of which was rendered very rough with the wind, he poured a tea-spoonful of oil on the water. This small quantity produced an instant calm over a space of several yards square, which spread amazingly, and extended itself gradually till it reached the lee side, making all that quarter of the pond, perhaps half an acre, as smooth as a looking-glass. On repeating this experiment, which constantly succeeded, one circumstance struck him with particular surprise; this was the sudden, wide, and forcible, spreading of a drop of oil on the face of the water, which, he adds, "I do not know that any body has considered." When a drop of oil is put on a looking-glass, or polished marble, it spreads very little; but

on water it instantly expands into a circle extending several feet in diameter, becoming so thin as to produce the prismatic colours for a considerable space, and beyond them so much thinner as to be invisible, except in its effects of smoothing the waves at a much greater distance. It seems, says Dr. Franklin, as if a mutual repulsion between its particles took place as soon as it touched the water, and a repulsion so strong as to act on other bodies swimming on the surface, as straws, leaves, &c. forcing them to recede every way from the drop, as from a centre, leaving a large clear space. In endeavouring to account for the singular effects of oil, Dr. Franklin observes, that there seems to be no natural repulsion between water and air, such as to keep them from coming in contact with each other.—Therefore, air in motion, which is wind, in passing over the smooth surface of water, may rub, as it were, on that surface, and raise it into wrinkles, which, if the wind continues, are the elements of future waves. The smallest wave does not immediately subside, but in subsiding raises nearly as much of the water next to it. A small power, continually operating, will produce a great action: so that the first-raised waves, being continually acted upon by the wind, are, though the wind does not increase in strength, continually increased in magnitude, rising higher, and extending their bases, so as to include a vast mass of water in each wave, which, in its motion, acts with great violence. But, if there be a mutual repulsion between the particles of oil, and no attraction between oil and water, oil dropt on water will not be held together by adhesion to the spot on which it falls: it will not be imbibed by the water, but be at liberty to expand itself and spread on a surface, that prevents, perhaps, by repelling the oil, all immediate contact; the expansion will continue till the mutual repulsion between the particles of oil is weakened, and reduced to nothing by their distance. Dr. Franklin imagines, that the wind, blowing over water thus covered with a film of oil, cannot easily catch upon it, so as to raise the first wrinkles, but slides over it, and leaves it smooth as it finds it. It moves a little the oil, indeed, which, being between it and the water, serves it to slide with, and prevents friction: hence the oil, dropt on the windward side of the pond, proceeds gradually to leeward, as may be seen by the smoothness it carries with it quite to the opposite side; for the wind, being thus prevented from raising the first wrinkles, which he calls the elements of waves, cannot produce waves, which are to be made by continually acting upon and enlarging those elements; and thus the whole pond is calmed. Upon the whole, there is great room to suppose (notwithstanding the partial failure of an experiment made at Portsmouth by Dr. Franklin and others), that seafaring people may derive advantages from using oil on particular occasions, in order to moderate the violence of the waves, or to lessen the surf which sometimes renders the landing

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on a lee-shore dangerous or impracticable. To this purpose we are informed, that the captain of a Dutch East-India ship, being overtaken by a storm, found himself obliged, for greater safety in wearing the ship, to pour oil into the sea, to prevent the waves breaking over her; which had an excellent effect, and succeeded in preserving her. Phil. Transf. vol. lxiv. part 2. p. 445, &c. It is also observable, on the coast of Sutherland, when the lump-fish abounds in spring, and are devoured by the seals, that it may be known by the smoothness of the water above the spot; the oil serving to still the agitation of the waves.

Occasional cause is applied to the soul and body of man, and are only the *occasions*, not the direct *causes*, of their effects. The soul is not able to act on the body, nor the body reciprocally on the soul: to keep up an intercourse between them, God, on occasion of a motion of the body, impresses a sensation on the soul; and, on occasion of a sentiment of the soul, impresses a motion on the body: the motions, therefore, of the soul and body, are only *occasional causes* of what passes in the one or the other. Thus we say, the stroke, or percussion, is only the occasional cause of the motion produced in the body struck; it is God is the direct efficient cause. And thus the action of objects on our organs is not the efficient cause of our ideas and perceptions, but merely the occasional cause, which determines God to act on the mind, according to the laws of the union of soul and body.

In a *medical sense*, whatever produces a disease is called the *cause* thereof. This operates either by inducing a new state of the solids and fluids, or by taking away something which is absolutely requisite to the exercise of some function. If a cause pre-existed in some measure in the body before the effect produced, it is called an internal cause; but if it existed out of the body, and by its application to it produced the disease, it is called external.

Internal causes generally injure first the humours, and then the solid parts; whereas, the external causes affect the solids, and, in consequence of that, the humours; and this holds universally, unless perhaps in some few diseases produced by poison or contagion. The immediate cause is that which taken altogether immediately constitutes the present disease; this is always adequate, and sufficient to the formation of the disease, whether simple or complicated. The presence of this constitutes and continues the disease: and the absence of it removes the disorder, being very little different from the disease itself. The investigation, therefore, of this is extremely useful, and very necessary. The remote cause is that which changes the body in such a manner, as to dispose it for the reception of a disease upon the accession of another cause; but it is never adequate or sufficient to produce a disease alone; nor would that other cause, the accession of which is necessary, be of itself sufficient for

the production of the disease; but both must concur. The business of physic, therefore, is to eradicate both together, which, in conjunction, constitute the proximate or immediate cause. The remote cause inherent in the body, is called predisponent, antecedent, and by the Greeks προηχοιμενη, and consists principally in temperaments, plethora, and cacochymy. The cause whose accession to the remote cause excites, and in conjunction with it forms, the disease, is called the procatarctic cause, or the προφασις, or occasion of the disease. It is sometimes internal, sometimes external. These Boerhaave reduces to four classes. First, the *ingesta*, or things entering the body; such as the air, aliments, drink, medicines, poisons, such things as enter by the pores of the skin and nostrils; by the several passages of the mouth, lungs, œsophagus, stomach, intestines, &c. either in a visible or invisible manner; whether by steam, draught, deglutition, clyster, or injection. Secondly, the *gesta*, or things acted, as motion of the whole or any part of the body, affections of the mind, rest, both of the body and mind, sleeping and watching. Thirdly, things retained, or excreted, whether salubrious, secrementious, or morbid. Fourthly, things applied to the body; as air, vapours, fomentations, cloths, liniments, ointments, and plasters; together with whatever wounds, contuses, or corrodes: all which circumstances should be well considered by medical men.

OF THE FIRST MATTER.

ALL philosophers agree that there is a *first matter*, which was produced from the beginning; and, though it can never undergo any change, yet it is to be seen in all the generations and corruptions which are in nature. Hence it appears, that the first matter existed before the generation of the compounds wherein it is found, and that it still remains and survives the corruption of it; as, for instance, in fire which is made of chips; the matter of the fire was in the chips, and is found partly in the fire, partly in the smoke, and partly also in the ashes. It is agreed by all, that nothing produces nothing, and that there is not any thing in nature that can be reduced into nothing, but that the first principles remain in all revolutions which can happen; therefore, in respect of matter, we may justly say, that there is nothing new in the world since the creation, and that this matter in its nature is incorruptible; so that to explain the essence of this first matter is the only difficulty.—Aristotle makes it the subject of all forms, and nothing but a passive power or a mere capacity of producing them. He says also, that matter in itself hath neither quality nor quantity, nor any essence besides that which it received from that form which perfected it: but this explication gives us no clear idea of matter, neither doth it teach us any thing of the nature of it. Those were nearer the truth who said that the first matter

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was nothing else but the first elements into which compounds by a total dissolution are reduced; also that these elements ought to be simple and indivisible, for otherwise the first elements are not such as we suppose them to be. It follows from this doctrine, that neither water, air, earth, nor fire, are first elements, because they are compounds, as by the new chemistry is evidently proved; therefore, we must look for other elements which are simple and indivisible. Now, it is obvious, that simple and indivisible atoms are the only first matter, and the principle and elements whereof bodies are composed: out of these atoms are corpuscles made, out of these corpuscles, small masses, out of masses greater parts, and of these parts greater bodies, whereof the universe itself consists. And *vice versa*, going backward analytically, the world is divided into great bodies, those bodies are reduced by mortality and time into parts, parts into small masses, masses into corpuscles, and, lastly, corpuscles into atoms.

OF ATOMS, AND THEIR NATURE.

TO demonstrate the existence of *atoms*, we may suppose that every compound may be divided into so many parts as they are which make the compound; and division must necessarily cease when there is a failure of parts to be divided. On the other hand, there is no end of division as long as there are particles to be divided; for we must allow, either that a body cannot be so exactly divided but that there always remain divisible parts *in infinitum*, or that there are parts after a certain number of divisions which will not admit any further divisions. Aristotle holds the former, but Gassendus and the ancient philosophers defend the latter; and, according to this last doctrine, after all the divisions are made, nothing can remain besides atoms, that is, indivisible beings, which are the first elements of natural bodies.

I confess it is hard to imagine a corporeal thing to be indivisible, because we see nothing in this world which is not divisible; but this makes nothing against atoms which are corporeal, because they compose bodies, and are indivisible, because they are the first and most simple elements of bodies. Hence arises another difficulty, because it cannot be easily explained after what manner a thing that is divisible is composed of parts which are indivisible. Impartial minds do not find so much difficulty in conceiving this matter, as those do who follow the prejudices they have received; some people do not consider, first, that there are many things which escape our senses, and yet are most real; secondly, that which composes a body is not a compound, as we see that unity makes number, though itself be not a number; letters, whereof nouns and words are framed, yet are neither one or the other; the drops of water, whereof rivers consist, are not rivers: so atoms, though they are invisible and indi-

visible, yet they compose bodies which are visible and divisible. They are also immutable, in order to the world's continuing in the same state, and bodies being of the same nature now as formerly.

OF THE PROPERTIES, MAGNITUDE, FIGURE, WEIGHT, AND MOTION, OF ATOMS.

AN *atom* is a corporeal being, simple, invisible, and indivisible; solidity constitutes its essence or essential property, which distinguishes it from spirit and vacuity, which hath no power of resisting. Atoms necessarily avoid all our senses, because they are composed of many distinct and gross parts, whose object ought to be composed ere it can be perceived by the external organ; this, however, does not destroy the truth and reality of atoms, because small corpuscles escape our senses; as we observe in dust, which sticks to our clothes; in the corpuscles of a stone, which is made hollow by drops of water; in divers occult parts of a mite, which cannot be seen without the help of a microscope; and, lastly, in small corpuscles which are seen to move in a chamber by the sun-beams: we may omit many others that are smaller, which, without doubt, we could see if our sight were more acute.

Though atoms are most subtle and imperceptible, yet they have their particular extension, magnitude, and figure, from whence their differences arise: for the figure of some of them is round, as the atoms of water, oil, and quicksilver; others have cubicular figures, such as atoms of sea-water; and others are pyramidal, as those whereof nitre consists; there are some which have sharp points like needles, as those of fire; whence we have to suppose there are others variously figured. This difference is necessary to distinguish compounds: and as these atoms, as to their solidity or invisibility and indivisibility, (which are their inseparable properties,) are alike, so also, if they did not differ in their figure and thickness, all bodies would be alike.

Weight is the principle of the said natural motion, inasmuch as it doth resist a violent motion. I mention this, that we may know whether motion in atoms hath an internal or external principle, or whether weight be determined only to one motion, or that it be indifferently inclined to many; and whether the motion of atoms doth tend to some centre; and whether it be continuant or interrupted, and, lastly, whether it be perpendicular or horizontal, parallel or declined, right, or parabolical, or circular.

In order to solve this difficulty, I suppose that atoms may be considered in a double state: the first state is before the composition of the bodies which are made of them, and may be called the state of liberty; the other is that which they have in the bodies which consist of them, which may be termed the state of obligation or servitude.

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If atoms be considered in their first state, their motion is perpetual; so that an atom that is loose, and freed from any composition, is essentially in motion, which ought not in the least to be wondered at; for motion in respect of a free atom is the same that understanding is in respect of an angel, which is never without knowing unless his intellect be bound and clouded.

From this principle it is evident, that atoms are in continual motion, unless they are hindered, or that they meet with some obstruction, or that there are other atoms resisting or repelling them, or that they find such as will stick to them, or that they insinuate themselves into the atoms of certain bodies, or that they enter into some composition whereby their motion is stopped. Nevertheless, atoms in compounds are not altogether void of motion, because they are not so straitly embodied together but that they have some motion, like vibrations and palpitations, according to the liberty which is granted them by the diffused vacuities; nay, some of them do sometimes attempt their escape, especially in porous bodies, which therefore sooner corrupt and perish than bodies which are more solid and close. It is yet more evident in living bodies, out of which the animal spirits, which are but the bodies of atoms, and most subtle corpuscles, are dissipated by transpiration, whence aliment is necessarily requisite to supply to the whole body those spirits which are dissipated by motion and agitation. This motion of atoms, or the least corpuscles, in living bodies, may be deservedly accounted the image of their first liberty; and though they do but seldom enjoy their full liberty, yet they are apt to raise the greatest commotions in order to be freed, and to gain their liberty. This is the origin of many distempers; as, in acute fevers, the atoms or corpuscles of the boiling blood, or obstructed choler, are carried and driven into the brain, where they produce watchfulness, deliriums, and phrensies. According to this principle, that which we said before may be concluded, *That many distempers arise from minute corpuscles and emancipated atoms*; for these, being driven forwards by other atoms, and forced back, run into the membranes, periostracum, meninges, or intestines, and cause the cholic, head-ach, gout, and rheumatism; so that this solution of corpuscles and emancipation of atoms in our bodies is much to be dreaded; and, to prevent their danger, all motions of the body which are too violent must be avoided; for these are the external cause of the confusion of the spirits and the emancipation of the atoms.

The emancipation of the atoms, and also of the small corpuscles which are composed of those atoms, are to be seen no less in the great world than in the little; for the winds are nothing less than emancipated atoms, which, by their impetuosity being driven backwards and forwards, force all bodies that stand in their way;

it is these atoms which agitate the air, and overturn all things which resist their motion; therefore the motion of atoms is not equal, nor every where alike, but varies according to the diversity of bodies whereby they are driven, or as the figures of them are more or less fitted for motion, or otherwise, according to the proportion of vacuities which are dispersed in bodies; so that some atoms are moved quicker, and others slower, not because some are heavier than others, but because they are driven backwards or forwards, or are stopped, by others which happen to fix them with greater or less violence.

An atom is not a body according to the notion we have, that it is a compound being; but a simple being, and also corporeal; that is, simple, because it is indivisible; and corporeal, because it hath a certain extension, and makes up the composition of bodies, which in the total division of them are reduced again into atoms. Two other difficulties arise from the former opinion: for, if an atom be indivisible, after what manner can we propose to ourselves that it hath extension, or how can it be an ingredient in the composition of divisible bodies? To this we answer in few words, that extension is according to the nature of the thing extended; for, if the thing extended be divisible, in the same manner is the extension; and so, on the other side, it is of the rational soul, which is possessed of the whole body, and exercises its operations in all the parts of it; nevertheless it is like an atom, indivisible; and, though it be divisible in respect of the space it occupies, yet it hath an internal extension which is indivisible; it is the same thing which divines are forced to say of angels, and some philosophers about their physical tumid points. But some will say, that atoms are neither like souls, angels, nor physical points, because they have parts, and these have none; and since that which consists of parts is divisible, it follows also that an atom is divisible. To this difficulty I answer, with the divines, that angels and our souls, which are spirits—and also, with philosophers, that physical points, which are material—have no real but only potential parts; that is, an angel and rational soul in respect of the operations which they exercise and the space which they occupy, and the tumid points in respect of the space which they fill up. Indeed, an angel and the soul have two powers, whereof the one is the intellect, the other the will, which being only an indivisible substance, capable of understanding and willing, yet no man will deny but they, notwithstanding their indivisibility, (which at least is equal to the indivisibility of an atom,) do fill up a divisible space; as no man can doubt but that an angel can be at the same time in the four corners of the room and in the middle of it, and that it hath a four-square figure by communication of the four angles or corners, and that it can quit this and assume another figure at its pleasure; which cannot be said of tumid points and atoms, which are destitute

destitute of understanding and will. The rational soul, being equally indivisible with an atom, angel, or point, doth wholly possess a great body, no less than it did when the body was little; therefore it dilates itself without being divided, because in its nature it is simple and indivisible, and is without distinct parts. This is the opinion of Aristotle, and indeed it is the most common opinion. But, if the soul were not by its own substance extended through the whole body, and had its seat only in the heart, as Empedocles would have it; or in the spleen and the stomach, as Van Helmont places it; or in the *glandula pinealis* of the brain, according to Cartesius; or in the striate bodies of the brain where the common sense is, or the sense itself, as it is called by way of excellency; and in the callous parts, because there it forms the ideas of things and judges of them; and in the cineritious part of the brain, because there it performs the functions of the memory, according to the opinion of Duncan—it is certain that all these parts, which are taken to be the seat of the soul, are divisible, and that they have distinct parts and figures: so the soul, as it is indivisible, occupies a space or a place which is divisible; whence I conclude, that indivisibility does not hinder but that a substance may have a certain indivisible extension, but divisible as to the place which it possesses, or that it may have angles and figure in respect of place, though its substance essentially remain one, simple and indivisible.

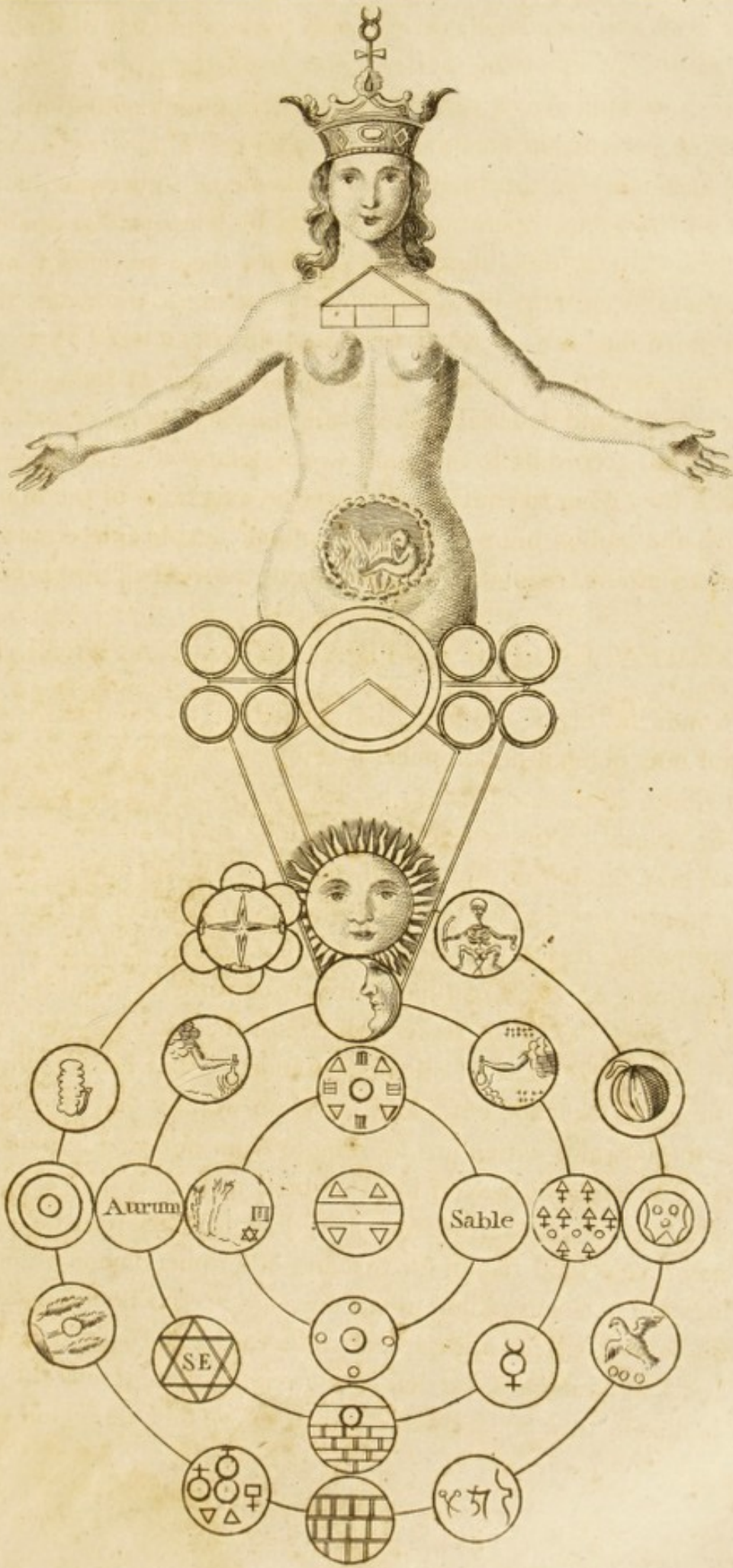
Hence it follows that there is one catholic or universal matter, called corpuscles or atoms, filling all space, which is an extended, impenetrable, and divisible substance, common to all bodies, and capable of all forms; infinitely harder than any of the sensible porous bodies compounded of them; even so hard, as never to wear, or break in pieces; no other power being able to divide what God made one in the first creation. While these corpuscles remain entire, they may compose bodies of one and the same nature and texture in all ages; but should they wear away or break in pieces, the nature of things depending on them would be changed. Water and earth, composed of old worn particles and fragments of particles, would not be of the same nature and texture now with water and earth composed of entire particles at the beginning; and therefore that nature may be lasting, the changes of corporeal things are only to be placed in the various separations and new associations of these permanent corpuscles; that in order to form the vast variety of natural bodies, this matter must have motion in all its assignable parts, and act in all manner of directions and tendencies. These corpuscles have therefore not only a *vis inertiae*, accompanied with such passive laws of motion as naturally result from that force; but also are moved by certain active principles, such as that of gravity, and that which causes fermentation, and the cohesion and sympathy of bodies. That
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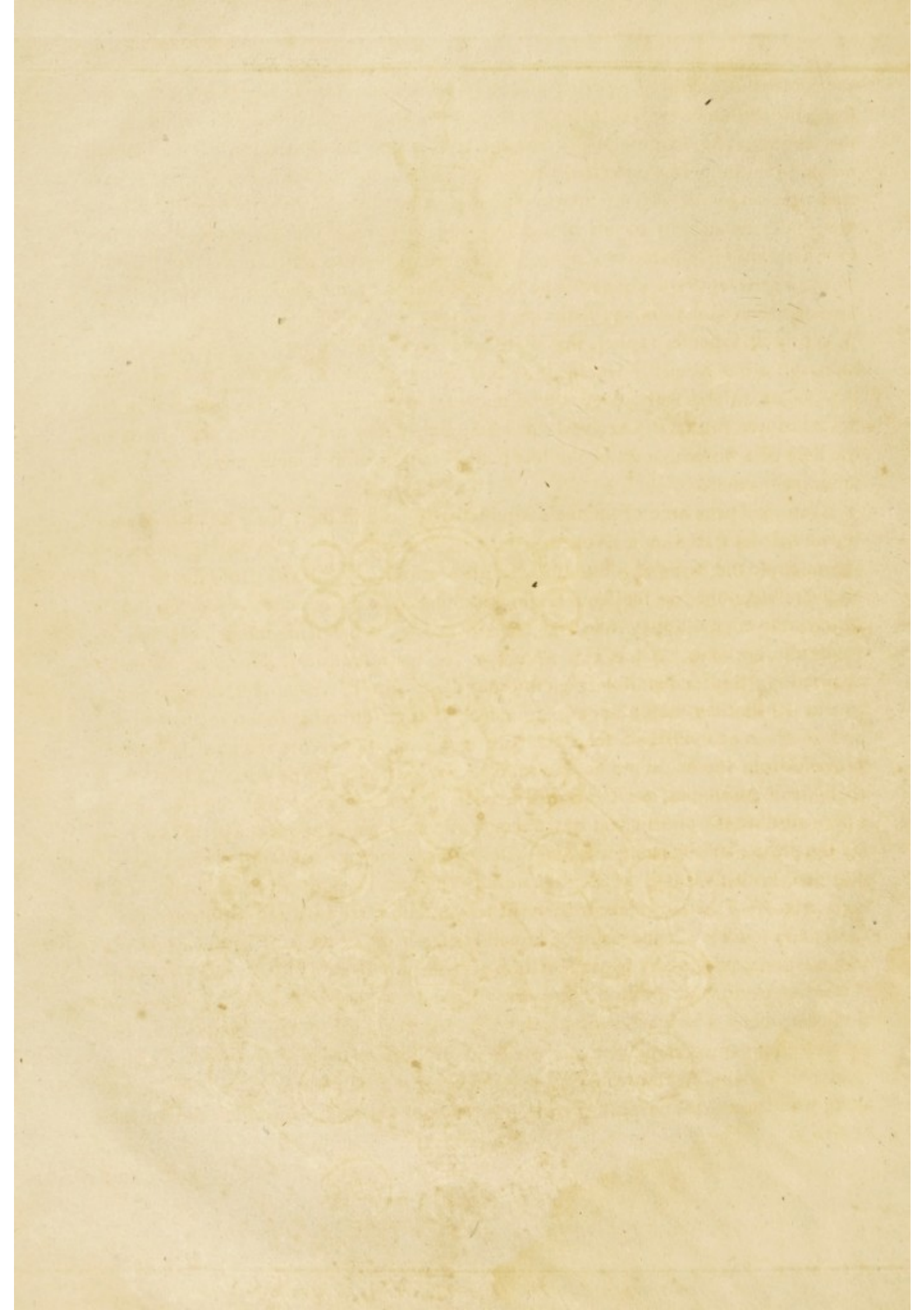
this matter muſt alſo be actually divided into parts, and each of theſe primitive particles, fragments, or atoms of matter, muſt have their proper magnitude, figure, and ſhape; and muſt have different orders, poſitions, ſituations, and poſtures, whence all the varieties of compound bodies ariſe. This view of the firſt principles of matter accounts for an infinity of phenomena, otherwiſe inexplicable; and points out all the occult operations in nature, by ſympathy, antipathy, fascination, coheſion, coagulation, diſſolution, &c. for, ſince theſe corpuscles are every-where and at all times in motion; iſſuing from and cohering to all bodies that fall in their way; and ſince they are operated upon and diverſly altered by the four elements proper to this world; and theſe elements again by rays of light, heat, and influx of the anima mundi, and celeftial bodies—all the viciffitudes of nature are deduced from them; and, according to the qualities and temperature of the matter ſo formed, and of thoſe they come in contact with, are the affections of the mind, the functions of the body, the paſſion of love, and a thouſand inexplicable circumſtances attendant on human affairs, regulated and governed; as we ſhall now proceed to ſhow.

OF SYMPATHY AND ANTIPATHY IN NATURAL BODIES.

THE wonderful effects we ſee in nature, whoſe true and efficient cauſes are not eaſily found out, obliged philoſophers heretofore to have recourſe to occult cauſes, and to attribute all thoſe effects to natural ſympathy and antipathy, which happen amongſt the ſeveral bodies whereof the world is compounded.

That we may the better underſtand what may be ſaid upon a ſubject ſo nice and delicate, and give a reaſon for thoſe wonderful effects which are attributed to ſympathy and antipathy, in the firſt place we muſt ſuppoſe, that the difficulty which occurs in explaining an effect of this nature, is becauſe the mind is not able to know the truth of things but by the ſenſes, which are the gates through which the objects enter, and form their ideas in our underſtanding; but becauſe there are an abundance of things that eſcape our ſenſes, it is no wonder that it is ſo hard to give a reaſon for thoſe cauſes which are ſo remote from our view: as for example, iron moves itſelf, and that by way of local motion, and joins itſelf to the loadſtone; we do not ſee that which draws the iron to it, though we ſee it attracted; and therefore that we may give a ſolid reaſon for this and other phenomena of the like nature, we declare, according to our philoſophy, that there are no bodies but what continually emit certain ſubtle particles and imperceptible corpuscles which are diſperſed through the air, and are ſometimes carried to a great diſtance, unleſs they are ſurrounded by other bodies in their way. By this principles we find the reaſon why a dog follows





the footsteps of the hare, or from a heap of a thousand stones, he readily knows the stone his master threw, and picks it out, and by his command brings it to him; from this dispersion of corpuscles, we find the reason how the contagion of the plague, either from the person infected, or from the wind blowing from that region, is carried a great way off; by this appears the reason why wounds may be cured at a hundred miles distance by means of the sympathetic powder, the astonishing properties of which are fully described in my Illustration of the Occult Sciences; so likewise of the fermentation of Canary wine brought into England, which ferments here at the same time of the vintage there.

We must suppose, farther, that these small corpuscles differ in figure and magnitude, and are not equally received by this or that body; so one man is infected by the plague in the same place where many others escape; for the same reason the beams of the sun melt wax, and not lead; unless they are collected and united by the help of a burning lens, or the like; and the heat of fire melts metals in a very different manner.

Again, the palm-tree of the male kind is barren unless the female be planted near it; and, if separated by a river, they lean to each other as if they would embrace; if you strike the string of a lute in one corner of a room, it shall cause the string of another lute, tuned to the same height, and placed in an opposite corner, to give a sound; the cock always crows and claps his wings in the same moment the sun ascends the horizon. All effects which we see from sympathy afford us matter of admiration; but the loadstone demonstrates the affinity of corpuscles more palpably to our senses than most other experiments. The loadstone is found in iron-mines, and is not much different from the nature of iron; wherefore the particles which proceed from the loadstone have a kind of agreement with the pores of iron; and these small corpuscles, going out of the loadstone, and meeting with the iron in the way, rush into the pores of it; but, because all cannot enter at once, a great many remain without, and these are as strongly beaten back by the particles of the iron which they meet with, as if they were of the number of those corpuscles, which, being at liberty, return of their own accord, and at length send these by a reflective motion to the loadstone, from whence they first came. Hence it is that the iron is drawn towards the loadstone, principally by the agitation of those minute magnetic corpuscles moved in the concavities of the iron; and being shaken together by the sundry motion of those corpuscles which are twisted one within another, those corpuscles which return by reflection are complicated and annexed to those which are in the pores of the iron, and cannot be returned or moved towards the loadstone, unless they draw along with them those corpuscles to which they are annexed, and which cannot fol-

low, unless by their motion the iron be carried with them; so the iron follows and is moved toward the loadstone, except the iron be bigger than the loadstone; for then the corpuscles which proceed from the loadstone are not so many, nor by consequence so powerful, as to draw the iron. The reason the loadstone draws no other body but iron, is because other bodies do not return the atoms, neither are their pores well fitted for those magnetic corpuscles. By the same reason it appears that the loadstone does not approach to the iron, but the iron to the loadstone. It may be said that hard and solid bodies, such as iron, cannot emit such a great number of corpuscles as other bodies, which, like the loadstone, are less solid and more porous. There may be a reason given also why the loadstone, being rubbed with garlic or oil, does not so easily draw iron to it, which is, that these strange corpuscles, by their oiliness, hinder the emission of the corpuscles out of the loadstone, and also their entrance into the pores of the iron, and thus break their elastic force.

We may observe many other effects of the loadstone: as for example, that iron put upon a table is moved by the virtue of this stone placed under the table; for it is certain that the corpuscles of the loadstone which moves the iron penetrate through the vacuity or pores of the table, as if by small and invisible threads it had been tied to the loadstone. It is the same thing if the table be of marble or glass, provided it be not greasy nor too thick, which proves the porosity of bodies. Another effect of the loadstone is seen in a needle, which, being touched by it, always turns towards the north pole; the reason is, because there are mountains of loadstones under the poles, dispersing their attractive spirits through the universe, spirits which are entangled with those which adhere to the magnetical needle, whose force is lessened as the spirits of it are dissipated; especially if the compass be set in a place where there are pieces of iron to which the spirits stick, and leave the needle, which had taken no greater quantity of them than what was requisite according to its capacity. But the most wonderful property in this stone is, that it draws iron on one side, and rejects it on the other, so that it appears in every loadstone that there are two poles of the world, the north pole attracts iron, the south pole repels it; because the spirit of the north pole enters in at the pores of the iron, but the southern cannot, for it strikes against the iron, and drives back too much its elastic particles. This explication presupposes the being of spirits and atoms, and their figures and motions, as also small occult vacuities, which are dispersed through all bodies.

There are observed to be many effects for which no reason can be given, without the help of the word antipathy. We will instance some few: and, first, of the basilisk, who kills all whom he sees, which is by the antipathy subsisting betwixt it and other animals; but this is rather done by the emission of certain venomous spirits,
which

which penetrate the eyes of those seen by the basilisk; the nature of this poison cannot be explained, unless we know the occult property of poison, because poison kills only by a contrariety betwixt us and it; whence we discover the principle of this contrariety of the basilisk, that the spirits issuing out of the pores of its eyes kill those animals which they meet with, because the spirits penetrate them by their subtilty, or sharp figure, like needles piercing the heart. The poison of vipers, and such like, is not so acute nor so deadly, nor so ready in its effects, as that of the basilisk. In reference to this matter, there are many things that are worth considering. In the first place, it is certain that the basilisk is not engendered but in moist deep places, as in the bottom of pits where there is nothing but muddy, thick, stinking, water. In the second place, it is to be observed, that, if you take a glass, and hold it against the basilisk's eyes, those spirits which issue from his eyes reflecting upon the glass are sent back from whence they came, and will kill the basilisk: now it cannot be said that the basilisk hates itself; but that the venomous spirits reflecting from the glass, receive a more violent motion, and forcibly drive back the other spirits which are issuing from his eyes, so that they penetrate his brain and heart, and thence occasion his death; in the same manner as vapours often arise with so great violence from the hypocondria, the mesentery, and the stomach, into the head, that they cause an apoplexy, epileptic dizziness, or lethargy; and sometimes they are carried with such subtilty and violence into the heart, that the persons so afflicted die suddenly.

A strange antipathy subsists in some vegetables, as between the colewort and the vine, which, if planted near together, will insensibly give back and lean sideways, as if they really hated one another. This effect cannot be ascribed to any thing but the emission of the corpuscles and material spirits of both of them, which rush upon one another, and mutually repel, by the irregularity of their figures. This is apparent in the juice of coleworts, which if taken by a man when he is drunk, he presently comes to himself and is sober; because the corpuscles of the juice of coleworts blunt the corpuscles of the juice of the vine. In the same manner, we find by experience, that spirit of opium or laudanum cures the cholic, head-ach, tooth-ach, and other kinds of pains; it also cures the phrensy, and procures sleep. But there is need of the greatest care in using these narcotic medicines, because it often happens that the vital spirits are so stupified by them, that they are deprived of their motion, which causes a deadly sleep. The colewort and the vine have not so powerful an effect on each other, as narcotic medicines have on the animal spirits; for neither the vine nor the colewort will lean sideways if there be cloth or paper set betwixt them, because the corpuscles flowing from each are then stopped in their way.

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A third effect, which is ascribed to antipathy, is observed in the use of medicines, as well internal as external; the external, of which we now speak, are those we carry about us, which by their quality take away the malign air, and preserve us from the plague and other contagions, as prepared quicksilver, or a toad dried and shut up in a box; this phenomenon is ascribed to the pestiferous spirits or corpuscles, which, approaching towards us, find subjects more apt for their reception, and fix in them, but not in us, at least in such a quantity as to hurt us; which most evidently appears in this, that the prepared quicksilver, or the toad, being once filled with these contagious atoms, becomes useless, and ought to be changed and renewed; and I know by experience that quicksilver, prepared white and shining like an adamant, or polished silver, being carried about a person who is frequently with sick people, in time becomes black, so that afterwards it is useless to him who carries it, because there are no small vacuities left to retain the airy poisons; but it may be renewed by another preparation, whereby it may be made as white, transparent, and useful, as before. Quicksilver turns black more or less, sooner or later, according to the proportion of the greater or less malignity in the air, where the person goes, who carries it about him; and these antidotes can never hurt, nay, if rightly prepared, they not only withstand the contagious air, when they hinder its nearer approach toward us, but also suppress inward vapours, which, ascending into the head, occasion many distempers. These consequences, properly speaking, are the joint effects of sympathy and antipathy acting together; for the animal effluvia or corpuscles issuing from our bodies, repel as much as possible the malignity of the ambient matter, by antipathy; whilst bodies composed of poisonous or noxious particles, draw to themselves, by sympathy, the foul or poisonous atoms which surround them, just the same as the loadstone draws iron. In this we see, and shall hereafter prove, that amulets or charms, worn about the body; that electricity, animal magnetism, and other occult properties, acting upon our bodies, though attributed to witchcraft, or some inexplicable cause, are nothing more than the natural effects of sympathy and antipathy, pre-ordained at the beginning of all things. Aromatic herbs, and sweet-smelling flowers, used against infectious air, act by repulsion, or antipathy; whereas nightshade, hemlock, and all poisonous herbs, act by sympathy, drawing into their pores the infectious atoms, just the same as horse-raddish draws in vinegar; and hence it follows that both these classes of plants are useful in preserving the animal juices from infection.

I now proceed to effects internal. Rhubarb, and the leaves of fenna, purge melancholy; jalop and diagridium, phlegm and waterish humours. It is a constant and certain truth that every purgative medicine comprehends in it certain spirits

or

or corpuscles which are venomous, that is, acute, pungent, and biting; so that, nature being stirred up by them, and thereby the internal parts and membranes being touched and agitated, the animal spirits rush together in order to assist the part affected, and draw with them the foreign humours which are less fixed; and then nature, by the help of these spirits, expels them by the proper passages: so that after a purgation by rhubarb, the urine is yellow, but, after senna or cassia, it is dark and high-coloured.

Thus sympathy and antipathy exist in all substances, whether animal, vegetable, or mineral; and things of one class have affinity or correspondence with things of another class, or contrariwise, according to the nature and quality of the atoms or corpuscles whereof they are formed. Hence it is that so strong a sympathy exists between rue and the fig-tree; and that the elm rejoiceth to cohabit with the vine: and hence it is likewise that serpents preserve their sight by fennel; and that the hind draws out the piercing dart with dittany, or garden ginger. Hence also by antipathy water and oil, and wine and the juice of hemlock, repel each other; as do the vine and brasic plants; for the vine, which usually entwines round every thing it is near, shuns and inclines another way from these. Rue, and the ash-tree, are so inimical to serpents, that they cannot exist under their branches; and the herb polypody is so obnoxious to crabs, that if they are covered over with its leaves, they will in a short time cast off their shell and claws.

From an investigation of these properties in nature, medicine, and the art of healing, was first discovered. All things temperate in quality, concord sympathetically with our bodies, as sweet marjoram and nutmeg to the head, and wormwood to the belly. Those which exceed this medium in their temperaments, are noxious and hurtful; and are the more dangerous or deadly, in proportion as they recede from the temperate quality, which we perceive in opium, arsenic, and the like. From this cause, we likewise find that sympathy and similitude are synonymous, and that all substances which have resemblance by signature, have sympathy and agreement by nature, and serve for the conservation of each other. Thus sulphur is found to preserve wine, which hath great analogy with our blood; and if wood, or cables, or any thing whose use is in the water, be done over with a preparation of the oil of sulphur, they will be preserved, in a most singular and remarkable manner, from injury or decay. From hence Paracelsus concludes, that the particles of sulphur are of themselves a balsam, sufficient to prevent wine or any inanimate substance from putrefaction; and so conserves the body, that no adverse qualities can prejudice or affect it. Querintius in his Pharmacy, assures us, that sulphur rightly prepared is the true balsam of the lungs, and the principal ingredient used by the

ancient Egyptians to embalm their mummies, or bodies of their deceased nobles whereby they are preserved even to this day from putrefaction, as may be seen in the British Museum, and in most other magazines of curiosities. Sulphur is certainly the efficient cause of all mineral springs; of all crystallizations, stones, pebbles, &c. by which they concrete, and are held together, as is evident from striking them against steel, the sparks of fire produced being the sulphurous or inflammable part. All volcanos, burning mountains, and subterraneous fires, are occasioned by sulphur; as are likewise earthquakes, thunder and lightning, meteors, &c. The active properties of sulphur are indeed wonderful; and, were I to instance many that I have discovered in the various chemical preparations I have made of it, few of my readers would be disposed to give me credit. For ten successive years I applied myself to the daily toil of making chemical experiments; and there is scarcely an herb or a mineral substance to be found, that I have not passed through the retort, or the crucible, in order to ascertain their native qualities, and power of action, previous to the invention of my Solar and Lunar Tinctures; and I must confess that the occult properties of sulphur cost me more labour to fix, to investigate, and to ascertain, than all things else together, except mercury. And I do in consequence affirm, that there are no mineral substances in the bowels of the earth, whose virtues are not communicated to plants and herbs growing on the earth's surface; and that the correspondent virtues found in these herbs are infinitely more pure, innocent, balsamic, nutritive, and better adapted to medicine, than any gross or earthy particles whatever. Even from the common herb borage, we can extract nitre, sea-salt, tartarum vitriolatum, and the common fixed alkali; and it is no trivial information to the medical world, to know, that the three mineral acids are all to be found in one humble plant. Indeed vegetables appear to be the medium contrived by an all-wise and omnipotent Creator, for selecting, concocting, and combining, the medical and occult virtues of the different substances found in the bowels of the earth, and for adapting their virtues by an easy and natural concoction to the alleviation of human infirmities; according to that passage in scripture which says, that *the Lord hath caused medicine to grow out of the earth, and he that is wise will not abhor them; for with such doth he heal men, and taketh away their pains.* Eccl. xxxviii. 4, 7. Whence I conclude, that all disorders, incident to mankind, are to be cured, preferably, and more elegantly, more safely, and certainly, by preparations from medical plants and herbs, than from any mineral substances whatever; and that mercury, for the *lues venerea*, for the scrophula, and impurities of the blood, ought to be wholly expunged from our practice. Its baneful effects are every day more or less experienced, in the rotten bones and ruined constitutions of those, who have

habitually.

Habitually taken it in advertised nostrums, for a certain complaint, until it has fixed itself, and the disease likewise, so strongly in the habit, as to be almost beyond the reach of a proper remedy, which in reality and truth can only be found in the vegetable world.

Vegetables bear relation to the seven planets, and have form and affinity with the microcosm, or parts of man; and constitute the original aliment intended by the Creator for the sustenance of our bodies. And whatever signature or similitude a plant has with any member or part of our body, it will promote a cure in that part, and tend sympathetically to its comfort and preservation. For example, those herbs which in any respect resemble the form of the eyes, are salubrious and healing to the eyes, as eyebright scabius, marigold, chamelion, sempervivum, nardum, and star-wort. So plants which resemble the head, are cephalic, and help the disorders and infirmities thereof; the walnut resembles the brain; so that if the oil or spirit of the nut be applied to the head, it strengthens the fibres and comforts the brain. Maidenhair and the moss of quinces have the figure of the hair of our head; and a decoction of these herbs, in restoring hair lost by the *lues venerea*, is wonderfully efficacious. So plants, which in root, leaves, or fruit, resemble the figure of the heart, have a power of comforting and sustaining the heart: as the citron-apple, fuller's-thistle, spikenard, mint, balm, white-beet, trefoil, and mother-wort. Herbs which resemble the lungs, promote respiration, and strengthen the lungs, as hounds-tongue, lung-wort, sage, camphor, wall-wort, &c. Plants which resemble the ears, conduce much to the relief of all disorders of the ears, as fools-foot, or wild spikenard, which are a specific for deafness; and so an oil extracted from the shell of sea-snails, which resembles the ear, has been found of wonderful efficacy in restoring the faculty of hearing, even after several years deafness. The sense of smelling is greatly promoted by the application of those herbs which resemble the nose, as water-mint, &c. So plants that bear resemblance with the womb, conduce much to strengthen and comfort the same, to purge the uterus, and promote fecundity, as the round birth-wort, briony, ladies-seal, heart-wort, satyrium, and mandrakes, which have round and hollow roots. Plants which bear similitude with the gall and bladder, contribute to the benefit of those parts, by breaking the stone, strengthening the urinary passages, and bringing away the gravel; as particularly pointed out in my edition of Culpeper's Herbal. So likewise herbs and roots which bear affinity with the generative parts, contribute much to their virility, strength, and vigour; and truffles, potatoes, and the capsula of the cashew-tree, which have similitude with the testicles, wonderfully stir up and promote the semen; as do the parsnip, the root of rag-wort, and the *mangel wurzel*, or root of
scarcity,

scarcity, contribute much to stimulate the virile member. Herbs having formation like the milt, nourish and preserve the same, such as spleen-wort, milt-wort, lupines, and ivy. Plants which in leaves or roots bear signature with the liver, do wonderfully concur to promote a good digestion and concoction of the blood, to prevent the liver from decay, and to heal and cure all infirmities thereof: such virtue has the herb trinity, agaric, liver-wort, fumitory, lent-figs, &c. Herbs and seeds resembling the teeth, confer much to the good and preservation of them; as tooth-wort, the pine-kernel, and seeds of hemlock. Those plants which have resemblance with the knuckles and joints of the body, are wonderfully efficacious against the gout, white swellings, and all pains whatever in the joints, such as galinal and knotty odoriferous rushes, &c. Plants and herbs expressing a natural fatness or oiliness increase corpulency, or fatness of the body, as all pulse, almonds, and kernels of every kind; and, by the same rule, those vegetables which have a lean and spare designation, macerate and reduce the body, such as sarsaparilla, long-leaved rosa-folis, &c. Plants *nervosus* supple and fortify the nerves and sinews, as fennel, flax, hemp, the nettle, the herb neuras, and the root of mallows. Vegetables possessing a milky juice, propagate milk in all female animals; and those possessing a serous quality, purge the noxious humours between the flesh and skin, as spurrage, scammony, and the like. Plants that are hollow, as the stalks of corn, reeds, leeks, mallows, hollyocks, garlic, and bugloss, are singularly good to purge, open, and comfort, the porous and hollow organs of the body. St. John's-wort, having its leaves perforated, is sanative to wounds; and palma Christi, having in its root a strong resemblance of the hands and fingers, is remarkably healing to all cuts, burns, scalds, and injuries thereof.

There is another similitude found between some vegetables, and the brute species, which directs us to a very curious occult virtue, in curing hurts or injuries received from those creatures they bear affinity with. Thus, the herb dragon, which in form resembles a snake, and the bramble called Christ's-thorn, having its thorns set like the teeth of serpents, are an absolute cure for the bite of those animals. Ragwort, which is like a bee, is the best cure for the sting of bees. Fleabane, which grows as if covered with vermin, causeth all fleas to avoid the room. Scorpion-grass, dart-wort, and the flowers of turnsol, having similitude with the tail of a scorpion, have surprising efficacy in curing hurts by all venomous creatures.

The properties and virtues of plants are also known by the analogy of their form; those of the same or like figure having the same or like virtues and uses. Thus the umbelliferous tribe have all a carminative taste or smell, and are consequently powerful expellers of wind, and good in all flatulent disorders. The galeate or verticil-

late kind are all of them a degree warmer, and more potent, and therefore may be reputed aromatic, and proper for nervous disorders. The tetrapetalous kind are hot and biting, and exert their power by means of a diuretic volatile salt with which they abound, and are therefore good in chronical diseases, obstructions, cacochymias, &c.

The colours of plants and herbs likewise bear similitude or sympathy, and direct us to a knowledge of their temperature and use; those of a light colour, such as briony and water-lily, are profitable for the cure of phlegmatic diseases. Those of a yellow aspect purge cholera, and remove obstructions occasioned thereby, as is the effect of rhubarb, celandine, &c. Those of a sanguine hue purify the blood and juices, and contribute greatly to a good complexion, as the root of fernbrake, agrimony, germander, and sorrel. And this rule is to be observed with respect to plants in general, that so many distinct colours as it hath commixed, so many virtues will it possess; and whatever disease it bears analogy or sympathy with, that disease it will cure. The flower of the water-lily, bearing the signature of a drop of water, is a preservative against the apoplexy. The root of saffra, and the stones of cherries, are good against the stone and gravel in the bladder and kidneys. The seeds of marigolds have resemblance with the canker, and are a certain cure for that complaint. All plants of a glutinous nature, having their stalks signated with cuts and stabs, are sanative to cuts, scars, and wounds. The root of galengal growing in marshy grounds, and taken up in May or June, and worn as an amulet against the belly, will perform most astonishing cures in the dysentery and flux; it has a strong resemblance of the natural excrements, both in figure and colour. All the excrescences of trees arising above the branches, are good against excrescences of the arteries. The strawberry very much resembles pustules of the leprosy; and the distilled water of strawberries is a most admirable cure for that complaint, as well as for red and pimpled faces.

We may further remark, that the more signatures or similitudes are found cohering in a plant to one and the same signification, so much the more powerful and efficacious will its operation be, in any of the purposes for which it is applied; for the spirit is in quality the same in all bodies, but different in quantity, which constitutes that variety or difference perceivable by our senses. In some bodies, this spirit is more copious and active; in others, more sparing and debilitated; so that, by how much the more the same spirit produces a convenient form and figure, in divers things or subjects under the same climate, by so much the more the same subjects are enabled to sympathize with, and assist, each other. For sympathy is

by the spirit; and similitude points out the things that act by sympathy. Hence it is that similitude of affection increases strength, and the contrary, hatred. So it is that plants whose parts resemble the scorpion, as libards-bane, hellebore, and aconitum, will cure the bite of that reptile; and that the flowers of plants, having the resemblance of butterflies, conduce to fruitfulness and virility, as gandergoose, the flower of beans, woodbine, and ragwort. Plants spotted like serpents, as cow-garlic, wake-robin, dragons-wort, sea-dragon, &c. are sanative against the bite of serpents; and plants, which resemble the head of such animals, are also good against their poison; as the flowers of wild bugloss, which resemble the head of a viper, Dioscorides affirms to be a certain cure.

The virtues of plants and herbs are, however, variable, and liable to be injured by change of climate, which will alter or destroy them, as we see in many of the medical plants of other countries, brought into England; which, though they seem to flourish with us, never possess their virtues in the same excellent degree as in their own climate, which is the reason that Culpeper recommends English herbs for an English constitution. The bodies of different animals also render the effect of the same plant different; the tythmals or spurges, being all very violent cathartics when taken by us; but yet, they are eaten by goats and several other animals, without any purgative effect, and seem to give them a particular share of vigour and spirits. Fishes, on the contrary, are more strongly affected by them than we are; for the juice of spurge, made into a paste with flour and honey, will so much intoxicate them, that they may be taken out of the water with one's hand. Again, bitter almonds are of no ill consequence to us, yet they kill all sorts of birds that touch them.

The foregoing notions may be ridiculed, from their extreme simplicity; yet where is the man, at all conversant with natural philosophy and physic, and possessed of an impartial mind, that will dare to controvert these facts? Every wayfaring man knows something of the herbs I have mentioned, and is capable of judging of their similitude and sympathy. Let him apply them for the purposes I have pointed out, and their occult properties will soon be visible to his senses. The track of nature is a plain and obvious road, abounding with most pleasing prospects, and the surest guides. God, in the plenitude of his omniscience and mercy seems to have set a mark on the minutest particles of his creation, for man's information and benefit; in the contemplation of which, our happiness, as well as our health, will invariably be found,

OF THE OCCULT PROPERTIES OF GENERATION
IN PLANTS AND HERBS.

ALL plants are produced from seeds, as all animals are produced from eggs, and the process of nature is very similar in both kinds of generation. The smallest vegetables have seeds, though often not discoverable by the naked eye. Mistletoe is also known to be produced from seed; and the sessile and flat funguses, which some consider as morbid excrescences, are true species of those agarics, which are furnished with caps and stems, and grow on the ground, whose seeds falling on a moist tree, produce, as it were, half caps without stems. Besides, that seeds are the eggs of plants, appears from hence, that as every egg produces an offspring similar to the parent, so do also the seeds of vegetables, and, therefore, they also are eggs. A seed resembles the egg of an hen; as this, as well as the egg, has a shell, external membrane or film, a membrane including the yolk, the yolk itself, and the scar or point of life. In seeds the white is wanting, because the moisture of the earth supplies its place, and nourishes the embryo of the plant. When the flower is going off, the seed begins to swell, and on the outside there is seen a vesicle, which is the amnion, furnished with an umbilical chord or navel-string, which is introduced through the chorion to the opposite side of the egg. While with the egg the amnion increaseth, on its top is observed another small body, which likewise increaseth continually, till it has filled the whole chorion and egg; and the amnion and chorion are turned into the external shell or coat of the seed. Thus, as the same changes are brought about on the seed as in the egg, the seeds must be the eggs of plants. Farther, that plants spring from eggs, is plain from the lobes, which, when we speak of cows and similar quadrupeds, are nothing else than several secundines, always adhering to the fœtus, drawing their supply or fluids from the matrix, which fluids they prepare for the nourishment of the tender fœtus. That most plants have feminal leaves or lobes is very well known. These feminal leaves once constituted the whole seed, except the hilum, or little heart, in which is the point of life; and these lobes prepare the nourishment for the very tender plant, until it be able to strike root in the earth; in the same manner as the yolk in an egg, becoming the placenta, prepares the nourishment, and sends it by the navel-string to the chick; after which they drop off. Hence it appears, that the feminal leaves are the lobes; but since all lobes proceed from the egg or seed, we may fairly conclude that plants are produced from eggs. But, as no egg can produce an animal till it be impregnated or fecundated by the male, it will be necessary to investigate the situation of the genital organs destined by nature for this purpose in plants.

It is plain, that the genital organs of plants must be situated where the seeds are produced; but the seeds are produced where the flower and fruit are; therefore in the flower and fruit are the genital organs of plants. And as there was never a clear and evident example produced of any plant which wanted flowers and fruit, though they might not be distinctly known on account of their exceeding minuteness, we may justly say, that the essence of plants consists in their fructification. Moreover, as generation precedes the birth in animals, the flower in plants always precedes the fruit; and, therefore, we are necessarily led to ascribe fecundation to the flower, and the birth or exclusion of the seed to the ripe fruit. The flower may, consequently, be defined to be the genital organs of a plant, serving for fecundation, and the fruit to be the genital organs serving for the birth or maturation of the seed. And, since we know that there are many plants, some of which want the calyx, others the corolla, others the filaments of the stamina, and others the style; but that all flowers, the mosses only excepted, are furnished with the antheræ, or stigmata, or both together; these parts must constitute the essence of the flower. If we find a flower with antheræ, but no stigmata, we may also assuredly find another flower either in the same, or a different plant of the same species, which has stigmata with the antheræ, or without them. The act of fecundation is performed in the flower, and, therefore, the genital organs of both sexes must be present in the flower; not, indeed, always in one and the same flower; but it is sufficient that those of the male be in one flower, and those of the female in another; and these genital organs are the antheræ and stigmata. The antheræ, or male organs of generation in flowers, are nothing else but the bodies which prepare and contain the male sperm; therefore these antheræ are the testicles together with the seminal vesicles, and their dust the genuine male sperm of plants, answering to those particles which are called animalcules in the male sperm of animals. This proposition may be evinced by the following arguments: the antheræ and the dust always come before the fruit; and, when they shed their dust, which they do before the flower has attained its full vigour, they have performed their office, and then drop and become useless. Besides, the antheræ are so situated in the flower, that their dust, which is the male sperm, may reach the pistil or female organs; for the stamina either surround the pistil, as in most flowers, or, if the pistil incline to the upper side of the flower, the stamina do the same; or, if the pistil nods, the stamina ascend.

Farther, the antheræ and stigmata are in full vigour at the same time, both when they are in the same flower, and when they are in separate flowers. Moreover, if we cut asunder the antheræ before they have shed their dust, their structure will be found altogether as wonderful and curious as that of the seed-

vessels

vessels themselves; for within, they consist of one, two, three, or four, cells; and they open either longitudinally or at the base, separating into pieces or valves, or from the top, or at the two points or horns. And, if we cut off the antheræ of any plant which bears but one flower, taking care at the same time that no other plant of the same species is near it, the fruit proves abortive, or at least produces seeds which will not vegetate. Finally, the figure of the fertilizing dust will clearly convince any one, that this fine powder is not accumulated by chance, or from the dryness of the antheræ.

The powder of the antheræ, in point of fecundation, answers to the animalcules in the male sperm; and the stigma which receives this dust is always moistish, that the dust may instantly adhere or stick to it. That the stigmata, which are the other essential parts of the flower, are the female organ of generation, may be proved by the following considerations: the parts of the pistillum are the germen, the style, and the stigma; the germen, or seed-bud, while the plant is in flower, is always imperfect and immature, being only the rudiment of the future fœtus; the style is no essential part, for it is wanting in many species of plants; but the germen can never bring the fruit to maturity, except it be within the flower along with the stigma. Hence it follows, that the stigma is that part of the flower which receives the impregnating dust. This will farther appear, if we consider, that the stigma is always so situated, that the antheræ, or their impregnating dust, can reach it: moreover, it has always a figure peculiar to itself, so that in most (though not all) plants it is double when the fruit consists of two cells; triple when the seed-vessel has three cells; quadruple when it has four cells, &c. Again, the stigmata are always in full vigour at the same time with the antheræ: besides, the stigmata in most plants, when they have discharged their office, drop off in the same manner as the antheræ do; which proves, that the stigmata contribute nothing to the ripening of the fruit, but serve only for the purpose of generation. If the stigmata be cut off before they have received the impregnating dust of the antheræ, the plant is castrated as to the female organs, and the fruit perishes. The stigma of the flower has, besides, two other singular properties: viz. that it is always divested of the cuticle or film, nor has it any bark as the other parts have, and then it is always bedewed with a moisture.

Upon the whole it appears, that the generation of plants is accomplished by the antheræ shedding their dust on the stigmata. In the generation of animals, we are certain, that the male sperm must come in contact with the female organ, if there be any impregnation. In the vegetable kingdom the genital dust is carried by the air to the moist stigmata, where the particles burst and discharge their exceeding fine or

soluble contents, which impregnate the ovary. This will appear if it be considered, that when a plant is in flower, and the dust of the antheræ flying about, part of this dust visibly lights upon and clings to the stigma; the stamina and pistillum are generally of the same height, that the male dust may more easily come at the stigma, and in those plants where this is not the case, a singular process of fecundation may be observed; thus in the African tree crane's-bill, or *geranium inquinans*, where the pistillum is shorter than the stamina, the flowers before they blow are pendulous, but upon their opening they stand upright, that the powder may fall upon the stigma; after which they again nod till the fruit is ripe, and then stand upright a second time, that their seeds may be more easily scattered about. In some of the pinks, the pistilla, which are longer than the stamina, are bent back like rams horns towards the antheræ.

Again, the stamina for the most part surround the pistillum, so that some of the dust is always blown by the wind on the stigma. Moreover, the stamina and pistillum come at the same time, not only in one and the same flower, but also where some are male and others female, on the same plant, very few excepted.

Farther, in almost all sorts of flowers we see how they expand or open by the heat of the sun, but in the evening, and a moist state of the air, they close or contract their flowers, lest the moisture getting to the dust of the antheræ should coagulate the same, and render it incapable of being blown on the stigma; but when once the fecundation is over, the flowers neither contract in the evening, nor yet against rain. The wind on many occasions serves as a vehicle for bringing the farina of the males to the females. M. Geoffroy cites a story from Jovius Pontanus, who relates that in his time there were two palm-trees, the one male, cultivated at Brindisi, the other female, in the wood of Otranto, fifteen leagues apart; that this latter was several years without bearing any fruit; till at length, rising above the other trees of the forest, so as it might see (says the poet) the male palm-tree at Brindisi, it then began to bear fruit in abundance. M. Geoffroy makes no doubt but that the tree then only began to bear fruit, because, it was in a condition to catch on its branches the farina of the male brought thither by the wind. In the male and females of the pistachia-nut-tree they observe the same method as in those of the date-tree. We may observe farther, that since the male dust is generally of greater specific gravity than the air, in most plants that have the pistillum longer than the stamina, the all-wise Creator has made the flowers nodding, that the powder may more easily reach the stigma. With respect to those plants, whose stems grow under water, the flowers, a little before they blow, emerge or rise above the surface of the water; and those, all whose parts
grow

grow under water about the time of flowering, raise their genital stems above the water, which stems sink again as soon as the time of generating is over. A similar conclusion may be farther established from the consideration of all sorts of flowers; but enough has been said to prove that the generation of plants is performed by the genital dust of the antheræ falling on the moist stigma or female organ, which dust, by the help of the moisture, adheres and bursts, discharging its contents, the subtle particles of which are absorbed by the style, into the ovarium, germen, or seed-bud. However, the dust of the antheræ does not penetrate through the style to the germen and rudiments of the seed, as some writers have supposed: the contrary appears to be the case from opening a flower of the oriental rough poppy, with a large flower, cutting its pistillum perpendicularly downwards; and the lamellæ or folds, the placētæ, and the small seeds sticking to them, will be found of a pure white colour, though at the same time the style and all the stigma are wholly tinged with a purple hue from the dust of the antheræ. Hence we conclude, that not one grain or particle of the farina enters the folds of the receptacle or seeds themselves.

We may close this account with observing upon the whole, that the calyx is the marriage-bed, in which the stamina and pistilla, the male and female organs, celebrate the nuptials of plants, and where they are cherished and defended from external injuries: the corolla or petals are the curtains closely surrounding the genital organs, in order to keep off storm, rain, or cold; but, when the sun shines bright, they freely expand, both to give access to the sun's rays, and the fecundating dust: the filaments are the spermatic vessels by which the juice, secreted from the plant, is carried to the antheræ; the antheræ are the testicles, and may not improperly be compared to the soft roe or milt of fishes: the dust of the antheræ answers to the sperm and seminal animalcules; for though it is dry, that it may be the more easily conveyed by the wind, yet it gets moisture upon touching the stigma: the stigma is that external part of the female organ which receives the male dust, and on which the male dust acts: the style is the vagina or tube, through which the effluvia of the male dust pass to the germen or seed-bud: the germen is the ovary, for it contains the unimpregnated or unfertilized seeds; the pericarpium or seed-vessel, answers to the impregnated ovary, and in fact is the same with the germen or seed-bud, only increased in bulk and loaded with fertile seeds; the seeds are the eggs. Moreover, the calyx is a production of the external bark of the plant; the corolla of the inner bark; the stamina of the alburnum or white sap; the pericarpium or seed-vessel of the woody substance; and the seeds of the pith of the tree; for in this manner they are placed, and in this

this they are also unfolded; so that in the flower we find all the internal parts of a plant unfolded.

The stomach of plants is the earth, from which they receive their nourishment, and the finest and most subtile parts of its soil is their chyle: the root, which carries the chyle from the stomach to the body of the plant is analogous to the lacteals or chyloferous vessels of animals: the trunk, which supports and gives strength to the whole plant, is analogous to the bones: the leaves, by which plants transpire, are instead of lungs, and they may be also compared to the muscles of animals, for by their agitation with the wind the plant is put in motion; on which account herbs furnished with leaves cannot thrive, except they have air; but succulent plants which have no leaves, though shut up in green-houses and quite deprived of the external air, thrive very well. Heat is to plants analogous to the heart in animals; for they have no heart, nor have they occasion for any; because they live like polypes in the animal kingdom; their juices mixed with air being propelled through their vessels, but not circulated back again by returning vessels. Plants have generally their genital organs placed at their ramifications, as animals have theirs at the ramification of the iliac vessels, with this difference, that the ramifications of plants ascend, whereas those of animals go downwards or backwards; whence the ancients called a plant an inverted animal. Pliny observes, that there is in plants a natural instinct to generation, and that the males by a certain blast, and subtile powder, do consummate the nuptials on the females.

For the manner wherein the farina fecundifies, M. Geoffroy advances two opinions:—1. That the farina being always found of a sulphureous composition, and full of subtile penetrating parts (as appears from its sprightly odour), falling on the pistils of the flowers, there resolves, and the subtilest of its parts, penetrating the substance of the pistil and the young fruit, excite a fermentation to open and unfold the young plant, inclosed in the embryo of the seed. In this hypothesis the seed is supposed to contain the plant in miniature, and only to want a proper juice to unfold its parts, and make them grow. 2. The second opinion is that the farina of the flower is the first germ or bud of the new plant, and needs nothing to unfold it, and enable it to grow, but the juice it finds prepared in the embryos of the seed. These two theories of vegetable generation, the reader will observe, bear a strict analogy to those two of animal generation: viz. either that the young animal is in the semen masculinum, and only needs the juice of the matrix to cherish and bring it forth; or that the animal is contained in the female ovum, and needs only the male seed to excite a fermentation, &c. M. Geoffroy rather takes the proper seed to be in the farina; inasmuch as the best microscopes do not discover the least appearance of any bud in the little embryos

embryos of the grains, when examined before the apices have shed their dust. In leguminous plants, if the leaves and stamina be removed, and the pistil, or that part which becomes the pod, be viewed with the microscope, before the flower be opened; the little green transparent vesiculæ, which are to become the grains, will appear in their natural order; but still showing nothing else but the mere coat or skin of the grain. If the observation be continued for several days successively, in other flowers, as they advance, the vesiculæ will be found to swell, and by degrees to become replete with a limpid liquor; wherein, when the farina comes to be shed, and the leaves of the flower to fall, we observe a little greenish speck, or globule, floating about. At first there is not any appearance of organization in this little body: but in time, as it grows, we begin to distinguish two little leaves like two horns. The liquor diminishes insensibly, as the little body grows, till at length the grain becomes quite opaque; when, upon opening it, we find its cavity filled with a young plant in miniature; consisting of a little germ or *plumula*, a little root, and the lobes of the bean, or pea, &c.

The manner wherein this germ of the apex enters the vesicula of the seed, is not very difficult to determine. For, besides that the cavity of the pistil reaches from the top to the embryos of the grains, those grains or vesiculæ have a little aperture corresponding to the extremity of the cavity of the pistil, so that the small dust, or farina, may easily fall through the aperture into the mouth of the vesicula, which is the embryo of the grain. This cavity, or cicatricula, is much the same in most grains, and it is easily observed in pease, beans, &c. without the microscope. The root of the little germ is just against this aperture, and through this it passes out when the little grain comes to germinate.

From what has been said, it becomes evident, that, unless the female plant is impregnated by the male, it can bring forth no fruit, nor seed that will grow. This holds good throughout the whole system of vegetation. But, as trees and plants are immoveably fixed, and cannot like animals rove about in search of a mate, the all-wise Creator has compensated this, by means of little insects, the bee, and the winds, which doubtless carry the pollen, or fecundating matter of the male, to the pistilla of the female, whereby impregnation and generation follow. But as this, in the production of fruits, is rather a fortuitous event, which sometimes happens in profusion, and at others but sparingly; those who cultivate fruits have been led by art to assist nature in this necessary contact of the sexes. While in Arabia, I was taken to see this curious operation performed on the date-tree, by which the Arabs always secure to themselves a plentiful harvest of that fruit, which is of so much importance to their traffic, and amongst whom this art appears to have been known

long before any botanist dreamed of the difference of sexes in vegetables. Of this the gardener informed me, but was surpris'd to find I knew the circumstance before; "for (says he) all who come from Europe to this country have regarded this operation as a fable. When they observe a tree where the spadix has female flowers, they search on a tree that has male flowers (which they know by custom and experience) for a male spadix which has not yet burst out of its spatha or husk; this they open, take out the spadix, and cut it lengthwise in several pieces, taking care not to hurt the flowers. These pieces of spadix with male flowers they put lengthwise between the small branches of the spadix which hath female flowers, and then cover them over with a palm-leaf; in this situation the pistilla of the female flower becomes impregnated by the male, which soon after withers and dies; and, unless the natives thus wed and fecundate the female date-tree, it bears no fruit. Or even if they permit the spadix of the male flower to burst, or come out, before it is taken, it is useless for fecundation; it must for this purpose have its *maiden-head*, as the Arabs term it, or it will not do; and this is lost the same moment the blossoms burst out of their case." From this curious process of nature in the generation of vegetables, and from a contemplation of the apparatus she has contrived for that purpose, many useful hints may be derived how to alter, improve, enrich, and vary, the taste, form, and quality, of fruits, &c. by impregnating the flower of one with the farina of another of the same class; and to this artificial coupling and mixing it is, that the numberless varieties of new fruits, flowers, &c. produced every year by our nurserymen and gardeners, with many other phenomena in the vegetable kingdom, are to be ascribed.

In the cultivation of many of our home-plants, we sometimes meet with circumstances not unfamiliar to those of the date-tree, which become barren when deprived of the males. Thus, if the flowers of the male-hemp are pulled off before those of the female are fully expanded, the females do not produce fertile seeds. But, as a male flower is sometimes found upon a female plant, this may be the reason why fertile seeds are sometimes produced even after this precaution has been observed. The tulip affords another experiment to the same purpose.—Cut off all the antheræ of a red tulip, before the pollen is emitted; then take the ripe antheræ of a white tulip, and throw the pollen of the white one upon the stigma of the red; the seeds of the red tulip, being thus impregnated by one of a different complexion, will next season produce some red, some white, but mostly variegated, flowers.

In the year 1744, Linnæus published a description of a new genus, which he called *peloria*, on the supposition of its being a hybrid or male plant, i. e. a plant produced by an unnatural commixture of two different genera. The root, leaves, caulis, &c.

of

of this plant, are exceedingly fimilar to thofe of the *Antirrhinum linaria*, or common yellow toad-flax; but the flower and other parts of the fructification are totally different. On account of its fimilarity to the *linaria* in every part but the flower, Linnæus imagined it to have been produced by a fortuitous commixture of the *linaria* with fome other plant; and from this doctrine he fupposes that only two fpecies of each genus of plants exifted *ab origine*, and that all the variety of fpecies which now appear have been produced by unnatural embraces betwixt fpecies of different genera. Under this head he defends the cafe of Richard Baal, gardener of Brentford. This Baal fold a large quantity of the feeds of the *Brassica florida* to feveral gardeners in the fuburbs of London. Thefe gardeners, after fowing their feeds in the ufual manner, were furprifed to find them turn out to be plants of a different fpecies from that which Baal made them believe they had purchafed; for, inftead of the *Brassica florida*, the plants turned out to be the *Brassica longifolia*. The gardeners, upon making this difcovery, commenced a profecution of fraud againft Baal in Weftminfter-hall. The court found Baal guilty of fraud, and decerned him not only to reftore the price of the feeds, but likewife to pay the gardeners for their loft time, and the ufe of their ground. “Had thefe judges (fays Linnæus) been acquainted with the fexual generation of plants, they would not have found Baal guilty of any crime, but would have afcribed the accident to the fortuitous impregnation of the *Brassica florida* by the pollen of the *Brassica longifolia*.”

With refpect to the nourifhment of plants, we need only recur to the analogy that is known to fubfift between plants and animals. It is highly probable that the radical fibres of plants take up their nourifhment from the earth, in the fame manner that the lacteal veffels abforb the nutriment from the intefines; and, as the oily and watery parts of our food are perfectly united into a milky liquor, by means of the fpittle, pancreatic juice, and bile, before they enter the lacteals, we have all the reafon imaginable to keep up the analogy, and fuppose that the oleaginous and watery parts of the foil are alfo incorporated, previous to their being taken up by the abforbing veffels of the plant. To form a perfect judgment of this, we muft reflect that every foil, in a ftate of nature, has in itfelf a quantity of abforbent earth, fufficient to incorporate its inherent oil and water; but, when we load it with fat manures, it becomes essentially neceffary to beftow upon it, at the fame time, fomething to affimilate the parts. Lime, foap-afhes, kelp, marl, and all the alkaline fubftances, perform that office. In order to render this operation vifible to the fenfes, difsolve one dram of Rufsia pot-afh in four ounces of water; then add one fpoonful of oil; fhake the mixture, and it will inftantly become an uniform mafs of a whitifh colour, adapted to all the purpofes of vegetation. This eafy and familiar

familiar experiment is a just representation of what happens after the operation of burn-baking, and consequently may be considered as a confirmation of the hypothesis advanced. In this process, the sward being reduced to ashes, a fixed alkaline salt is produced; the moisture of the atmosphere soon reduces that salt into a fluid state, which, mixing with the soil, brings about an union of the oily and watery parts, in the manner demonstrated in the experiment. When the understratum consists of a rich vegetable mould, the effects of burn-baking will be lasting; but, when the soil happens to be thin and poor, the first crop frequently suffers before it arrives at maturity. The farmer, therefore, who is at the expense of paring and burning a thin soil, should bestow upon it a portion of rotten dung, or shambles manure, before the ashes are spread, in order to supply the deficiency of oily particles: in this way the crop will be supported during its growth, and the land will be preserved in health and vigour. But plants not only receive nourishment by their roots, but also by their leaves. Vegetables that have a succulent leaf, such as vetches, pease, beans, and buck-wheat, draw a great part of their nourishment from the air, and on that account impoverish the soil less than wheat, oats, barley, or rye, the leaves of which are of a firmer texture. Rape and hemp are oil-bearing plants, and, consequently, impoverishers of the soil; but the former less so than the latter, on account of the greater succulency of its leaf. The leaves of all kinds of grain are succulent for a time, during which period the plants take little from the earth; but, as soon as the ear begins to be formed, they lose their softness, and diminish in their attractive power. The radical fibres are then more vigorously employed in extracting the oily particles of the earth for the nourishment of the seed. The leaves of plants serve, not only as excretory ducts to separate and carry off the redundant watery fluid, which, by being long detained in the plants, would turn rancid and prejudicial to them, but likewise to imbibe the dew and rain, which contain salt, sulphur, &c. and to be of the same use to plants that the lungs are to animals. But, as plants have not a dilating and contracting thorax, their inspirations and expirations will not be so frequent as those of animals, but depend wholly on the alternate changes from hot to cold for inspiration, and *vice versa* for expiration. But the greater part of their nourishment is derived from the roots. These, therefore, are found to bear a considerable proportion to the body of the plant above ground; the superficies of the former being above four-tenths of that of the latter. Hence appears the necessity of cutting off many branches from a transplanted tree; because, in digging it up, a great part of the root is cut off.

It is a curious occult fact, with respect to vegetables, that they thrive best from putrefaction, and flourish most in putrid air. Manure, though it has a stench almost
sufficient

sufficient to infect the blood, yet, if placed round plants and herbs, will make them grow surprisingly; and we every day see how luxuriantly they will thrive upon a dunghill. Yet it is as true, that though these vegetables eagerly suck in and imbibe so foul a moisture, and thrive in air so strongly tainted with putrefaction, even in such as would prove fatal to human life, yet those very plants exhale a direct opposite effluvium, tending to refresh and sweeten the atmosphere, and to render it wholesome, when it is become noxious in consequence of epidemical complaints, or of animals dying and putrifying in it; whence it follows that vegetables draw in the foul or infected corpuscles, as favourable to their sustenance, which being concocted, altered, and changed, in the body of the plant, it again emits them purified and sweet. This I have proved by the following experiment: A quantity of air was made thoroughly noxious, by some mice breathing and dying in it. This I divided into two parts, in glass receivers. Into one I put a mouse with a sprig of mint, which lived very well, and the mint also flourished; but in the other, where there was no mint, the mouse died almost immediately. This experiment I have many times repeated with different kinds and portions of infected air, and have always found the result nearly the same; wherefore this plain reasoning follows; that, as vegetables draw in by their leaves and roots the putrid effluvium of the air, so their emission of purified corpuscles contributes to make the remaining air more fit and wholesome for respiration; and from this circumstance I recommend all persons who visit the sick, or have putrid disorders in their families, to use as many fresh vegetables as possible, and never to be without some sprigs of mint about them.

OF SYMPATHY, ANTIPATHY, SAGACITY, AND OCCULT INSTINCT, IN BRUTES.

BRUTE is a general name given to all animals except man; and an animal must be an organized living body, endowed with sense; for minerals are said to grow and increase, plants to grow and live; but animals alone are endowed with sensation. It is this property of sensation alone, that constitutes the essential characteristic of an animal; and by which the animal and vegetable kingdoms seem to be so materially separated. Those naturalists, who have supposed the distinction between animals and vegetables to consist in any thing else than the gift of sensation, have found themselves greatly embarrassed; and have generally agreed, that it was extremely difficult, if not impossible, to settle the boundaries between the animal and vegetable kingdoms. But this difficulty will be easily seen to arise from their taking the characteristic marks of the animal kingdom from something that was evidently common to both. Thus Boerhaave attempted to distinguish an animal from a vegetable,

table, by the former having a mouth, which the latter has not; but here, as the mouth of an animal is only the instrument by which nourishment is conveyed to its body, it is evident that this can be no essential distinction, because vegetables, as we have above demonstrated, require nourishment, and have instruments proper for conveying it into their bodies; and, where the end is the same, a difference in the means can never be essential. The fixing the difference in an animal's having a gullet, stomach, and intestines, as is done by Dr. Tyfon, is as little to the purpose.

The power of moving from one place to another, hath by many been thought to constitute their essential difference; and indeed, in most cases, it is the obvious mark by which we distinguish an animal from a vegetable; but Lord Kames hath given us several very curious instances of the locomotive power of plants; some of which would doubtless do honour to an animal.—Upon the slightest touch, the Mimosa, or sensitive plant, shrinks back, and folds up its leaves,* as a snail, on the slightest touch, retires within its shell. If a fly perch upon one of its flower-leaves, it closes instantly, and crushes the insect to death. There is not an article in botany more admirable than a contrivance, visible in many plants, to take advantage of good weather, and to protect themselves against bad. They open and close their flowers and leaves in different circumstances: some close before sunset, some after; some open to receive rain, some close to avoid it. The petals of many flowers expand in the sun; but contract at night, or on the approach of rain. After the seeds are fecundated, the petals no longer contract. All the trefoils may serve as a barometer to the husbandman; they always contract their leaves on an impending storm. Some plants follow the sun, others turn from it. Many plants, on the sun recess, vary the position of their leaves; which is styled the *sleep of plants*. A singular plant was lately discovered in Bengal: its leaves are in continual motion all day long; but, when night approaches, they fall down from an erect posture to rest.

A plant has a power of directing its roots for procuring food. The red whortleberry, a low ever-green plant, grows naturally on the tops of our highest hills, among stones and gravel. This shrub was planted in an edging to a rich border, under a fruit-wall. In two or three years, it over-ran the adjoining deep-laid gravel walk; and seemed to fly from the border, which was not congenial to its nature, and in which not a single runner appeared. An effort to come at food in a bad situation, is extremely remarkable in the following instance: Among the ruins of New Abbey, formerly a monastery in Galloway, there grows on the top of a wall a plane-tree about twenty-feet high. Straitened for nourishment in that barren situation, it several years ago directed roots down the side of the wall, till they reached

* See a particular description of the sensitive plant, in the Appendix to Culpeper, p. 27.

the ground ten feet below; and now the nourishment it afforded to those roots during the time of their descending was amply repaid, having every year since that time made vigorous shoots. From the top of the wall to the surface of the earth, these roots have not thrown out any fibres; but are now united in a single root.

Plants, when forced from their natural position, are endowed with a power to restore themselves. A hop-plant, twisting round a stick, directs its course from south to west, as the sun does. Untwist it, and tie it in the opposite direction; it dies. Leave it loose in the wrong direction, it recovers its natural direction in a single night. Twist a branch of a tree so as to invert its leaves, and fix it in that position; if left in any degree loose, it untwists itself gradually, till the leaves recover their natural position. What better can an animal do for its welfare? A root of a tree, meeting with a ditch in its progress, is laid open to the air. What follows? It alters its course like a rational being; dips into the ground, undermines the ditch, rises on the opposite side to its wonted distance from the surface, and then proceeds in its original direction. Lay a wet sponge near a root laid open to the air; the root will direct its course to the sponge. Change the place of the sponge; the root varies its direction. Put a pole into the ground at a moderate distance from a scandent plant: the plant directs its course to the pole, lays hold of it, and rises on to its natural height. A honeysuckle proceeds in its course, till it is too long for supporting its weight; and then strengthens itself by shooting into a spiral. If it meets with another plant of the same kind, they coalesce for mutual support; the one screwing to the right, the other to the left. If a honeysuckle-twigg meets with a dead branch, it screws from the right to the left. The clasps of briony shoot into a spiral, and lay hold of whatever comes in their way for support. If, after completing a spiral of three rounds, they meet with nothing, they then try again for further support, by altering their course.

By comparing these and other instances of seeming voluntary motion in plants, with that share of life wherewith some of the inferior kinds of animals are endowed, we can scarcely hesitate in ascribing the superiority to the former; that is, putting sensation out of the question. Muscles, for instance, are fixed to one place, as much as plants are; nor have they any power of motion, besides that of opening and shutting their shells; and in this respect they have no superiority over the motion of the sensitive plant; nor doth their action discover more sagacity, or even so much, as the roots of the plane-tree, or the action of other vegetables.

M. Buffon, who seems to be desirous of confounding the animal and vegetable kingdoms, denies sensation to be any essential distinction. "Sensation (says he) more essentially distinguishes animals from vegetables; but sensation is a complex
idea,

idea, and requires some explication. For, if sensation implied no more than motion consequent upon a stroke or an impulse, the sensitive plant enjoys this power; but if, by sensation, we mean the faculty of perceiving and comparing ideas, it is uncertain whether brute animals are endowed with it. If it should be allowed to dogs, elephants, &c. whose actions seem to proceed from motives similar to those by which men are actuated, it must be denied to many species of animals, particularly to those which appear not to possess the faculty of progressive motion. If the sensation of an oyster, for example, differed only in degree from that of a dog; why do we not ascribe the same sensation to vegetables, though in a degree still inferior? This distinction, therefore, between the animal and vegetable, is neither sufficiently general nor determined. Hence we are led to conclude, that there is no absolute and essential distinction between the animal and vegetable kingdoms; but that nature proceeds, by imperceptible degrees, from the most perfect to the most imperfect animal, and from that to the vegetable; and thus, the fresh-water polypus may be regarded as the last of animals and the first of plants."

It were to be wished, that philosophers would on some occasions consider, that a subject may be dark as well on account of their inability to see, as when it really affords no light. This great author boldly concludes, that there is no essential difference between a plant and an animal, because we ascribe sensation to an oyster, and none to the sensitive plant; but we ought to remember, that, though we cannot perceive a distinction, it may nevertheless exist. Before M. Buffon, therefore, had concluded in this manner, he ought to have proved that some vegetables were endowed with sensation.

It is no doubt, however, as much incumbent on those who take the contrary side of the question, to prove that vegetables are not endowed with sensation, as it was incumbent on M. Buffon to prove that they are. But a little attention will show us, that the difficulty here proceeds entirely from our inability to see the principle of sensation. We perceive this principle in ourselves, but no man can perceive it in another. Why then does every individual of mankind conclude, that his neighbour has the same sensations with himself? It can only be from analogy. Every man perceives his neighbour formed in a manner similar to himself; he acts in a similar manner on similar occasions, &c. Just so it is with brute animals. It is no more doubtful that they have sensations, than that we have them ourselves. If a man is wounded with a knife, for instance, he expresses a sense of pain, and endeavours to avoid a repetition of the injury. Wound a dog in the same manner, he will also express a sense of pain; and, if you offer to strike him again, will endeavour to
escape,

escape, before he feels the stroke. To conclude here, that the action of the dog proceeded from a principle different from that of the man, would be absurd and unphilosophical to the last degree.

We must farther take notice, that there are sensations essentially distinct from one another; and, in proportion as an animal is endowed with more or fewer of these different species, it is more or less perfect as an animal: but, as long as only one of them remains, it makes not the least approach to the vegetable kingdom; and, when they are all taken away, is so far from becoming a vegetable, that it is only a mass of dead matter. The senses of a perfect animal, for instance, are five in number. Take away one of them, suppose sight, he becomes then a less perfect animal; but is as unlike a vegetable as before. Suppose him next deprived of hearing, his resemblance to a vegetable would be as little as before; because a vegetable can neither feel, taste, nor smell; and we suppose him still to enjoy these three senses. Let us, lastly, suppose him endowed only with the sense of feeling, which however seems to include that of taste, and he is no more a vegetable than formerly, but only an imperfect animal. If this sense is then taken away, we connect him not with the vegetable kingdom, but with what M. Buffon calls brute-matter. It is to this kingdom, and not to the vegetable, that animals plainly approximate as they descend. Indeed, to suppose an approximation between the vegetable and animal kingdoms, is very absurd; for, at that rate, the most imperfect animal ought to be the most perfect plant: but we observe no such thing. All animals, from the highest to the lowest, are possessed of vegetable life; and that, as far as we can perceive, in an equal degree, whether the animal life is perfect or imperfect: nor doth there seem to be the smallest connection between the highest degree of vegetation and the lowest degree of sensation. Though all animals are possessed of vegetable life, these two seem to be as perfectly distinct and incommensurate to one another, as any two things we can possibly imagine.

The power of vegetation, for instance, is as perfect in an onion or leek, as in a dog, an elephant, or a man: and yet, though you threaten a leek or an onion ever so much, it pays no regard to your words, as a dog would do; nor, though you wound it, does it avoid a second stroke. It is this principle of self-preservation in animals, which, being the most powerful one in their nature, is generally taken, and with very good reason, as the true characteristic of animal life. This principle is undoubtedly a consequence of sensation; and, as it is never observed to take place in vegetables, we have a right to say that the foundation of it, namely, sensation, belongs not to them. There is no animal, which makes any motion in consequence of external impulse where danger is threatened, but what puts itself in a

posture of defence; but no vegetable whatever does so. A muscle, when it is touched, immediately shuts its shell; and, as this action puts it in a state of defence, we conclude that it proceeded from the principle of self-preservation. When the sensitive plant contracts from a touch, it is no more in a state of defence than before; for whatever would have destroyed it in its expanded state, will also do so in its contracted state. The motion of the sensitive plant proceeds only from certain property called *irritability*; and which, though our bodies possess it in an eminent degree, is a characteristic neither of animal nor vegetable life, but belongs to us in common with brute-matter. It is certain, that an electrified silk thread shows a much greater variety of motions than any sensitive plant. If a bit of silk thread is dropt on an electrified metal plate, it immediately erects itself; spreads out the small fibres like arms; and, if not detained, will fly off. If a finger is brought near it, the thread seems greedily to catch at it. If a candle approaches, it clasps close to the plate as if afraid of it. Why do we not conclude that the thread in this case is really afraid of the candle? For this plain reason, that its seeming flight is not to get away from the candle, but to get towards the electrified metal; and, if allowed to remain there, will suffer itself to be burnt without offering to stir. The sensitive plant, in like manner, after it has contracted, will suffer itself to be cut to pieces, without making the least effort to escape. The case is not so with the meanest animal. An hedge-hog, when alarmed, draws its body together, and expands its prickles, thereby putting itself in a posture of defence. Throw it in water, and the same principle of self-preservation prompts it to expand its body and swim. A snail, when touched, withdraws itself into its shell, but if a little quicklime be sprinkled upon it, so that its shell is no longer a place of safety, it is thrown into agonies, and endeavours to avail itself of its locomotive power in order to escape the danger. In muscles and oysters, indeed, we cannot observe this principle of self-preservation so strongly, as nature has deprived them of the power of progressive motion: but, as we observe them constantly to use the means which nature has given them for self-preservation, we can have no reason to think that they are destitute of that principle upon which it is founded.

But there is no need of arguments drawn from the inferior creation. We ourselves are possessed both of the animal and vegetable life, and certainly must know whether there is any connection between vegetation and sensation or not. We are conscious that we exist; that we hear, see, &c. but of our vegetation we are absolutely unconscious. We feel a pleasure, for instance, in gratifying the calls of hunger and thirst; but of the process by which our aliment improves our growth and vigour, we are altogether ignorant. If we, then, who are more perfect than other
vegetables,

vegetables, are utterly insensible of our own vegetable life, why should we imagine that the less perfect vegetables are sensible of it?

To illustrate our reasoning here by an example. The direction of the roots of the plane-tree, mentioned above, shows as much sagacity, if we are to look only to the outward action, as can be observed in any motion of the most perfect animal whatever; nevertheless, we have not the least suspicion, either that the tree saw the ground at a distance, or that it was informed of its being there by the rest of its roots. If a wound is made in the body of a man, and a loss of substance is to be repaired, the same sagacity is to be observed in the arrangement of the fibres, not only as if they were animated, but they will dispose of themselves seemingly with a degree of wisdom far superior to what we have any idea of; yet this is done without our having the least knowledge either how it is done, or of its being done at all. We have therefore in ourselves a demonstration, that vegetable life acts without our knowing what it does: and, if vegetables are ignorant of their most sagacious actions, why should we suspect that we have a sensation, let it be ever so obscure, of any of their inferior ones, such as contracting from a touch, turning towards the sun, or advancing to meet a pole? Thus we may easily give M. Buffon a reason why we ascribe sensation to an oyster, and none to a vegetable; namely, because we perceive the vegetable to do nothing but what is also performed in our own bodies without our having the least sensation of it; whereas an oyster puts himself in a defensive posture on the approach of danger; and, this being an action similar to our own upon a like occasion, we conclude that it proceeds from the same principle of sensation. Here it may also be observed, that, though the inferior animals are deficient in the number, they are by no means so in the acuteness of their sensation; on the contrary, though a muscle or an oyster is probably endowed with no other sense than that of feeling, yet this sense is so exquisite, that it will contract upon the slightest touch, such as we should be altogether insensible of.

As to that power of contractility, or irritability, which is observed in some plants; our solids have it, when deprived both of vegetable and animal life; for the human heart, or a muscle, cut out of an animal body, will continue to contract, if it is irritated by pricking it, after it has neither sensation nor vegetation.

A very good moral reason may also be adduced, why vegetables are not endowed with sensation. Had they been so, we may suppose them to suffer pain when they are cut or destroyed; and, if so, what an unhappy state must they be in, who have not the least power to avoid the injuries daily offered them? In fact, the goodness of the Deity is very conspicuous in not giving to vegetables the same sensations as to animals; and, as he hath given them no means of defence, though we had not
been

been told it by himself, we might have known that he gave them for food to animals; and, in this case, to have endowed them with sensation would have been cruelty. Though animals without number prey upon one another, yet all of them have some means of defence; from whence we justly conclude, that their mutual destruction was not an original appointment of the Creator, but what followed from the fall of Adam, and what he foresaw would happen in a course of time, and which he therefore gave every one of them some means of guarding against. It may no doubt be here objected, that the giving some means of self-defence to every animal cannot be reckoned a sufficient proof that it was not the original design of the Creator that they should be destroyed, seeing these means are not always effectual for their preservation. This objection, however, cannot be completely obviated without a solution of the question concerning the origin of evil among the works of a perfectly-good Being. But, whatever difficulty there may be in solving this question, it is certain, that, as some means of self-defence is given to every animal, it has been the original design of the Creator, that in all cases one species of animals should not be destroyed at the pleasure or will of any other species: and, as no means of self-defence is given to any vegetable, it is plain that they have been destined for a prey to every species of animals that had access to them. Philosophers have insisted much on the necessity of one animal's devouring another, that there might be room sufficient for all; but this, so far from being a system worthy of the divine wisdom, seems to be a reflection upon it, as if the Author of Nature could not have found means to preserve the life of one part of his creatures, without the destruction and misery of the rest. The sacred writings leave us at no loss to see how this carnivorous disposition came in; and in the next world, this piece of perfection (as the sanguinary philosophers above-mentioned would have it to be) seems to be left out; for there, it is said, "They shall not hurt nor destroy; the lion shall eat straw like the ox; and there shall be no more pain." Isa. xi. 7, 9. Rev. xxi. 4.

OF ANIMAL FLOWERS.

The grand argument for animal life in vegetables, was inferred from the curious construction of the fresh-water polypus, and the *actinia* genus, called animal flowers, sea-anemone, sea-sunflower, &c. which, having indeed the external form and figure of vegetables, with scarcely any progressive motion, might easily deceive superficial observers; but, when more minutely examined, the polypus, and all the *actinia* class, turn out to be absolute animals, of the viviparous kind, and to feed on fish; and their heads or mouths, when open, resemble a full-blown flower, whence they

they are called flower-fish. There is one species of them, in which the purest white, carmine, and ultramarine, are scarcely sufficient to express their brilliancy. The bodies of some of them are hemispherical, of others cylindrical, and of others shaped like a fig. Their substance likewise differs; some are stiff and gelatinous, others fleshy and muscular; but all of them are capable of altering their figure when they extend their bodies and claws in search of food. They are found on many of the rocky coasts of the West-India islands, and on some parts of the coast of England. They have only one opening, which is in the centre of the uppermost part of the animal; round this are placed rows of fleshy claws; this opening is the mouth of the animal, and is capable of great extension. The animals themselves, though exceedingly voracious, will bear long fasting. They may be preserved alive a whole year, or perhaps longer, in a vessel of sea-water, without any visible food; but, when food is presented, one of them will successively devour two muscles in their shells, or even swallow a whole crab as large as a hen's egg. In a day or two the crab-shell is voided at the mouth, perfectly cleared of all the meat. The muscle-shells are likewise discharged whole, with the shells joined together, but entirely empty, so that not the least particle of fish is to be perceived on opening them. An anemone of one species will even swallow an individual of another species; but, after retaining it ten or twelve hours, will throw it up alive and uninjured. Through this opening also it produces its young ones alive, already furnished with little claws, which, as soon as they fix themselves, they begin to extend in search of food. One of the extremities of the sea-anemone exactly resembles the outward leaves of that flower; while its limbs are not unlike the flag or inner part of it. By the other extremity it fixes itself, as by a sucker, to the rocks or stones lying in the sand; but it is not totally deprived of the power of progressive motion, as it can shift its situation, though very slowly.

A peculiar species of *Actinia*, called *A. sociata*, or the clustered animal-flower, has been found in some of the West-India islands, an account of which was published in the Philosophical Transactions, vol. lvii. by Mr. Ellis, in a letter to Lord Hillsborough. This compound animal, which is of a tender fleshy substance, consists of many tubular bodies, swelling gently towards the upper part, and ending like a bulb, or very small onion; on the top of each is its mouth, surrounded by one or two rows of tentacles, or claws, which when contracted look like circles of beads. The lower part of all these bodies has a communication with a firm fleshy wrinkled tube, which sticks fast to the rocks, and sends forth other fleshy tubes, which creep along them in various directions. These are full of different sizes of these

remarkable animals, which rise up irregularly in groups near to one another. This adhering tube, that secures them fast to the rock, or shelly bottom, is worthy of our notice. The knobs are formed into several parts of it by its insinuating itself into the inequalities of the coral rock, or by grasping pieces of shells, part of which still remain in it, with the fleshy substance grown over them. This shows us the instinct of nature, that directs these animals to preserve themselves from the violence of the waves, not unlike the anchoring of muscles by their fine filken filaments that end in suckers; or rather like the shelly basis of the serpula, or worm-shell, the tree-oyster, and the slipper-barnacle, &c. whose bases conform to the shape of whatever substance they fix themselves to, grasping it fast with their testaceous claws, to withstand the fury of a storm. When we view the inside of this animal dissected lengthwise, we find a little tube leading from the mouth to the stomach, from whence there rise eight wrinkled small guts, in a circular order, with a yellowish soft substance in them; these bend over in the form of arches towards the lower part of the bulb, whence they may be traced downwards, to the narrow part of the upright tube, till they come to the fleshy adhering tube, where some of them may be perceived entering into the papilla, or the beginning of an animal of the like kind, most probably to convey it nourishment till it is provided with claws; the remaining part of these slender guts are continued on in the fleshy tube, without doubt for the purpose of producing and supporting more young from the same common parent.

The Abbé Dicquemarre, by many curious though cruel experiments, related in the Phil. Transf. for 1773, has shown that these animals possess, in a most extraordinary degree, the power of reproduction; so that scarcely any thing more is necessary to produce as many sea-anemones as we please, than to cut a single one into as many pieces. A sea-anemone being cut in two by a section through the body, that part, where the limbs and mouth are placed, ate a piece of muscle offered to it soon after the operation, and continued to feed and grow daily for three months after. The food sometimes passed through the animal; but was generally thrown up again, considerably changed, as in the perfect sea-anemone. In about two months, two rows of limbs and a mouth were perceived growing out of the part where the incision was made. On offering food to this new mouth, it was laid hold of and eaten; and, the limbs continually increasing, the animal gradually became as perfect as those which had never been cut. In some instances, however, when one of these creatures was cut through, new limbs would be produced from the cut place, those at the mouth remaining as before; so that a monstrous animal was the consequence, having two mouths, and feeding at both ends.

Under

Under a large hollow cliff, in the island of Barbadoes, where the sea flows up, and forms a bafon, there is a fixed stone, or piece of rock, in the middle, which is always under water. Round its sides, at different depths, seldom exceeding eighteen inches, are seen at all times of the year, issuing out of little holes, certain substances that have the appearance of fine radiated flowers, of a pale yellow, or a bright straw-colour, slightly tinged with green, having a circular border of thick-set petals, about the size of, and much resembling, those of a single garden-marigold, except that the whole of this seeming flower is narrower at the discus, or setting-on of the leaves, than any flower of that kind. Mr. Hughes, in his History of Barbadoes, gives the following curious account of them: "I have attempted to pluck one of these animal-flowers from the rock to which they are fixed; but never could effect it; for, as soon as my fingers came within two or three inches of it, it would immediately contract together its yellow border, and shrink back into the hole of the rock; but, if left undisturbed for about four minutes, it would come gradually in sight, expanding, though at first very cautiously, its seeming leaves, till at last it appeared in its former bloom. However, it would again recoil, with a surprising quickness, when my hand came within a small distance of it. Having tried the same experiment by attempting to touch it with my cane, and a small slender rod, the effect was the same. But, though I could not by any means contrive to take or pluck one of these animals entire, yet I cut off (with a knife which I had held for a long time out of sight, near the mouth of a hole out of which one of these animals appeared) two of these seeming leaves. These, when out of the water, retain their shape and colour; but, being composed of a membrane-like substance, surprisingly thin, they soon shrivelled up, and decayed." The reproductive power of the Barbadoes animal-flower is prodigious. Many people coming to see these strange creatures, and occasioning some inconvenience to a person through whose grounds they were obliged to pass, he resolved to destroy the object of their curiosity; and, that he might do so effectually, he caused all the holes out of which they appeared, to be carefully bored and drilled with an iron instrument, so that we cannot suppose but their bodies must have been entirely crushed to a pulp: nevertheless they again appeared in a few weeks in still greater abundance, from the very same places.

The sea-carnation, or animal-flower, found among the rocks at Hastings in Suffolk, is very similar to the animal-flower of Barbadoes. This animal adheres by its tail, or sucker, to the under part of the projecting rocks opposite the town; and, when the tide is out, has the appearance of a long white fig; which is also the form of it when put into a glass of sea-water.

OF THE POLYPUS.

THE Polype, or Polypus, which so long divided naturalists in opinion whether it was of vegetable or animal conformation, is a fresh-water animal of the Hydra genus, in the class of worms, and order of *zoophytes*, in the Linnæan system. It is of a cylindrical figure, but variable, with very long tentacula, or claws. There is scarcely an animal in the world more difficult to describe than this surprising worm; it varies its whole figure at pleasure, and is frequently found beset with young in such a manner as to appear ramose and divaricated; these young ones adhering to it so as to appear parts of its body.

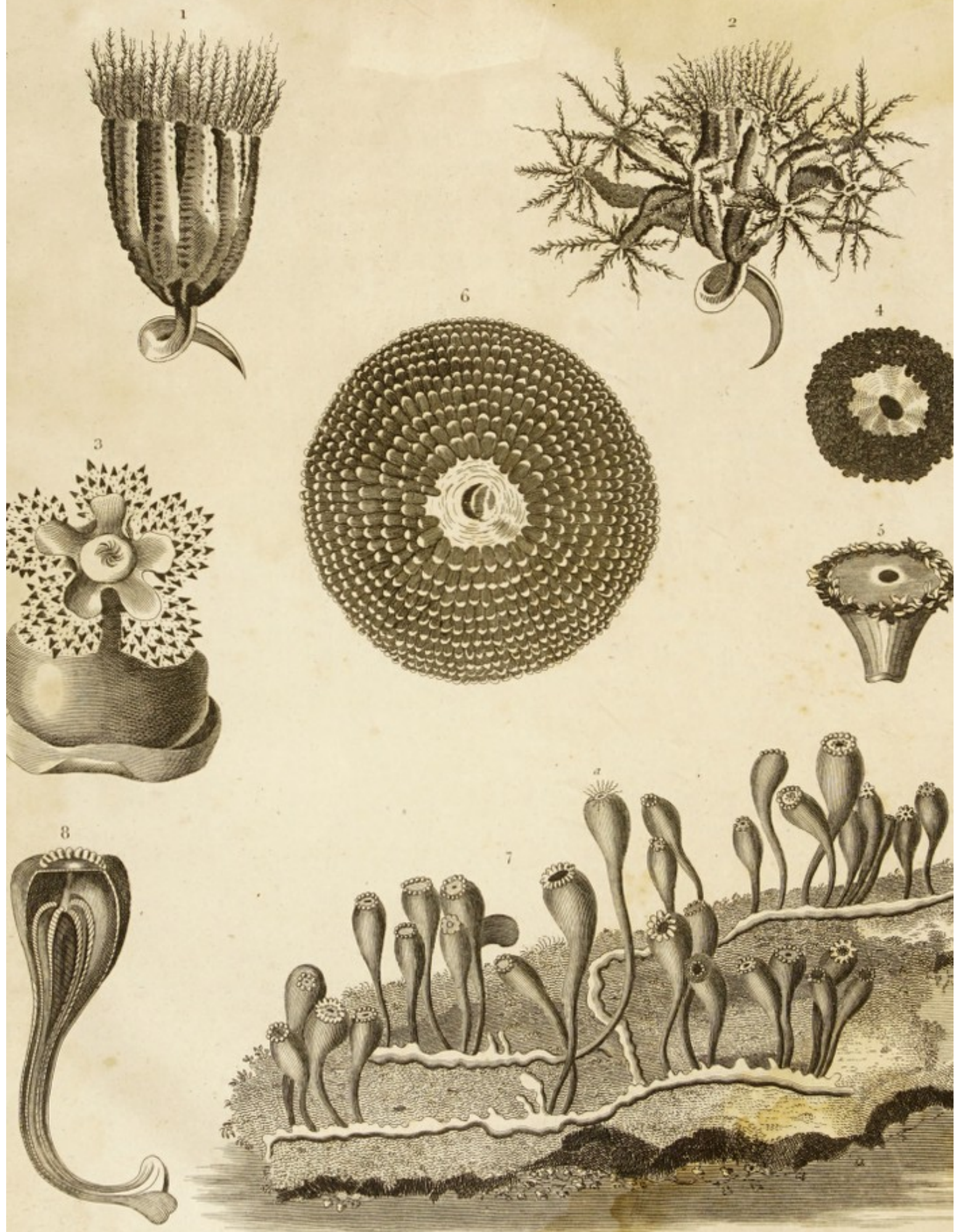
When simple and in a moderate state as to contraction or dilatation, it is oblong, slender, pellucid, and of a pale-reddish colour; its body is somewhat smaller towards the tail, by which it fixes itself to some solid body: and larger towards the other extremity, where it has a larger opening, called its mouth, around which are the tentacula, or claws, which are eight in number, and are usually extended to about half a length of its body. By means of these tentacula, or arms, as they are commonly called, expanded into a circle of more than half a foot diameter, the creature feels every thing that can serve it for food; and seizing the prey with one of them, calls in the assistance of the others, if necessary, to conduct it to its mouth.

The production of its young is different from the common course of nature in other animals; for the young one issues from the side of its parent in the form of a small pimple, which, lengthening every hour, becomes, in about two days, a perfect animal, and drops from off its parent to shift for itself: but, before it does this, it has often another growing from its side; and sometimes a third from that, even before the first is separated from its parent; and what is very extraordinary, there has never yet been discovered among them any distinction of sex, or appearance of copulation; every individual of the whole species being prolific, and that as much if kept separate as if suffered to live among others; but what is even still more surprising is the reproduction of its several parts when cut off; for, when cut into a number of separate pieces, it becomes in a day or two so many distinct and separate animals; each piece having the property of producing a head and tail, and the other organs necessary for life and all the animal functions.

There is no distinguished place in the body of the polypus, from whence the young are brought forth; for they spring out like shoots or branches of a tree, from all the exterior parts of their bodies. M. Trembley, who had heard much of this creature, and being determined to convince himself, by real experiments, whether it was a vegetable or an animal, cut one in the middle, when, to his utter amaze-

ment,





Animal Flowers or Flower Fish.

ment, he found that in two days each of those pieces was become a perfect animal, the head-part having shot forth a tail, and the tail a head. Numerous trials of a similar nature have been made in my own laboratory; and I have always found that it is of no consequence how often you cut them, for they still put out new members, and become so many distinct polypes.

They are always to be found in clear slowly-running waters, adhering by the tail to sticks, stones, and water-plants, and live on small insects. They are easily kept alive a long time in glasses, often changing the water, keeping the glasses clean, and feeding them with a small red worm, common in the mud of the Thames, or with other small insects. The creature has its name from the Greek *πολυς*, many, and *πους*, a foot, signifying an animal with many feet; but a more apposite one might easily have been invented, since it has in reality no feet at all. What were originally taken for feet, are what have since been called its *horns*, and of late more properly its *arms*, their office being to catch its prey. With these little arms, which are capable of great extension, it seizes minute worms, and various kinds of water-insects, and brings them to its mouth: and, like the sea-anemone, often swallows bodies larger than itself: having a surprising property of extending its mouth wider, in proportion, than any other animal. After its food is digested in its stomach, it returns the remains of the animals upon which it feeds through its mouth again, having no other observable emunctory. In a few days there appear small knobs or papillæ on its sides; as these increase in length, little fibres are seen rising out of the circumference of their heads, as in the parent animal; which fibres they soon begin to use for the purpose of procuring nourishment, &c. When these are arrived at mature size, they send out other young ones on their sides in the same manner; so that the animal branches out into a numerous offspring, growing out of one common parent, and united together, and disposed in the manner represented in the annexed plate. Each of these provides nourishment not only for itself, but for the whole society; an increase of the bulk of one polype, by its feeding, tending to an increase in the rest. Thus a polype of the fresh-water kind becomes like a plant branched out, or composed of many bodies, each of which has this singular characteristic, that, if one of them be cut in two in the middle, the separated part becomes a complete animal, and soon, adhering to some fixed base, like the parent from which it was separated, produces a circle of arms; a mouth is formed in the centre; it increases in bulk, emits a numerous progeny, and is soon, in every respect, as perfect an animal as that from which it was severed.

The several strange properties recorded of the polypes and animal flowers, though very surprising, are not, however, peculiar to them alone. The Surinam toad is well

known to produce its young, not in the ordinary way, but in cells upon its back. And, as to the most amazing of their properties, the re-production of their parts, we know the crab and lobster, if a leg be broken off, can always produce a new one.

I have annexed a copper-plate of some excellent drawings of these curious phenomena in nature; in which No. 1 represents the fresh-water polype, with its tentacula or arms extended upwards. No. 2 represents the same animal, with its young branching from it, and putting out their claws for food, which, howsoever taken, goes to the common support of the whole family. No. 3 shows the animal carnation-flower of the rocks near Hastings in Suffex, with its tentacles extended in search of food. No. 4 is an exact representation of the sea-anemone, above described. No. 5 shows the head of the animal-flower of Barbadoes. No. 6 is a brilliant display of the sea fun-flower animal, with its innumerable tentacles expanded to catch its prey, which being allured to it by its elegant appearance, they close instantly upon it, and convey it to the interior concavity or mouth. No. 7 represents a cluster of the animal-flower described by Mr. Ellis, in the islands ceded by France; in which *a* shows one of the animals stretching out its tentacles in search of food. No. 8 is a perpendicular dissection of one of the same animals, in order to show the gullet, intestines, stomach, and the fibres or tendons that move the claws.

OF ANIMALCULES.

THE next most surprising part of animal nature, is that of animalcules, an innumerable tribe of living beings, wholly invisible to the naked eye, and which cannot even be perceived to exist, but by the assistance of microscopes. The smallest living creatures our instruments can show, are those that inhabit the waters; for, though possibly animalcules equally minute, or perhaps more so, may fly in the air, or creep upon the earth, it is scarcely possible to bring such under our examination; but, water being transparent, and confining the creatures in it, we are able, by applying a drop of it to our glasses, to discover, to a certain degree of smallness, all that it contains.—Some of the most curious of these animalcules, which have been described by microscopical observers, are as follow.

1. *The Hair-like Insect.* This is so called on account of its shape; being extremely slender, and frequently an hundred and fifty times as long as broad. The body or middle part, which is nearly straight, appears, in some, composed of such rings as the windpipe of land-animals; but, in others, seems rather scaled, or made up of rings that obliquely cross one another. Its two ends are hooked or bent, pretty nearly in the same degree, but in a direction opposite to one another; and, as no eyes

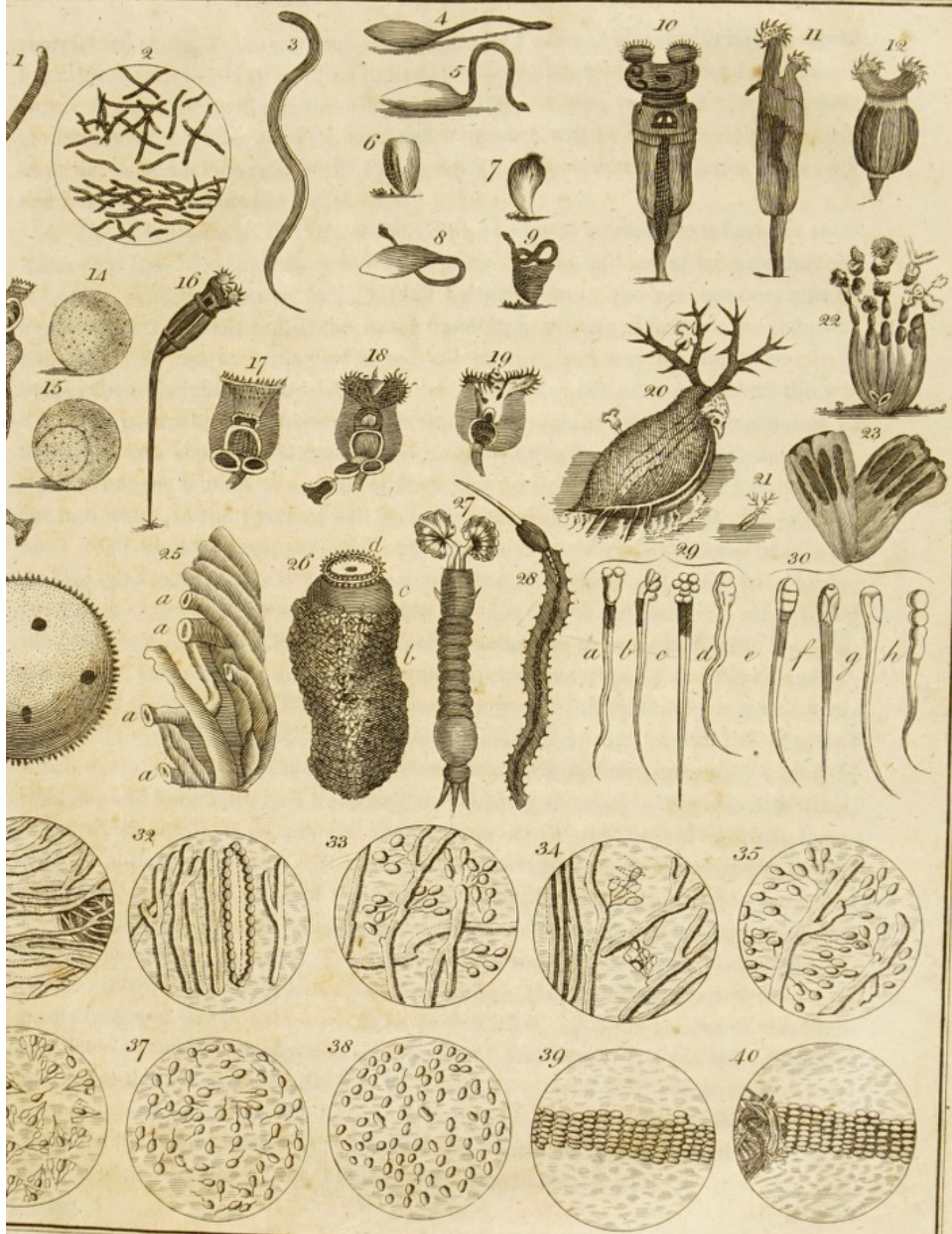
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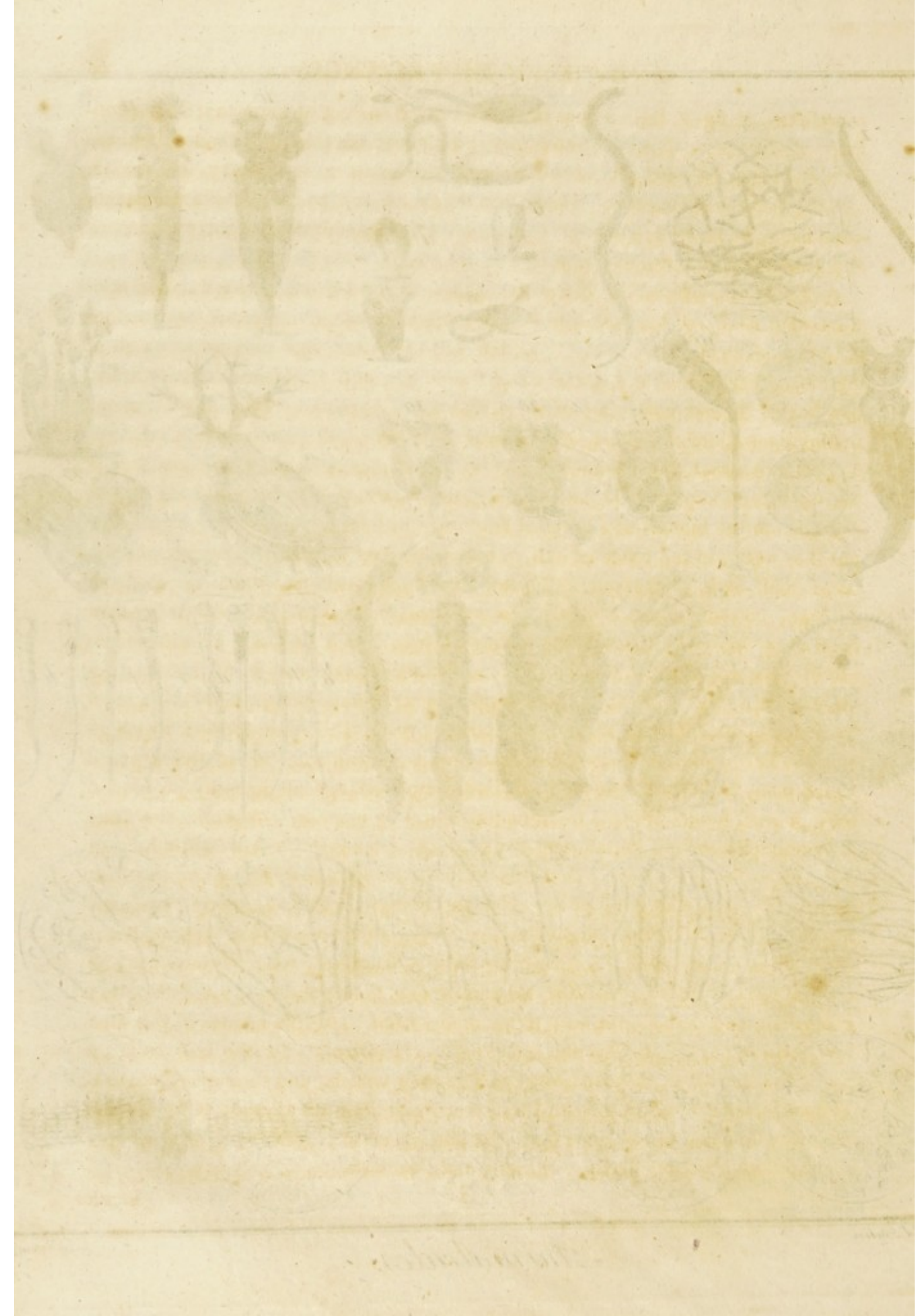
can be discerned, it is difficult to judge which is the head or tail. Its progressive motion is very singular, being performed by turning upon one end as a centre, and describing almost a quarter of a circle with the other; its shape and form may be seen greatly magnified in the following curious Plate of Animalcules, at fig. 1. Its motions are very slow, and require much patience and attention in the observer. These creatures are so small, that millions of millions of them might be contained in the circle, fig. 2. When viewed singly, they are exceedingly transparent, and of a beautiful green colour; but, when numbers of them are brought together, they become opaque, lose their green colour, and grow entirely black. The hair-like insect was first discovered in a ditch at Norwich, one end of which communicates with the river there, and the other end with a second ditch, into which several kennels empty themselves. The length of this ditch was at least a hundred yards, and its breadth nine. The bottom, for more than a foot thick, was covered with a blackish-green substance, in appearance like mud, made up for the most part of these insects; but, supposing only half or a quarter part of it to be composed of them, according to the above dimensions, their numbers must exceed all imagination.

2. *Eels in Paste, &c.* When paste is allowed to stand till it becomes sour, it is then found to be the habitation of numberless animalcules, which may be discerned by the naked eye; and, though their form cannot be perfectly distinguished, their motion is very perceptible, and the whole paste will seem to be animated. Fig. 3 represents one of these *anguillæ* highly magnified. The most remarkable property of these insects is, that they are viviparous. If one of them is cut through near the middle, several oval bodies, of different sizes, will be seen to issue forth. These are young *anguillæ*, each of them coiled up and inclosed in its proper membrane, which is so exquisitely fine, as scarce to be discernable by the greatest magnifier, while it encloses the embryo animal. The largest and most forward immediately break through this covering, unfold themselves, and wriggle about in the water nimbly; others get out, uncoil, and move themselves about more slowly; and the least mature continue entirely without motion. The *uterus*, or vessel that contains all these oval bodies, is composed of many ringlets, not unlike the *aspera arteria* of land-animals, and seems to be considerably elastic; for, as soon as the animalcule is cut in two, the oval bodies are thrust out with some degree of violence, from the springing-back or action of this bowel. An hundred and upwards of the young ones have been seen to issue from the body of one single eel, whereby the prodigious increase of them may be accounted for; as probably several such numerous generations are produced in a short time. Animalcules of a similar kind are likewise found in vinegar; and, like those already described, are discovered to be viviparous. But it is not only in acid matters that such appearances are observed. In

some fields of wheat, many grains may be observed that appear blackish outwardly, as if scorched; but, when opened, are found to contain a soft white substance, which, attentively considered, appears to be nothing else than a congeries of threads or fibres, lying close to each other in a parallel direction, much resembling the unripe down of some thistles on cutting open the flower-heads before they begin to blow. This fibrous matter discovers not the least sign of life or motion, unless water is applied: but immediately on wetting, provided the grains of wheat have been newly gathered, the supposed fibres separate, and appear to be living creatures. Their motions at first are very languid; but gradually become more active and vigorous, twisting and wriggling themselves somewhat in the manner of the eels in paste, but always slower and with less regularity.

3. *The Proteus*, so called on account of its assuming a great number of different shapes, so as scarcely to be known as the same animal in its various transformations; and indeed, unless it be carefully watched while passing from one shape to another, it will often become suddenly invisible. When water, wherein any sort of vegetable has been infused, or animals preserved, has stood quietly for some days or weeks in any glass or other vessel, a slimy substance will be collected about the sides: some of which being taken up with the point of a pen-knife, placed on a slip of glass in a drop of water, and looked at through the microscope, will be found to harbour several kinds of little animals that are seldom found swimming about at large; among which the proteus is one. Its shape is better understood from the annexed plate, than from any description that could be given. Its substance and colour resemble that of a snail; and its whole shape seems to bear a considerable resemblance to that of a swan. It swims to and fro with great vivacity: but will now and then stop for a minute or two; during which time its long neck is usually employed as far as it can reach, forwards, and on every side, with a somewhat-flow but equable motion, like that of a snake, frequently extending thrice the length of its body, and seemingly in search of food. There are no eyes, nor any opening in the head like a mouth, to be discerned: but its actions plainly prove it to be an animal that can see; for, though multitudes of different animalcules swim about in the same water, and its own progressive motion is very swift, it never strikes against any of them, but directs its course between them with a dexterity wholly unaccountable should we suppose it destitute of sight. When it is alarmed, it suddenly draws in its neck, represented in the Plate at fig. 4 and 5. transforming itself into the shape represented at fig. 6. when it becomes more opaque, and moves about very slowly, with the large end foremost. When it has continued some time in this posture, it will often, instead of the head and neck it had formerly, put forth a new one, with a kind of wheel-machinery, represented





represented at fig. 7. the motions of which draw a current of water to it from a considerable distance. Having often pulled in and thrust out this short head, sometimes with and sometimes without the wheel-work, the creature, as if weary, will remain motionless for a while; then its head and long neck will be very slowly protruded, as at fig. 8. and it soon resumes its former agility. Sometimes it disposes of its neck and head as represented at fig. 9.

4. *The Wheel-animal, or Vorticella.* This wonderful animalcule is found in rain-water that has stood some days in leaden gutters, or in hollows of lead on the tops of houses, or in the slime or sediment left by such water; and perhaps may also be found in other places; but, if the water standing in gutters of lead, or the sediment left behind it, has any thing of a red colour in it, one may be almost certain of finding them therein. Though it discovers no signs of life except when in the water, yet it is capable of continuing alive for many months after it is taken out of the water, and kept in a state as dry as dust. In this state it is of a globular shape, exceeds not the bigness of a grain of sand, and no signs of life appear; but, being put into water, in the space of half an hour a languid motion begins, the globule turns itself about, lengthens itself by slow degrees, assumes the form of a lively maggot, and most commonly in a few minutes afterwards puts out its wheels; swimming vigorously through the water, as if in search of food; or else, fixing itself by the tail, works the wheels in such a manner as to bring its food to it. Fig. 10, 11, 12, and 13, show the different appearances of its wheels; and fig. 14 and 15, show its globular form. The most remarkable part of this animalcule is its wheel-work. This consists of a couple of semicircular instruments, round the edges of which many little fibrillæ move themselves very briskly, sometimes with a kind of rotation, and sometimes in a trembling or vibrating manner. When in this state, it sometimes unfastens its tail, and swims along with a great deal of swiftness, seemingly in pursuit of its prey. Sometimes the wheels seem to be entire circles, armed with small teeth, like those of the balance-wheel of a watch, appearing projected forwards beyond the head, and extending sideways somewhat wider than its diameter. The teeth or cogs of these wheels seem to stand very regularly at equal distances; but the figure of them varies according to their position, the degree of their protrusion, and perhaps the will of the animal itself. All the actions of this creature seem to imply sagacity and quickness of sensation. At the least touch or motion in the water, they instantly draw in their wheels; and their eyes seem to be lodged somewhere about the wheels; because, while in the maggot state, its motions are slow and blundering; but, after the wheels are protruded, they are performed with great regularity, swiftness, and steadiness.

Besides the above, there are found in our waters several other species of animals furnished with wheels, some of which appear to have a rotatory, and others a vibratory, motion. Fig. 16. represents a kind found in the ditch at Norwich, where the hair-like insect is produced. They differ from the foregoing only in having very long tails. Fig. 17, 18, and 19, represent a species of wheel-animals, which are also covered with shells. The body of this species consists of three parts, in like manner as the other; only the thorax and abdomen, in this, are not separated by any gut, or intermediate vessel, but are joined immediately together. The heart is plainly perceived, having a regular systole and diastole, as in the former species. These creatures occasionally draw themselves entirely within their shells; and the shell then appears terminated by six short spikes on one side and two on the other. The young ones of this species are carried in oval sacculi, or integuments, fastened externally to the lower part of their shells somewhere about the tail. When a young one is about to burst its integuments, the parent assists it greatly, by wagging its tail, and striking the oval bag, so that the young one's head becomes as it were forced into the water, though the tail cannot be so soon disengaged. In this condition the young one sets its wheel a-going, and exerts all its endeavours to free itself from its confinement. When it has got clear, it swims away, wagging its tail as the old one does, and leaving the integument adhering to the shell of the parent. These wheel-animals are great tormentors of the water-flea, of which a figure is given in the plate. Fig. 20. shows it magnified, with some of the wheel-animals adhering to it; fig. 21. shows the natural size of the flea. These insects are often found in great numbers in the same water; and, when that is the case, it is not uncommon to discover five or six of these crustaceous wheel-animals fastened by their tail to the shell or horns of the flea: causing it, seemingly, a vast deal of uneasiness; nor can they be driven away, or shaken off, by all the efforts the flea can use for that purpose.

5. *The Bell-flower Animal, or Plumed Polype.* These animalcules dwell in colonies together, from ten to fifteen, (seldom falling short of the former number, or exceeding the latter,) in a slimy kind of mucilaginous or gelatinous case; which out of the water has no determined form, appearing like a little lump of slime; but, when expanded therein, has some resemblance to the figure of a bell with its mouth upwards; and is usually about half an inch long and a quarter of an inch in diameter. These bells, or colonies, are to be found adhering to the large leaves of duckweed, and other aquatic plants. They may be most easily discovered by letting a quantity of water, with duckweed in it, stand quietly for three or four hours in glass vessels in a window, or other place where a strong light comes; for then,

if any are about the duckweed, they will be found, on careful inspection, extending themselves out of their cases, and making an elegant appearance. Besides the particular and separate motion which each of these creatures is able to exert within its own case, and independant of the rest, the whole colony together has a power of altering the position of the bell, or even of removing it from one place to another; and hence this bell is sometimes found standing perfectly upright, as at fig. 22. and sometimes bending the upper part downwards. As these animalcules seem not to choose to stay together in societies whose number exceeds fifteen, when the colony happens to increase in number, the bell may be observed to split gradually, beginning from about the middle of the upper or anterior extremity, and proceeding downwards towards the bottom, as at fig. 23. till they at last separate entirely, and become two complete colonies independent of each other, one of which sometimes removes to another part of the vessel. The arms of each individual of this colony are set round the head, to the number of forty, having each the figure of an *Italic f*, one of whose hooked ends is fastened to the head, and all together, when expanded, compose a figure shaped somewhat like a horse's shoe, convex on one side next the body, but gradually opening and turning outwards, so as to leave a considerable area within the outer extremities of the arms. When the arms are thus extended, the creature, by giving them a vibrating motion, can produce a current in the water, which brings the animalcules, or whatever other minute bodies are within the sphere of its action, with great velocity to its mouth, situated between the arms; where they are taken in if liked, or driven away by a contrary motion. Though their eyes cannot be discovered, yet they have perception of the light; for, when kept in the dark, they always remain contracted; but, on being exposed to the light of the sun or of a candle, they constantly extend their arms, and show evident signs of being pleased.

6. *The Globe-animal.* This animalcule, represented at fig. 24. seems exactly globular, having no appearance of either head, tail, or fins. It moves in all directions, forwards or backwards, up or down, either rolling over and over like a bowl, spinning horizontally like a top, or gliding along smoothly without turning itself at all. Sometimes its motions are slow, at other times very swift; and, when it pleases, it can turn round, as it were upon an axis, very nimbly, without removing out of its place. The whole body is transparent, except where the circular black spots are shown in the figure. Some of the animals have no spots, and others from one to seven. The surface of the whole body appears, in some, as if all over dotted with points; in others, as if granulated like shagreen; but their more general appearance is, as if beset thinly round with short moveable hairs or bristles, which probably

probably are the instruments by which their motions are performed. These animalcules may be seen by the naked eye, but appear only like moving points.

7. *The Pipe-animal.* These creatures are found on the coast of Norfolk, living in small tubes or cases of sandy matter, in such multitudes as to compose a mass sometimes of three feet in length. Fig. 25. shows a piece of such a congeries broke off, where *a a a a* represent the mouths or openings of the pipes wherein the little animals make their abode. Fig. 26. shows one single pipe, with its inhabitant, separated from the rest, and magnified nine or ten times in diameter. The pipe or case *b* is made of sand, intermixed here and there with minute shells, and all cemented together by a glutinous slime, probably issuing from the animal's own body *c*, which is composed of muscular ringlets, like those of a worm, capable of great extension or contraction. The anterior end, or head, *d*, is exceedingly beautiful, having round it a double row of little arms disposed in a very regular order, and probably capable of extension, in order to catch its food, and bring it to its mouth. Some of these tubes are found petrified.

8. *An Insect with net-like arms.* The properties and shape of this little animal are very extraordinary. It is found only in cascades, where the water runs very swift. There these insects are found in clusters, standing erect on their tails; and resembling, when all together, the combs of bees at the time they are filled with their aureliæ. On being taken out of the water, they spin threads, by which they hang exactly in the same manner as the garden-spider. Fig. 27. shows one of these insects magnified. Its body appears curiously turned as on a lathe; and at the tail are three sharp spines, on which it raises itself, and stands upright in the water: but the most curious apparatus is about its head, where it is furnished with two instruments like fans or nets, which serve to provide its food. These it frequently spreads out and draws in again; and when drawn up they are folded together with the utmost nicety and exactness, so as to be indiscernible when brought close to the body. At the bottom of these fans a couple of claws are fastened to the lower part of the head, which, every time the nets are drawn in, conduct to the mouth of the animal whatever is taken in them. Some of these creatures being kept with water in a vial, most of them died in two days; and the rest, having spun themselves transparent cases, (which were fastened either to the sides of the glass, or to pieces of grass put into it,) seemed to be changed into a kind of chrysalis. None of them lived above three days; and, though fresh water was given them two or three times a-day, yet in a few hours it would sink to a degree scarcely conceivable, and that too at several yards distance, though, in proportion to the water, all the included insects were not more than as one to one million one hundred and fifty thousand.

sand. This makes it probable, that it is necessary for them to live in a rapid stream, lest they should be poisoned by the effluvia issuing from their own bodies, as no doubt they were in the phial.

9. *A curious aquatic Worm.* This animalcule is shown, magnified, at fig. 28. It is found in ditch-water, and is of various sizes, from one fortieth to half an inch in length. About the head it has somewhat of a yellowish colour; but all the rest of the body is perfectly colourless and transparent, except the intestines, which are considerably opaque, and disposed as in the figure. Along its sides are several papillæ, with long hairs growing from them: it has two black eyes, and is very nimble. But the most remarkable thing in this creature, is a long horn or proboscis; which, in the large ones, may be seen with the naked eye, if the water is clear, and is sometimes one tenth of an inch in length; this it waves to and fro as it moves in the water, or creeps up the side of the glass; but it is not known whether it is hollow, or of what use it is to the creature itself.

10. *Spermatic Animals and Animalcula Infusoria.* The discovery of living animalcules in the semen of most animals, is claimed by Leeuwenhoek, a Dutch naturalist. According to this naturalist, these animalcules are found in the male seed of every kind of animal; but their general appearance is very much the same, nor doth their size differ in proportion to the bulk of the animal to which they belong. The bodies of all of them seem to be of an oblong oval form, with long tapering slender tails issuing from them: and, as by this shape they resemble tadpoles, they have been frequently called by that name; though the tails of them, in proportion to their bodies, are much longer than the tails of tadpoles are: and it is observable, that the animalcules in the seed of fishes have tails much longer and more slender than the tails of those in other animals; inasmuch, that the extremity of them is not to be discerned without the best glasses, and the utmost attention. Fig. 29, *a, b, c, d,* represent the spermatic animalcula of the rabbit; and fig. 30, *e, f, g, h,* those found in the seed of a dog. The numbers of these animalcula are inconceivable. On viewing with a microscope the milt or seed of a male cod-fish, innumerable multitudes of animalcules are found therein, of such a diminutive size, that at least ten thousand of them are capable of being contained in the bulk of a grain of sand; whence it is concluded, that the milt of this single fish contained more living animalcules than there are to be found people living in the whole world. To find the comparative size of these animalcules, Mr. Leeuwenhoek placed a hair of his head near them; which hair, through his microscope, appeared an inch in breadth; and he was satisfied, that at least sixty such animalcules could easily lie within that diameter; whence, their bodies being spherical, it follows, that two hundred and six-

teen thousand of them are but equal to a globe whose diameter is the breadth of a hair. He observed, that, when the water wherewith he had diluted the feed of a cod-fish was exhaled, the little bodies of the animalcules burst in pieces; which did not happen to those in the feed of a ram: and this is imputed to the greater firmness and consistency of the latter, as the flesh of a land-animal is more compact than fish. These animalcules appear to be very vigorous and tenacious of life; for they may be observed to move long after the animal from which they are taken is dead. They have this peculiarity also, that they are continually in motion, without the least rest or intermission, provided there is fluid sufficient for them to swim about in. These animalcules are only peculiar to the feed; nothing that has the least token of life being discoverable by the best glasses, either in the blood, spittle, urine, gall, or chyle. Great numbers, however, are to be found in the whitish matter that sticks between our teeth; some of which are of an oval figure, and others resemble eels.

The *Animalcula Infusoria* take their name from their being found in all kinds either of vegetable or animal infusions. Indeed, there is scarcely any kind of water, unless impregnated with some mineral substance, but what will discover living creatures. Leeuwenhoek says, that at first he could discern no living creatures in rain-water; but, after standing some days, he discovered innumerable animalcules, many thousands of times less than a grain of sand, and in proportion to a mite as a bee is to a horse. In other rain-water, which had likewise stood some time, he found the smallest sort he had ever seen; and, in a few days more, met with others eight times as big as these, and almost round. In another quantity of rain-water, that had been exposed like the former, he discovered a kind of animalcules with two little horns, in continual motion. The space between the horns was flat, though the body was roundish, but tapering a little towards the end; where a tail appeared, four times as long as the body, and the thickness of a spider's web. He observed several hundreds of these within the space a grain of sand would occupy. If they happened on the least filament or string, they were entangled in it, and then would extend their bodies into an oblong round, and struggle hard to disengage their tails. He observed a second sort, of an oval figure, and imagined the head to stand at the sharpest end. The body was flat, with several small feet, moving exceeding quick, but not discernible without a great deal of attention. Sometimes they changed their shape into a perfect round, especially when the water began to dry away. He met also with a third sort, twice as long as broad, and eight times smaller than the first: yet in these he discerned little feet, whereby they moved very nimbly. He perceived likewise a fourth sort, a thousand times smaller than a louse's eye, and which exceeded all the rest in briskness: he found these
turning

turning themselves round, as it were upon a point, with the celerity of a top. And he says there were several other forts. The production of *animalcula infusoria* is very surprizing. In four hours time, an infusion of cantharides has produced animalcules less than even the tails of the spermatic animals we have already described. Neither do they seem to be subject to the fate of other animals; but, several kinds of them at least, by dividing themselves in two, to enjoy a sort of immortality. Nor do the common methods by which other animals are destroyed, seem to be effectual for destroying their vital principle. Hot mutton-gravy, secured in a phial with a cork, and afterwards set among hot ashes, to destroy as effectually as possible every living creature that could be supposed to exist in it, has nevertheless been found swarming with animalcules, after standing a few days. In the Philosophical Transactions, vol. lix. we have a very curious account, given us by Mr. Ellis, of animalcules produced from infusions of potatoes and of hemp-feed.

“ On the 25th of May, 1768, Fahrenheit’s thermometer seventy degrees, I boiled a potatoe in the New-River water, till it was reduced to a mealy consistence. I put part of it, with an equal proportion of the boiling liquor, into a cylindrical glass vessel, that held something less than half a wine-pint, and covered it close immediately with a glass cover. At the same time I sliced an unboiled potatoe, and, as near as I could judge, put the same quantity into a glass vessel of the same kind, with the same proportion of New-River water not boiled; and covered it with a glass cover; and placed both vessels close to each other. On the twenty-sixth of May, twenty-four hours afterwards, I examined a small drop of each, by the first magnifier of Wilson’s microscope, whose focal distance is reckoned at the fiftieth part of an inch; and, to my amazement, they were both full of animalcules of a linear shape, very distinguishable, moving to and fro with great celerity; so that there appeared to be more particles of animal than vegetable life in each drop. This experiment I have repeatedly tried, and always found it to succeed in proportion to the heat of the circumambient air; so that even in winter, if the liquors are kept properly warm, at least in two or three days the experiment will succeed. What I have observed are infinitely smaller than spermatic animals, and of a very different shape: the truth of which every accurate observer will soon be convinced of, whose curiosity may lead him to compare them; and I am persuaded he will find they are no way akin. At present I shall pass over many other curious observations, which I have made on two years experiments, in order to proceed to explain a hint which I received last January from M. de Saussure, of Geneva, when he was here; which is, that he found one kind of these animalcules that increase by dividing across into nearly two equal parts. I had often seen this appearance

appearance in various species a year or two ago, as I found upon looking over the minutes I had taken when I made any new observation; but always supposed the animal, when in this state, to be in coition. Not hearing, till after M. de Sauffure left this kingdom, from what infusion he had made his observation, his friend Dr. de la Roche, of Geneva, informed me, the latter end of February last, that it was from hemp-feed. I immediately procured hemp-feed from different feedsmen, in distant parts of the town. Some of it I put into New-River water, some into distilled water, and some I put into very hard pump-water. The result was, that in proportion to the heat of the weather, or the warmth in which they were kept, there was an appearance of millions of minute animalcula in all the infusions; and, some time after, some oval ones made their appearance. These were much larger than the first, which still continued; they wriggled to and fro in an undulatory motion, turning themselves round very quick all the time that they moved forwards. Nothing more plainly shows these animals to be zoophytes than this circumstance; that when, by accident, the extremity of their bodies has been shrivelled for want of a supply of fresh water, the applying more fresh water has given motion to the part of the animal that was still alive; by which means, this shapeless figure has continued to live and swim to and fro all the time it was supplied with fresh water."—Thus we have given as full an account as our limits would admit, of the most curious kinds of animalcules that have hitherto been observed. We cannot, however, dismiss this subject, without taking notice of the animalcules found in the seed of man.

Before the invention of microscopes, the doctrine of equivocal generation, both with regard to animals and plants of some kinds, was universally received: but this instrument soon convinced every intelligent person, that those plants which formerly were supposed to be produced by equivocal generation, arose from seeds; and the animals, in like manner, from a male and female. But, as the microscope threw light upon one part of nature, it left another involved in darkness: for the origin of the animalcula infusoria, or of the spermatic animals already mentioned, remains as much unknown as that of many other kinds was, when the doctrine of equivocal generation reigned in full force.

The discovery of spermatic animalcules was thought to throw some light on the mysterious affair of generation itself, and these minute creatures were imagined to be each of them individuals of the same species with the parent. Here the infinite number of these animalcules was an objection, and the difficulty remained as great as before; for, as every one of these animalcules behaved to be produced from a male and female, to explain their origin by animalcular generation in the same manner,

manner, was only explaining generation by itself. This hypothesis, therefore, having proved unsatisfactory, others have been invented, but which are likewise involved in doubt. M. Buffon, however, so far as concerns human generation, has given such a particular account of the animalcules in the seed of man, that we shall state it here, for the information of the curious.

Having procured the private parts of a man who died a violent death, he extracted all the seed from them while they were still warm: and having examined a drop of it with a double microscope, it had the appearance as in the Plate, at fig. 31. Large filaments appeared, which in some places spread out into branches, and in others intermingled with one another. These filaments clearly appeared to be agitated by an internal undulatory motion, like hollow tubes which contained some moving substance. He saw distinctly this appearance changed for that at fig. 32. Two of these filaments, which were joined longitudinally, gradually separated from each other in the middle, alternately approaching and receding, like two tense cords fixed by the ends, and drawn asunder in the middle. These filaments were composed of globules that touched one another, and resembled a chaplet of beads. After this, he observed the filaments swelled in several places, and perceived small globular bodies issue from the swelled parts, which had a vibratory motion like a pendulum. These small bodies were attached to the filaments by small threads, which gradually lengthened as the bodies moved. At last, the small bodies detached themselves entirely from the filaments, drawing after them the small thread, which looked like a tail. When a drop of the seminal liquor was diluted, these small bodies moved in all directions very briskly. The seminal matter was at first too thick, but gradually became more fluid; and, in proportion as its fluidity increased, the filaments disappeared, but the small bodies became exceedingly numerous. Each of them had a long thread or tail attached to it, from which it evidently endeavoured to get free. Their progressive motion was extremely slow, during which they vibrated to the right and left; and at each vibration they had a rolling unsteady motion in a vertical direction.

At the end of two or three hours, the seminal matter becoming still more fluid, a greater number of these moving bodies appeared. They were then more free of incumbrances; their tails were shorter; their progressive motion was more direct, and their horizontal motion greatly diminished. In five or six hours, the seed had acquired almost all the fluidity it could acquire without being decomposed. Most of the small bodies were now disengaged from their threads: their figure was oval; they moved forward with considerable quickness, and, by their irregular motions backward and forward, they had now more than ever the appearance of animals.

Those that had tails adhering to them, seemed to have less vivacity than the others: and of those that had no tails, some altered both their figure and their size. In twelve hours, the feed had deposited at the bottom of the vial a kind of ash-coloured gelatinous substance, and the fluid at top was almost as transparent as water. The little bodies, being now entirely freed from their threads, moved with great agility, and some of them turned round their centres. They also often changed their figures, from oval becoming round, and often breaking into smaller ones. Their activity always increased as their size diminished. In twenty-four hours the feed had deposited a greater quantity of gelatinous matter, which, being with some difficulty diluted in water, exhibited an appearance somewhat resembling lace. In the clear feed itself, only a few small bodies were now seen moving; next day, these were still farther diminished; and after this nothing was to be seen but globules, without the least appearance of motion. All the above-mentioned appearances in the feed of man, are shown in the Plate, at fig. 33, 34, 35, 36, 37, and 38. Fig. 39 and 40 represent an appearance of the globules in another experiment, in which they arranged themselves in troops, and passed very quickly over the field of the microscope: in this experiment they were found to proceed from a small quantity of gelatinous mucilage, deposited by the feed.

An objection has, however, been made to the existence of animalcules in the feed, or in any other part of animal bodies, from the total exclusion of air, which is found so necessary to the life of larger animals. Many instances, however, have been observed of large animals being found in such situations as they could not possibly have enjoyed the least benefit from the air for a great number of years; and in this state have not only lived, but lived much longer than they would otherwise have done.

In Toulon harbour, and the road, are found solid hard stones, and perfectly entire, containing, in different cells, secluded from all communication with the air, several living shell-fish, of an exquisite taste, called *dactyli*. To come at these fish, the stones are broken with mauls. Also, along the coast of Anconia, in the Adriatic, are stones usually weighing about fifty pounds, and sometimes even more; the outside rugged, and easily broken, but the inside so hard as to require a strong arm and an iron maul to break them; within them, and in separate niches, are found small shell-fish, quite alive, and very palatable, called *solenes*, or *cappe lunghe*. These facts are attested by Gassendi, Blondel, Mayol, the learned bishop of Sulturara; and more particularly by Aldrovandus, a physician of Bologna. The two latter speak of it as a common fact which they themselves saw.

In the volume for the year 1719, of the Memoirs of the Academy of Sciences at Paris, is the following passage: "In the foot of an elm, of the bigness of a pretty corpulent

corpulent man, three or four feet above the root, and exactly in the centre, has been found a live toad, middle-sized, but lean, and filling up the whole vacant space: no sooner was a passage opened by splitting the wood, than it scuttled away very hastily: a more firm and sound elm never grew; so that the toad cannot be supposed to have got into it. The egg or spawn whence it was formed, must, by some very singular accident, have been lodged in the tree at its first growth. There the creature had lived without air, feeding on the substance of the tree, and growing only as the tree grew. This is attested by Mr. Hubert, professor of philosophy at Caen."

The volume for the year 1731 has a similar observation, expressed in these words: "In 1719, we gave an account of a fact, which, though improbable, was well attested; that a toad had been found living and growing in the trunk of a middling elm, without any way for the creature to come out or to have got in. M. Seigne, of Nantes, lays before the academy a fact just of the very same nature, except that instead of an elm it was an oak, and larger than the elm, which still heightens the wonder. He judges, by the time requisite for the growth of the oak, that the toad must have subsisted in it, without air or any adventitious aliment, during eighty or one hundred years. M. Seigne seems to have known nothing of the fact in 1719."

With the two foregoing may be classed a narrative of Ambrose Paré, chief surgeon to Henry III. king of France, who, being a very sensible writer, relates the following fact, of which he was an eye-witness: "Being (says he) at my seat, near the village of Meudon, and overlooking a quarry-man whom I had set to break some very large and hard stones; in the middle of one we found a huge toad, full of life, and without any visible aperture by which it could get there. I began to wonder how it received birth, had grown and lived: but the labourer told me, it was not the first time he had met with a toad, and the like creatures, within high blocks of stone, having no visible opening or fissure."

Observations of living toads, found in very hard and entire stones, occur in several authors, particularly Baptist Fulgosa, doge of Genoa, the famous physicians Agricola and Horstius, and Lord Verulam; others give very specious accounts of snakes, frogs, crabs, and lobsters, being found alive, inclosed within blocks of marble, rocks, and large stones.

An instance similar to these, of the truth of which we have no reason to doubt, was observed in this country in the year 1773, where a large toad was found in the middle of a piece of coal, having not the least visible crack or fissure.

Thus much as to the faculty of some animals to live without air.

Upon the whole, though philosophers are not yet able to discover how very minute creatures are produced; yet, that there really are animals much smaller than

we can discern with our naked eye, seems to be indisputable. And the subject evidently requires the utmost attention of philosophers, as well as further improvements in the construction of microscopes, fully to investigate and explain it.—Most naturalists suppose another species or order of invisible animalcules, such as escape the cognizance even of the best microscopes, and give many probable conjectures in relation to them. Reason and analogy give some support to the existence of infinitely-imperceptible animalcules. The naked eye takes in from the elephant to the mite; but there commences a new order, reserved only for the microscope, which comprehends all those from the mite to those twenty-seven millions of times smaller; and this order cannot be yet said to be exhausted, if the microscope be not arrived at its last and highest perfection.

Animalcules are the cause of various disorders. The itch, from several experiments, is a disorder arising from the irritation of a species of insect found in the pustules of that disorder, (the *Acarus exulcerans*;) whence the communication of it by contact from one to another is easily conceived; as also the reason of the cure being effected by external applications. Many other cutaneous eruptions, often supposed to originate in the blood, are nothing more than settlements made by colonies of these invisible beings. A swarm of them light upon the skin, and, finding in its pores a comfortable habitation, soon produce a puncture, with scabs and irritation. But this is not the worst. Observation has long convinced me that a variety of internal complaints in the stomach, pancreas, lungs, liver, and intestines, are brought on by swallowing myriads of these, and other imperceptible living creatures, which inhabit raw vegetables and foul water; and, finding the heat and food of the stomach congenial to their growth, they become of an alarming size, and prey upon the vital parts, to the great detriment of the patient's health, and oftentimes at the expense of his life, before the malady can be known, or even suspected.

A patient of mine, a young man near eighteen years of age, had been a considerable time in a consumptive habit, and disordered in the stomach; and, notwithstanding he had the advice of several eminent physicians, and had taken a variety of medicines, he never found the smallest alleviation of his pain. Upon enquiring into the nature of his food for some time before, he told me he came from a village near Bridport, in Dorsetshire, which abounds with water-creffes, and on these he had fed almost daily for some months previous to his coming to London. I gave him three emetics successively, with a view to cleanse the stomach from all slime, phlegm, and undigested food; and immediately after the last had operated, he took a strong dose, undiluted, of my Solar Tincture. In less than ten minutes it brought up an animal of the most hideous form, which at first appeared incapable of motion, be-
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ing overcome by the strength of the medicine ; but, on putting it into a basin of warm water, it quickly recovered, and sent forth a set of tentacles or claws, which, though greatly enlarged, and diversely altered, soon convinced me it must originally have been a shoot of the fresh-water polypus ; that, on leaving the parent animal, it had attached itself to a root or leaf of the water-creffes which this young man unfortunately swallowed. And it appeared further, that these tentacles or claws had been so strongly affixed to the bowels or coats of the stomach, as to have defied the power of all common remedies to remove them. The patient happily found immediate relief, and is now healthy and robust.

From several other patients, apparently in consumptions, or afflicted with nausea, or uncommon sensations in the stomach and bowels, I have brought away living animals that would terrify many people to look upon ; and which must have come from the spawn, or eggs of minute animals, taken in with the food. For this reason I would admonish all my readers to have the utmost care taken in the washing and cleansing of sallads, water-creffes and all raw vegetables ; and particularly to guard against the long red worm which almost continually lies concealed in the very heart or centre of a head of celery. The same caution is necessary in eating all kinds of fruit ; since nothing much more abounds with animalcules, and various living creatures. Cold raw water, particularly when stagnant, ought never to be drunk. It is ever the safest way to boil your water, before it be used in the composition of any kind of beverage, or even to drink alone.

I might here adduce many other instances of persons having engendered living creatures in their bowels, by swallowing the eggs or spawn of the parent animal. A young man, servant to Lord Stawell, at Holt-park near Farnham, Surry, had eaten voraciously of water-creffes. Some time afterwards he went into a decline, and complained of a continual sensation of pain at the pit of his stomach, which no medicine could remove. His lordship, having a value for the man, sent him to town for the advice of the most able physicians ; but still to no purpose. He was in this state sent home to his friends, and given over as a lost and incurable case. In this stage some strong emetics were given him by a country apothecary ; and he threw up, to the amazement of all the country round, an incredible number of small tadpoles, which were evidently the production of spawn attached to the water-creffes, eaten without care, and perhaps without washing. The patient recovered rapidly, and in less than a month was able to resume his former avocation.

But a still more extraordinary case happened in the county of Hants, in the year 1792, of a girl about fourteen years of age, who found a most uncommon sensation in her stomach and bowels, and could plainly feel and distinguish some-

thing alive, and moving within her. The girl's description was for some time treated as a chimera. At last, however, she brought up a living toad ! This unquestionably must have been taken into her stomach in that state of the spawn which is just emerging to tadpoles, and was attributed to her eating water-creffes, which had long been a common food with her. Nothing could have saved her from poison, but the creature having been bred and nourished up as it were in her own body, and had assimilated so much with the nature thereof as to have thus long proved harmless. It is however certain, that, had it not been thus timely brought away, she must very soon have died.

Animalcules are the most common causes of foul and rotten teeth. They attack the roots below the enamel, which they perforate, and in a short time form crustations or scales round the teeth, as hard as stones ; but which are nothing more than a congeries or crustaceous shell, which these little animals inhabit, and are probably formed of the fine particles falling from the teeth during their perforations, cemented together by a glutinous slimy matter issuing from their own bodies, which are composed of ringlets like a worm. Hence too we discover the true cause of foetid or stinking breath ; for, when these little eels have made their way to the marrow, or internal part, of the tooth, the whole crown soon becomes rotten, and the marrow sends forth a putrid effluvia, somewhat similar, but much more offensive, than the animalcules in stinking cheese. These circumstances seem to be but little known to the generality of dentists and operators on the teeth ; otherwise I am persuaded their mode of practice would be widely different. Instead of applying powders and dentifrices calculated to destroy these little worms, they prepare such as multiply and nourish them ; of which any person may be convinced, who will take the pains to make a few simple experiments. Let the roots of the teeth be scraped, and the matter collected from them put into a few drops of any dentifrice or tooth-tincture, particularly of the aromatic kind. If viewed with a microscope, it will be seen that the animalcules or eels found in this matter will move about with great celerity, as if delighted with the liquor : and in proportion as it evaporates or dries away, the animals appear dissatisfied and become very uneasy.

Happening to have a patient who had a very bad set of teeth, he suffered me to make some experiments upon them. I took off a few of the scales, and emerged them in a small quantity of spring water. It was quickly filled with the little eels or animalcules ; but imparted no ill smell. I examined the scales with the microscope, and found them full of pores, out of which these invisible animals were issuing. I then took out as much of the foul matter from the cavities of his hollow teeth as I could conveniently get at ; and, the moment I put it in the water, it became foetid, and sent forth an offensive smell. Viewing it with the microscope, the animals

animals appeared in the same shape as the former, but quite opaque, and the intestinal canal much fuller, and more distended. I poured into the water a few drops of my Solar Tincture, and in less than five minutes all motion ceased, and they were quite dead. This induced me to persuade the man to wash his teeth and gums well with the Solar Tincture. He did so; and I then took off more of the scales, and collected all the matter I could from the rotten teeth; but very few living animalcules could be found therein, and the foetid smell was considerably abated. He continued to wash his mouth with the Tincture every other day for a week, and then used the following preparation: Chalk finely powdered, burnt hartshorn levigated, Florentine orris-root and myrrh, of each two drams; spirit of salt, six drops; the whole mixed into a fine powder. With this he rubbed his teeth every third day, with a soft brush, and in less than three weeks his black set of teeth became beautifully white; his breath sweet; and his gums hard and firm; and he has ever since continued them so by the simple means above described. I am no dentist; what I have stated was matter of mere accident; but I would caution all my readers against too free a use of those numerous powders and preparations continually recommended for the teeth. Instead of preserving them, they have too often the direct contrary tendency, by destroying the whole set. The world however is fond of tooth powders; and a moderate use of some of them may be of service; but the daily rubbing does more injury to the teeth than wholly neglecting them. Fine levigated powders may be prudently used once in six or seven days, to keep the teeth white and splendid. But the generality of powders prepared for this purpose are much too hard, and wear away the gums, as well as the enamel of the teeth. Yet, notwithstanding the danger of these preparations, it is a very desirable thing to be enabled to preserve the beauty and soundness of the teeth, from infancy to old age. For this purpose I would advise that children should be accustomed to wash their teeth every morning with common water, and a soft tooth brush; and after meals to rinse the mouth, and rub the teeth with their fingers, where a brush cannot conveniently be used. Those who constantly pursue this method, may expect to be free from rotten teeth, putrid slough, external discolourations, flaccid gums, and pain and looseness of the teeth, arising from the animalcules which prey upon them. When teeth have been neglected for a time, and scales and crustations are affixed to them, these should be removed by instruments, and the teeth and gums well washed with a powerful insinuating tincture, to kill the animalcules; then the teeth should be rubbed with a fine testaceous powder, in order to remove the discolouration. When the enamel is become perfectly clean, white, and polished, even this fine powder should be used very sparingly, and at distant intervals. The colour
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and sweetness are only to be preserved by frequent brushing and washing. The common trick of dentists is to give a wash that instantly cleanses and whitens the teeth, the sudden effects of which are apt to surprise and please people; but their consequences are very pernicious. All the acid spirits will do this; but they destroy the enamel, and rot the teeth. The safest liquid to take off black, green, and yellow, discolourations, is the following: Take plantane water, an ounce; honey of roses, two drams; spirit of salt, ten drops: mix the whole together, and rub the teeth well with a linen rag dipped in the mixture, every day till they are perfectly white. If the roots of the teeth are very foul, inclined to grow rotten, and surrounded with scales and crustations, I should by all means recommend them to be well washed with the Solar Tincture, which will stop them from further decay, entirely remove the scurvy from the gums, and perfectly sweeten the breath.

The form, disposition, and order, of the teeth, are admirable; and furnish us with a noble instance of the wisdom and goodness of the Creator; the foremost are weak, and far from the centre, as being only preparers to the rest; the others, being to grind and masticate, are accordingly stronger and placed near the centre of motion. Their peculiar hardness is very remarkable, considering the tender substance they are formed of. Again, their various forms, in various creatures, are no less considerable, being all curiously adapted to the peculiar food and occasions of the different species of animals. Thus in the rapacious, they are fitted for the catching holding, and tearing, the prey; in herbaceous, for the gathering and comminution of vegetables; and in such as have no teeth, as birds, the bill supplies the defect. Add to this, that the temporary defect of them is no less observable in some; that children, for instance, should have none while they are not able to use them, but to hurt themselves or the mother; and that, at the very age when they can take in the more substantial food, and live without the breast, and begin to need teeth, for the help of speech, that then their teeth should begin to appear, and gradually grow, as they more and more stand in need of them; and that, when this first crop are worn out or decayed, they should be succeeded by a new set, more firm and durable than the former. Nature, indeed, sometimes deviates from the ordinary rule; according to the construction of the elementary influx then operating, as is shown at large in my Illustration of the Occult Sciences; whence we have instances of persons born with all their teeth, as Marcus Curius Dentatus and Cneius Papirius Carbo: others have only had one continued tooth, reaching the whole length of the jaw, as Pyrrhus king of Epirus, and Prusias son of the king of Bithynia. A German physician, named Mentrelius, assures us that he saw an old man at Cleves, in 1666, aged a hundred and twenty years, who had a new set of teeth only two years

years before, which were cut with great pain ; and he also saw an Englishman at the Hague, who cut a new set of teeth in his hundred and eighteenth year. To the same purpose Dr. Slare mentions a relation, who had all his teeth at eighty years of age, and afterwards shed them, and had a new set all round. See Phil. Trans. Abr. vol. v. p. 353.

OF INSTINCT.

INSTINCT is an occult power or disposition of the mind, by which animals are unerringly directed to do spontaneously whatever is necessary for the preservation of the individual, or the continuation of the species. From this cause, all the actions of brutes, or inferior animals, are said to be directed by *instinct* ; but those of man by *reason*. Philosophers, however, have greatly differed in their opinions concerning this subject ; and modern authors are extremely at a loss where to draw the line. Some maintain that man is endowed with a greater number of instincts than any species of brutes whatever. Others insist, that in human nature there is not any power or propensity at all, which can properly be called instinctive. Some contend that brutes are guided wholly by an invariable instinct, without the smallest power of memory, or of any intellectual faculty ; whilst others insist, that they possess a vegetative soul, directed by a certain instinct, capable of reason, of memory, and of experience.

With respect to man, nothing can be more apparent than that, as being the microcosm, or epitome of all created nature, he must of necessity partake of all its essential properties ; of which *reason* and *instinct* rank amongst the foremost.

Upon the slightest reflection, it will be obvious to every reader, that *reason* can never be exercised but from experience ; consequently, until man is arrived to a certain degree of maturity, he must be directed, in most of the propensities of nature, by mere instinct. Thus an infant, a few moments after its birth, is directed by an instinctive impulse for its preservation, to seek the breast, and to suck it ; and to the same cause, in the earlier stages of life, and in all savage uneducated countries, are to be attributed the first sensations or desires of copulation, not from the pleasures of enjoyment, for they are then unknown ; but from an impulsive instinct, for the propagation of the species. It has been insisted, that the first commerce of the sexes amongst human beings is directed by reason ; and the arguments assigned for it are these ; that, as soon as the organs of generation in either sex become sufficiently ripe for the purpose intended by nature, they sympathise with the senses, and are affected with vibrations in the nerves, which rise into pleasure above the power of control, and are heightened by youth, health,

grateful aliment, imagination, ambition, sympathy, and various other involuntary sensations, which, under such circumstances, pervade the whole system. And as these organs are endued with a greater degree of sensibility than the other parts, both from their make, and the peculiar structure and disposition of their nerves; from the great distention of the muscular system and feed-vessels in males; as well as from the extension of the clitoris and sinuses of the uterus in females, which never fail to take place about the time of puberty; the genital organs in both sexes become so extremely irritable, that *reason*, being thereby *awakened*, directs and impels to that act, by which alone the human species can possibly be continued, and the works of an Omnipotent Creator carried on and conducted to the ends intended.

In the above statement, I am persuaded every rational mind will agree, that the word *instinct* ought to have been substituted where that of *reason* is used; because in civilized societies we are taught by *reason* to overcome those instinctive passions, instead of having our reason *awakened* by them; but we too often find that these instinctive passions are proof against both reason and resolution, even in the most virtuous families, in all countries, and in the best-regulated societies. What shall we say then of that part of the human race which yet remains in a state of nature, uncultivated, and unenlightened by any precepts of morality or science? They are subject to the primary command, "*Increase and multiply;*" and they obey it. A couple of young savages go together *for the first time*, without any view to offspring, without any knowledge of the pleasure to be derived from it, and without any determinate idea at all; and, as we see these means invariably pursued by all animals, as well rational as irrational, without experience, and without instruction, we must refer the mutual desire of the sexes to a much higher principle than can possibly arise from human motives; and that principle can be nothing but instinct. But as I shall have occasion to speak more at large on this subject under the article LOVE, when I come to treat of the affections and passions of the mind, and of the nature and perfections of Man, I shall in the interim proceed to show, that the inferior animals are directed by instinct to performances of the most surprising kind; and are, within certain limits, endued with memory, and a reasoning intellect.

The most remarkable instance of the power of instinct is observed in the construction of a honey-comb. Bees, it is well known, construct their combs with small cells on both sides, fit both for holding their store of honey, and for rearing their young. There are only three possible figures of the cells, which can make them all equal and similar, without any useless interstices. These are the equilateral triangle, the square, and the regular hexagon. Of the three, the hexagon is the
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most proper, both for convenience and strength. Bees, as if they knew this, make their cells regular hexagons. As the combs have cells on both sides, the cells may either be exactly opposite, having partition against partition, or the bottom of a cell may rest upon the partitions between the cells on the other side, which will serve as a buttress to strengthen it. The last way is the best for strength; accordingly the bottom of each cell rests against the point where three partitions meet on the other side, which gives it all the strength possible. The bottom of a cell may either be one plane, perpendicular to the side-partitions; or it may be composed of several planes, meeting in a solid angle in the middle point. It is only in one of these two ways that all the cells can be similar without losing room. And for the same intention, the planes, of which the bottom is composed, if there be more than one, must be three in number, and neither more nor fewer. It has been demonstrated, that, by making the bottoms of the cells to consist of three planes meeting in a point, there is a saving of material and labour no-way inconsiderable. The bees, as if acquainted with these principles of solid geometry, follow them most accurately; the bottom of each cell being composed of three planes, which make obtuse angles with the side partitions and with one another, and meet in a point in the middle of the bottom; the three angles of this bottom being supported by three partitions on the other side of the comb, and the point of it by the common intersection of these three partitions. One instance more of the mathematical skill displayed in the structure of a honey-comb deserves to be mentioned. It is a curious mathematical problem, at what precise angle the three planes which compose the bottom of a cell ought to meet, in order to make the greatest possible saving of material and labour. This is one of those problems belonging to the higher parts of the mathematics, which are called problems of maxima and minima. The celebrated Maclaurin resolved it by a fluxionary calculation, which is to be found in the Transactions of the Royal Society of London, and determined precisely the angle required. Upon the most exact mensuration which the subject could admit, he afterwards found, that it is the very angle in which the three planes in the bottom of the cell of an honey-comb do actually meet. If a honey-comb were a work of human art, every man of common sense would conclude, without hesitation, that he who invented the construction must have understood the principles on which it was constructed. We need not say that bees know none of these things. They work most geometrically without any knowledge of geometry; somewhat like a child, who by turning the handle of an organ makes good music without any knowledge of music. The art is not in the child, but in him who made the organ. In like manner, when a bee makes its comb so geometri-

cally, the geometry is not in the bee, but in that great Geometrician who made the bee, and made all things in number, weight, and measure. This places in a most striking point of view the difference betwixt instinct and reason. There are no improvements made by man, but what we see carried still further by succeeding generations; but in bees, and in all inferior animals, we see precisely the same economy and contrivance now, in constructing their cells, building their nests, laying up provisions, &c. as at the beginning; and that in all ages, and in all generations, they have neither improved, nor departed from, [that fixed system assigned to them by nature, for their preservation and guidance; whereas men, acting by reason and science, improve from the labours and inventions of each other. Were we to attribute reason instead of instinct to bees, in the construction of their combs, we should at the same time admit them to be rational creatures, endued with thinking and reasoning faculties far superior to men; for the principle upon which the honey-comb is constructed, is founded on those high departments of the mathematics, which were altogether unknown to the human race till the beginning of the present century, and which at this moment are beyond the comprehension of nine-tenths of mankind in the most enlightened nations on earth. Hence it is plain that the contrivance is not in the bees, but in the Creator of the bees, who directs them and all brute creatures, to act by an instinct for their own immediate benefit, without knowing the principles upon which they act. And this is by no means contrary to reason; for we daily see men, working under the direction of others of superior understanding, to effect purposes, and accomplish ends, without having themselves any idea of either; and, if we look through the endless variety of human avocations, we shall find that the greater part of mankind seem destined by God and nature to be governed in this way. But to proceed—

Caterpillars, when shaken off a tree in every direction, instantly turn round towards the trunk, and climb up, though they had never formerly been on the surface of the ground. This is a striking instance of instinct. On the tree, and not upon the ground, the caterpillar finds its food. If therefore it did not turn and climb up the trunk, it would inevitably perish. The solitary wasp digs holes in the sand, in each of which she deposits an egg: she collects a few small green worms, which she rolls up in a circular form, and fixes in the hole in such a manner that they cannot move. When the wasp-worm is hatched, it is amply stored with the food which nature has destined for its support. The green worms are devoured in succession; and the number deposited is exactly proportioned to the time necessary for the growth and transformation of the wasp-worm into a fly; then it issues from the hole, and is capable of procuring its own nourishment. This in-

instinct

instinct of the parent wasp is the more remarkable, that she feeds not upon flesh herself. Birds of the same species, unless when restrained by peculiar circumstances, uniformly build their nest of the same materials, and in the same form and situation, though they inhabit very different climates; and the form and situation are always exactly suited to their nature, and calculated to afford them shelter and protection. When danger, or any other circumstance peculiar to certain countries, renders a deviation from the common form or situation of nests necessary, that deviation is made in an equal degree, and in the very same manner, by all the birds of one species; and it is never found to extend beyond the limits of the country where alone it can serve any good purpose. When removed by necessity from their eggs, birds return to them with haste and anxiety, and shift them so as to heat them equally; and it is worthy of observation, that their haste to return is always in proportion to the coldness of the climate. Thus the ostrich in Senegal, where the heat is excessive, neglects her eggs during the day, but sits upon them in the night. At the Cape of Good Hope, however, where the degree of heat is less, the ostrich, like other birds, sits upon her eggs both day and night. In countries infested with monkeys, many birds, which in other climates build in bushes and clefts of trees, suspend their nests upon slender twigs, and thus elude the rapacity of their enemies.

The following is remarkable.—A cat frequented a closet, the door of which was fastened by an iron latch. A window was situated near the door. When the door was shut, the cat gave herself no uneasiness. As soon as she was tired of her confinement, she mounted on the sill of the window, and with her paw dexterously lifted the latch, and came out. This practice, which we are told continued for years, must have been the consequence of reasoning in particular ideas. It could not be the effect of instinct; for instinct is adapted only to a state of nature, in which cats have neither latches to lift nor doors to open; and as it is not said that the animal attempted to lift the latches of other doors, we are not authorized to infer that this particular action was the consequence of reasoning in ideas enlarged by abstraction; the cat had repeatedly seen one door opened by an exertion which she was capable of imitating. It is well known that crows feed upon several kinds of shell-fish when within their reach: and that they contrive to break the shell by raising the fish to a great height, and letting it drop upon a stone or a rock. This may perhaps be considered as pure instinct, directing the animal to the proper means of acquiring its food. But what is to be thought of the following fact, communicated by a gentleman whose veracity is unquestioned, and who, being totally unacquainted with the theories of philosophers, has of course no favourite hypothesis to support? In the spring of the year 1791, a pair of crows made their nest in a tree, of which there are several planted round his garden; and in his morning-walks

he had often been amused by witnessing furious combats between them and a cat. One morning the battle raged more fiercely than usual, till at last the cat gave way and took shelter under a hedge, as if to wait a more favourable opportunity of retreating to the house. The crows continued for a short time to make a threatening noise; but, perceiving that on the ground they could do nothing more than threaten, one of them lifted a stone from the middle of the garden, and perched with it on a tree planted in the hedge, where she sat watching the motions of the enemy of her young. As the cat crept along under the edge, the crow accompanied her by flying from branch to branch and from tree to tree; and, when at last puss ventured to quit her hiding-place, the crow, leaving the trees and hovering over her in the air, let the stone drop from on high on her back. That the crow on this occasion reasoned, is self-evident, and it seems to be little less evident, that the ideas employed in her reasoning were enlarged beyond those which she had received from her senses. By her senses she may have perceived, that the shell of a fish is broken by a fall; but could her senses inform her, that a cat would be wounded or driven off the field by the fall of a stone? No; from the effect of the one fall preserved in her memory, she must have inferred the other by her power of reasoning.

As to the natural affection of brutes, says an ingenious writer, "the more I reflect on it, the more I am astonished at its effects." It seems to awaken the passions, quicken the invention, and sharpen the sagacity, of the brute creation. Thus a hen, just become a mother, is no longer that placid bird she used to be, but with feathers standing on end, wings hovering, and clogging note, she flies at every thing which seems to threaten her brood. Dams will throw themselves in the way of the greatest danger, in order to avert it from their progeny. Thus a partridge will tumble along before a sportsman, in order to draw away the dogs from her helpless covey. In the time of nidification the most feeble birds will assault the most rapacious. All the hirundines of a village are up in arms at the sight of a hawk, whom they will persecute till he leaves that district. A very exact observer has often remarked, that a pair of ravens nesting in the rock of Gibraltar, would suffer no vulture or eagle to rest near their station, but would drive them from the hill with an amazing fury: even the blue thrush at the season of breeding would dart out from the clefts of the rocks to chase away the kestrel or the sparrow-hawk. If you stand near the nest of a bird that has young, she will not be induced to betray them by an inadvertent fondness, but will wait about at a distance, with meat in her mouth, for an hour together.

A most singular effect of instinct may be observed in the means by which cuckoos are propagated. Unlike the generality of birds, they do not pair. When a female appears on the wing, she is often attended by two or three males, who

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seem to be earnestly contending for her favours. From the time of her appearance till after the middle of summer, the nests of the birds selected to receive her egg are to be found in great abundance; but, like the other migrating birds, she does not begin to lay till some weeks after her arrival. It is on all hands allowed, that the cuckow does not hatch its own eggs. The hedge-sparrow, the water-wagtail, the titlark, the red-breast, the yellow-hammer, the green-linnet, or the winchat, is generally the nurse of the young cuckow. It may be supposed, that the female cuckow lays her egg in the absence of the bird in whose nest she intends to deposit; as it has been known that, on sight of one of these, a red-breast and its mate jointly attacked her on approaching the nest, putting her to flight; and so effectually drove her away, that she did not dare to return. Among the birds above mentioned, it generally selects the three first, but shows a much greater partiality to the hedge-sparrow. This last commonly takes up four or five days in laying her eggs. During this time (generally after she has laid one or two), the cuckow contrives to deposit her egg among the rest, leaving the future care of it entirely to the hedge-sparrow. When the hedge-sparrow has sat her usual time, and disengaged the young cuckow and some of her own offspring from the shell, her own young ones, and any of her eggs that remain unhatched, are soon turned out, the young cuckow remaining possessor of the nest, and sole object of her future care. The young birds are not previously killed, nor are the eggs demolished; but all are left to perish together, either entangled about the bush which contains the nest, or lying on the ground under it. The early fate of the young hedge-sparrow (says Mr. Jenner, who made these experiments) is a circumstance that has been noticed by others, but attributed to wrong causes; but the true cause we shall presently explain. A variety of conjectures have been formed upon it. A cuckow laid her egg in a water-wagtail's nest in the thatch of an old cottage. The wagtail sat her usual time, and then hatched all the eggs but one; which, with all the young ones except the cuckow, was turned out of the nest. The young birds, consisting of five, were found upon the rafter that projected from under the thatch, and with them was an egg not in the least injured. The cuckow was reared by the wagtails till it was nearly capable of flying, when it was killed by an accident.

A hedge-sparrow built her nest in a hawthorn-bush in a timber-yard. After she had laid two eggs, a cuckow dropped in a third. The sparrow continued laying as if nothing had happened, till she had laid five, her usual number, and then sat. On inspecting the nest, June 20, 1786, (says Mr. Jenner,) I found that the bird had hatched this morning, and that every thing but the young cuckow was thrown out. Under the nest I found one of the young hedge-sparrows dead, and one egg by the side of the nest entangled with the coarse woody materials that formed its outside

side covering. On examining the egg, I found one end of the shell a little cracked, and could see that the sparrow it yet contained was alive. It was then restored to the nest, but in a few minutes was thrown out. The egg, being again suspended by the outside of the nest, was saved a second time from breaking. To see what would happen if the cuckow was removed, I took out the cuckow, and placed the egg containing the hedge-sparrow in the nest in its stead. The old birds, during this time, flew about the spot, showing signs of great anxiety; but, when I withdrew, they quickly came to the nest again. On looking into it a quarter of an hour afterwards, I found the young one completely hatched, warm, and lively. The hedge-sparrows were suffered to remain undisturbed with their new charge for three hours, (during which time they paid every attention to it,) when the cuckow was again put into the nest; and, on examining it again in a few minutes, I found the young sparrow was tumbled out. It was a second time restored, but again experienced the same fate. From these experiments, and supposing, from the feeble appearance of the young cuckow just disengaged from the shell, that it was utterly incapable of displacing either the egg or the young sparrows, I was induced to believe that the old sparrows were the only agents in this seemingly-unnatural business. But I afterwards clearly perceived the cause of this strange phenomenon, by discovering the young cuckow in the act of displacing its fellow-nestlings, as the following relation will fully evince. June 18, 1787, I examined the nest of a hedge-sparrow, which then contained a cuckow's and three hedge-sparrows' eggs. On inspecting it the day following, I found the bird had hatched, but that the nest now contained only a young cuckow, and one young hedge-sparrow. The nest was placed so near the extremity of a hedge, that I could distinctly see what was going forward in it; and, to my astonishment, saw the young cuckow, though so newly hatched, in the act of turning out the young hedge-sparrow. The mode of accomplishing this was very curious. The little animal, with the assistance of its rump and wings, contrived to get the bird upon its back; and making a lodgment for the burden by elevating its elbows, clambered backward with it up the side of the nest, till it reached the top; where resting for a moment, it threw off its load with a jerk, and quite disengaged it from the nest. It remained in this situation a short time, feeling about with the extremities of its wings, as if to be convinced whether the business was properly executed, and then dropped into the nest again. With these (the extremities of its wings) I have often seen it examine, as it were, an egg and nestling before it began its operation; and the nice sensibility which these parts appeared to possess, seemed sufficiently to compensate the want of sight, which as yet it was destitute of. I afterwards put in an egg; and this, by a similar process, was conveyed to the edge of the nest and thrown out. These experi-

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ment I have since repeated several times in different nests, and have always found the young cuckoo disposed to act in the same manner. In climbing up the nest, it sometimes drops its burthen, and thus is foiled in its endeavours; but, after a little respite, the work is resumed, and goes on almost incessantly till it is effected. It is wonderful to see the extraordinary exertions of the young cuckoo, when it is two or three days old, if a bird be put into the nest with it that is too weighty for it to lift out. In this state it seems ever restless and uneasy. The singularity of its shape is well adapted to these purposes; for, different from other newly-hatched birds, its back, from the scapulæ downward, is very broad, with a considerable depression in the middle. This depression seems formed by nature for the design of giving a more secure lodgment to the egg of the hedge-sparrow, or its young one, when the young cuckoo is employed in removing either of them from the nest. When it is about twelve days old, this cavity is quite filled up, and then the back assumes the shape of nestling birds in general.

It appears a little extraordinary that two cuckows' eggs should ever be deposited in the same nest, as the young one produced from one of them must inevitably perish; yet two instances of this kind fell under our author's observation, one of which he thus relates: Two cuckows and a hedge-sparrow were hatched in the same nest this morning, (June 27, 1787,) one hedge-sparrow's egg remained unhatched. In a few hours after, a contest began between the cuckows for the possession of the nest, which continued undetermined till the next afternoon, when one of them, which was somewhat superior in size, turned out the other, together with the young hedge-sparrow, and the unhatched egg. This contest was very remarkable. The combatants alternately appeared to have the advantage, as each carried the other several times nearly to the top of the nest, and then sunk down again, oppressed by the weight of its burden; till at length, after various efforts, the strongest prevailed, and was afterwards brought up by the hedge-sparrows.

But the principal circumstance that has agitated the mind of naturalists respecting the cuckoo is, why, like other birds, it should not build a nest, incubate its eggs, and rear its own young? The most probable suggestion is, the short residence this bird is allowed to make in the country where it is destined to propagate its species; and the call that nature has upon it, during that residence, to produce a numerous progeny. The cuckoo's first appearance here is about the middle of April, commonly on the 17th. Its egg is not ready for incubation till some weeks after its arrival, seldom before the middle of May. A fortnight is taken up by the sitting bird in hatching the egg. The young bird generally continues three weeks in the nest before it flies, and the foster-parents feed it more than five weeks after this period; so that, if a cuckoo should be ready with an egg much sooner

than the time pointed out, not a single nestling, even one of the earliest, would be fit to provide for itself before its parent would be instinctively directed to seek a new residence, and be thus compelled to abandon its young one; for old cuckows take their final leave of this country the first week in July. Among the many peculiarities of the young cuckow, there is one that shows itself very early. Long before it leaves the nest, it frequently, when irritated, assumes the manner of a bird of prey, looks ferocious, throws itself back, and pecks at any thing presented to it, with great vehemence, often at the same time making a chuckling noise like a young hawk. Hence probably the vulgar opinion, that this bird changes into a hawk, and devours its nurse on quitting its nest; whence the French proverb, *Ingrat comme un coucou*, "As ungrateful as a cuckow." Sometimes, when disturbed in a smaller degree, it makes a kind of hissing noise, accompanied with a heaving motion of the whole body. From what has been said, it becomes evident, that the same instinctive impulse which directs the cuckow to deposit her eggs in the nests of other birds, directs her young ones to throw out the eggs and young of the owner of the nest. The scheme of nature would be incomplete without it; for it would be extremely difficult, if not impossible, for the little birds destined to find succour for the cuckow, to find it also for their own young ones after a certain period; nor would there be room for them to inhabit the nest. Cuckows may be, and often are, brought up tame, so as to become familiar. They will eat in this state bread and milk, fruits, insects, eggs, and flesh, either cooked or raw; but in a state of nature, they chiefly live on caterpillars. When fat, they are said to be as good eating as a land-rail: the French and Italians eat them to this day. The ancient Romans admired them greatly as food; Pliny says that there is no bird which can be compared to them for delicacy. In migrating, the major part of these birds are supposed to go into Africa; since they are observed to visit the island of Malta twice in a year, in their passage backwards and forwards, as is supposed, to that part of the world.

The instinct which has been discovered in ants, beavers, &c. is too well known and admired, to need any mention in this place; and we see in a great variety of birds, insects, and quadrupeds, a similar economy in laying up stores of provision in time of plenty, that they might have access to it in time of need. The common daw has a peculiar knack of this sort; and in houses where they have been brought up tame, have frequently been known to hide, with their meat, money, rings, seals, lockets, and other small trinkets, thereby occasioning injurious suspicions of theft in servants or others, who are perfectly innocent.

We have a remarkable anecdote given by the Rev. Mr. Robinson of Ousby in Westmoreland, relative to an instinct in crows, by which they are made the natural

tural planters of all sorts of wood and trees. They disseminate the kernels upon the earth, which like nurseries bring them forth till they grow up to their natural strength and perfection. He says, "About twenty-five years ago, coming from Roscastle early in the morning, I observed a great number of crows very busy at their work upon a declining ground of a mossy surface; I went out of my way on purpose to view their labour, and I found they were planting a grove of oaks. The manner of their planting was thus: they first made little holes in the earth with their bills, going about and about till the hole was deep enough; and then they dropped in the acorn, and covered it with earth and moss. The season was at the latter end of autumn, when all seeds are full ripe." Mr. Robinson seems to think that Providence had given the crows this instinct solely for the propagation of trees; but I imagine it was given them principally for their own preservation, by hiding provision in time of plenty, in order to supply them in a time of scarcity; so that such an instinct in these birds may answer a double purpose; both their own support in times of need, and the propagation of the trees they plant: for, wherever they hide a great number of nuts or grains in the earth, we cannot suppose they find them all again; but that as many will remain in the plot of ground they make use of, as can well grow by one another.

A wonderful spirit of sociality in the brute creation, independent of sexual attachment, has been frequently remarked. Many horses, though quiet with company, will not stay one minute in a field by themselves; the strongest fences cannot restrain them. A horse has been known to leap out at a stable window through which dung was thrown, after company; and yet in other respects to be remarkably quiet. Oxen and cows will not fatten by themselves; but will neglect the finest pasture that is not recommended by society. It would be needless to instance in sheep, which constantly flock together. But this propensity seems not to be confined to animals of the same class or species. Even great disparity of kind and size does not always prevent social advances and mutual fellowship. Of this the following remarkable instance is given: A gentleman who kept but one horse, happened also on a time to have but one solitary hen: these two incongruous animals spent much of their time together in a lonely orchard, where they saw no creature but each other; by degrees an apparent regard began to take place between these two sequestered individuals: the fowl would approach the quadruped with notes of complacency, rubbing herself gently against his legs; while the horse would look down with satisfaction, and move with the greatest caution and circumspection, lest he should trample on his diminutive companion; and thus by mutual good offices each seemed to console the vacant hours of the other.

In the Gentleman's Magazine for March 1788, we have the following anecdotes of a raven. The raven alluded to "lives, or did live three years since, at the Red Lion at Hungerford; his name, I think, is Rafe. You must know then, that, coming into that inn, my chaise ran over and bruised the leg of my Newfoundland dog; and, while we were examining the injury done to the dog's foot, Rafe was evidently a concerned spectator; for, the minute the dog was tied up under the manger with my horse, Rafe not only visited, but fetched him bones, and attended upon him with particular and repeated marks of kindness. The bird's notice of the dog was so marked, that I observed it to the hostler; for I had not heard a word before of the history of this benevolent creature. John then told me, that he had been bred from his pin-feather in intimacy with a dog; that the affection between them was mutual; and that all the neighbourhood had often been witnesses of the innumerable acts of kindness they had conferred upon each other. Rafe's poor dog, after a while, unfortunately broke his leg; and during the long time he was confined, Rafe waited upon him constantly, carried him his provisions daily, and never scarcely left him alone! One night by accident the hostler had shut the stable door, and Rafe was deprived of the company of his friend the whole night; but the hostler found in the morning the bottom of the door so pecked away, that, had it not been opened, Rafe would in another hour have made his own entrance port. I then enquired of my landlady, and heard what I have related confirmed by her, with several other singular traits of the kindnesses this bird shows to all dogs in general, but particularly to maimed or wounded ones. I hope and believe, however, the bird is still living; and the traveller will find I have not over-rated his merit."

To these instances of attachment between incongruous animals from a spirit of sociality or the feelings of sympathy, may be added the following instance of fondness from a different motive, recounted by Mr. White in his History of Selborne: "My friend had a little helpless leveret brought to him, which the servants fed with milk in a spoon; and about the same time his cat kittened, and the young were dispatched and buried. The hare was soon lost, and supposed to be gone the way of most foundlings, or killed by some dog or cat. However, in a fortnight after, as the master was sitting in his garden in the dusk of the evening, he observed his cat, with tail erect, trotting towards him, and calling with little short inward notes of complacency, such as they use towards their kittens, and something gamboling after, which proved to be the leveret, which the cat had supported with her milk, and continued to support with great affection. Thus was a graminivorous animal nurtured by a carnivorous and predacious one! Why so cruel and sanguinary a beast as a cat, of the ferocious genus of felis, the murium leo,

as Linnæus calls it, should be affected with any tenderness towards an animal which is its natural prey, is not so easy to determine. This strange affection probably was occasioned by that desiderium, those tender maternal feelings, which the loss of her kittens had awakened in her breast; and by the complacency and ease she derived to herself from procuring her teats to be drawn, which were too much distended with milk, till from habit she became as much delighted with this foundling as if it had been her real offspring. This incident is no bad solution of that strange circumstance which grave historians as well as poets assert, of exposed children being sometimes nurtured by female wild beasts that had probably lost their young. For it is not one wit more marvellous that Romulus and Remus, in their infant state should be nursed by a she-wolf, than that a poor little sucking leveret should be fostered and cherished by a bloody grimalkin.

That brute animals possess reflection and sentiment, and are susceptible of the kindly as well as the irascible passions, independently of sexual attachment and natural affection; and that they have a great share of fidelity, of pride, and even a sense of glory; may be demonstrated from the elephant, the horse, and the dog. Elephants, even in a savage state, are peaceable and gentle creatures. They never use their weapons but in defence of themselves or companions. Their social dispositions are so strong, that they are seldom found alone, but march always in large troops: the oldest and most experienced lead the van; the younger or lame ones keep in the middle; and those of a second rate, as to age, walk in the rear. The females carry their young on their tusks, embracing them at the same time with their trunk. They seldom march in this regular order but when they reckon the journey dangerous, such as an expedition to cultivated lands, where they expect to meet with resistance. On other occasions they are less cautious; some of them falling behind or separating from the rest, but seldom so far as to be without the reach of assistance by alarming and assembling their companions. It is dangerous to offer them the least injury, for they run straight upon the offender; and although the weight of their body be great, their steps are so large, that they easily outrun the swiftest man, whom they either pierce with their tusks, or seize with their trunk, dart him in the air like a stone, and then trample him under their feet. But they never attack any person unless when provoked. However, as they are extremely sensible and delicate with regard to injuries, it is always prudent to keep out of their way. Travellers who frequent those countries kindle large fires, and beat drums, during the night, in order to prevent their approach. After being once attacked by men, or falling into any ambush, they are said never to forget

the injury, but search for every opportunity of getting revenge. As they are endowed perhaps with a more exquisite sensation of smell than any other animal, owing to the great extent of their nose, they can scent a man at a very great distance, and trace him by his footsteps.

The elephant, when tamed, is the most friendly and obedient of all animals; he is entirely attached to the person who feeds and takes care of him. In a short time he understands signs, and the sound of his master's voice. He distinguishes the language of passion, of command, of satisfaction; and acts accordingly. He receives his orders with attention; and executes them with prudence and alacrity, but without precipitation. He easily learns to bow his knees and lower his body, for the convenience of those who mount him. He caresses his friends with his trunk. He lifts burdens with his trunk, and assists those who are loading him in laying them on his back. He delights in shining harness and trappings. When yoked in a cart or waggon, he pulls equally and cheerfully, unless he be abused by injudicious chastisement. His guide is generally mounted on his neck, with a small rod of iron, sharp at the point, in his hand; he directs his motion by pricking him on the ears and head; but, for the most part, a word is sufficient. A tame elephant will do more labour than six horses; but then he requires a proportional quantity of food. They are the principal beasts of burden in many parts of Africa and the East Indies. They carry sacks and bundles of all kinds on their neck, back, and tusks. They never lose or damage any thing committed to their care; they will stand on the edge of a river, take bundles off their necks and tusks, lay them carefully in a boat, whenever they are desired, and try with their trunk whether they are properly situated; if they be loaded with casks, they go in quest of stones to prop them and prevent them from rolling. The elephant is not only the most tractable, but the most intelligent, of animals; sensible of benefits, and resentful of injuries. In India, they were once employed in the launching of ships: one was directed to force a very large vessel into the water; the work proved superior to his strength; his master with a sarcastic tone, bade the keeper take away this lazy beast and bring another; the poor animal instantly repeated his efforts, fractured his skull, and died on the spot. In Delhi, an elephant, passing along the streets, put his head into a tailor's shop where several people were at work; one of them pricked the end with his needle: the beast passed on; but at the next dirty puddle filled his trunk with water, returned to the shop, and spitting every drop among the people who had offended him, spoiled their work. An elephant in Adfmeer, which often passed through the bazar, or market, as he went by a certain herb-woman, always received from her a mouthful of greens: at length

length he was seized with one of his periodical fits of rage, broke his fetters, and, running through the market, put the crowd to flight; among others, this woman, who in haste forgot a little child she had brought with her. The animal recollecting, the spot where his benefactress was wont to sit, took up the infant gently in his trunk, and placed it in safety on a stall before a neighbouring house. Another in his madness, killed his cornac, or governor: the wife, seeing the misfortune, took her two children and flung them before the elephant, saying, "Now you have destroyed their father, you may as well put an end to their lives and mine." It instantly stopped, relented, took the greatest of the children, placed him on its neck, adopted him for his cornac, and never afterwards would permit any body else to mount it. A soldier at Pondicherry, who was accustomed, whenever he received the portion that came to his share, to carry a certain quantity of it to one of these animals, having one day drank rather too freely, and finding himself pursued by the guards, who were going to take him to prison, took refuge under the elephant's body, and fell asleep. In vain did the guard try to force him from this asylum, as the elephant protected him with his trunk. The next morning the soldier, recovering from his drunken fit, shuddered with horror to find himself stretched under the belly of this huge animal. The elephant, who without doubt perceived the man's embarrassment, caressed him with his trunk, in order to inspire him with courage and make him understand that he might now depart in safety. A painter was desirous of drawing the elephant which was kept in the menagerie at Versailles in an uncommon attitude, which was that of holding his trunk raised up in the air with his mouth open. The painter's boy, in order to keep the animal in this posture, threw fruit into his mouth; but as the lad frequently deceived him, and made an offer only of throwing him the fruit, he grew angry; and, as if he had known that the painter's intention of drawing him was the cause of the affront that was offered him, instead of revenging himself on the lad, he turned his resentment on his master, and taking up a quantity of water in his trunk, threw it on the paper on which the painter was drawing, and spoiled it. At the Cape of Good Hope, it is customary to kill those animals for the sake of their teeth, by the chase. Three horsemen, well mounted and armed with lances, attack the elephant alternately, each relieving the other as they see their companion pressed, till the beast is subdued. Three Dutchmen (brothers), who had made large fortunes by this business, determined to retire to Europe, and enjoy the fruits of their labours; but resolved, before they went, to have a last chase by way of amusement: they met with their game, and began the attack in the usual manner; but unfortunately one of their horses

fell

fell down and flung its rider : the enraged animal instantly seized the unhappy man with its trunk, flung him up to a vast height in the air, and received him on one of his tusks ; then turning towards the two other brethren, as if it were with an aspect of revenge and insult, held out to them the impaled wretch writhing on the bloody tooth.

When the elephant is properly managed, he lives very long even in a state of slavery and labour : that some have lived in this state an hundred and thirty years, is pretty well authenticated. In a natural state they often exceed two hundred years, and propagate their species till they are an hundred and twenty : it is thirty years before they come to their full growth. The mode of connection between the male and female is now ascertained beyond the possibility of doubt ; as Mr. Buller, Lieut. Hawkins, and many others, saw a male copulate with a female, after they were secured, in the East-Indies, in a manner exactly similar to the conjunction of the horse with a mare. This fact entirely overturns what has been so often related concerning the supposed delicacy of this useful animal, and a variety of other hypotheses, which are equally void of foundation. The time an elephant goes with young, has been ascertained to be somewhat less than two years, as an elephant brought forth a young one twenty-one months and three days after she was taken. She was observed to be with young in April or May 1788, and she was only taken in January preceding ; so that it is very likely she must have had connection with the male some months before she was secured, otherwise they could not discover that she was with young, as a fœtus of less than three months cannot well be supposed to make any alteration in the size or shape of so large an animal. The young one, a male, was produced October 16, 1789, and appeared in every respect to have arrived at its full time. He was thirty-five inches high at his birth, and grew four inches in nearly as many months. Elephants are always measured at the shoulder ; for the arch or curve of the back, of young ones particularly, is considerably higher than any other part, and it is a sure sign of old age whenever this curve is found flattened or considerably depressed, after an elephant has once attained its full growth. The young elephants suck constantly with their mouths, and never with their trunks, as Buffon has asserted ; a conclusion he made merely from conjecture, and the great and various uses to which the trunk is adapted and applied by every elephant.—The approach of the rutting-season is easily known ; for some days before it happens, an oily liquor flows from a small hole on each side of the head. The domestic female on these occasions sometimes makes her escape, and joins the wild males in the woods. Some days afterwards her cornac goes in quest of her, and calls her by her name till she comes. She submits to him with complacence, and allows herself to be conducted home, and shut

shut up in the stable. They bring forth but one at a time, though the female has two dugs, one on each side the breast. The young one, as soon as it comes into the world, is as large as a wild boar, and is furnished with teeth: however, the large tusks do not make their appearance till some time after, and at the age of six months, they are several inches long. Elephants of this age are as large as an ox when in a natural state.

The intrepidity and sagacity of the HORSE have been regarded with admiration by all ranks of men, and in all ages of the world. Even in a domestic state he is bold and fiery; and, equally undaunted as his master, faces danger and death with ardour and magnanimity. He delights in the noise and tumult of arms, and seems to feel the glory of victory: he exults in the chase; his eyes sparkle with emulation in the course. But, though bold and intrepid, he is docile and tractable: he knows how to govern and check the natural vivacity and fire of his temper. He not only yields to the hand, but seems to consult the inclination of his rider. Constantly obedient to the impressions he receives, his motions are entirely regulated by the will of his master. He in some measure resigns his very existence to the pleasure of man. He delivers up his whole powers, he reserves nothing; he will rather die than disobey. Who could endure to see a character so noble, abused? who could be guilty of such gross barbarity? none but wretches most relentless and unfeeling! We need go no further than the horse, to prove how strongly nature has endowed brute animals with memory; for whatever roads, pastures, inns, or stables, a horse has been accustomed to, though removed for years to a distant part of the country, he never forgets them; but, if ever he returns, or passes by them again, he gives evident tokens that he has been accustomed to the place. The celebrated equestrians, Hughes and Astley, could, I doubt not, furnish a thousand curious anecdotes to illustrate this fact; but the following, I think, being incontrovertible, will be sufficient for the purpose.

Mr. James George, a gentleman of Southampton, in the county of Hants, lost his horse from off the common on which he had been accustomed to be turned out. About twelve months after, the horse was seen and recognised, grazing on a common near Bursledon. Soon as this was made known, Mr. George sent his servant with a bridle, and ordered the horse to be caught, and brought home. In a few days after, Mr. Langtree of Bursledon came to Mr. George, to demand the horse, insisting it was his property, and had been so for years. The horse, however, being positively withheld, Mr. Langtree brought an action for his recovery, which was tried at Winchester assizes, in March 1789. The plaintiff, on the positive affirmations of six or seven witnesses, traced the sale of the horse from one dealer's hands to another, as far back as the year 1784, when he

was purchased of one farmer Moses, in the county of Suffex, who bred him; and the horse was identified by them all. On the part of the defendant, the most positive evidence was adduced, to show that this horse was not the horse sworn to have been so bought and sold by the witnesses on the other side, but was, and had been, the real property of Mr. George, from the year 1786. In this situation, with the horse equally sworn to and identified by the witnesses on both sides, who had all been to inspect him but the day before the trial, the judge, by cross-examining the last witness, discovered, that, when the defendant's servant brought the horse back, he turned him into his old pasturage on Southampton common, where he had not been many minutes, before he set off, of his own accord, towards Southampton; and in his way crossed a number of lanes and turnings, passed by eight or ten stables, until he came to the stable of Mr. George, where he instantly stopped, and neighed at the stable door, as much as to say he was come back, and begged to be taken in. This circumstance decided the verdict. The learned judge remarked, that there could be no collusion in the evidence derived from the *memory of the horse*; and directed the jury to find for the defendant.

This character, though natural to the animal, is improved by habit and education. His education commences with the loss of liberty, and is finished by constraint. In the vast deserts of America, they roam at large without any restraint. M. de Salle relates, that he saw, in the year 1685, horses feeding in the meadows of North America, near the bay of St. Louis, which were so ferocious that nobody durst come near them. Oexmelin says, that he has seen large troops of them in St. Domingo running in the valleys; that, when any person approached, they all stopped; and one of them would advance till within a certain distance, then snort with his nose, take to his heels, and the whole troop after him. These relations sufficiently prove, that the horse, when at full liberty, has no inclination to associate with mankind: that all the softness and ductility of his temper proceed entirely from the culture and polish he receives in his domestic education, which in some measure commences as soon as he is brought forth.--The horse has not only a grandeur in his general appearance, but there is the greatest symmetry and proportion in the different parts of the body. The regularity and proportion of the different parts of the head give him an air of lightness, which is well supported by the strength and beauty of his chest. He erects his head, as if willing to exalt himself above the condition of other quadrupeds; his eyes are open and lively; his ears are handsome, and of a proper height; his mane adorns his neck, and gives him the appearance of strength and boldness. At the age of two years, or two years and a half, the horse is in a condition to propagate; and the mare, like most other females, is ready to receive him still sooner. But the foals produced

duced by such early embraces are generally ill-made and weakly. The horse should never be admitted to the mare till he is four or four and a half; this is only meant with regard to draught-horses. Fine horses should not be admitted to the mare before they are six years old; and Spanish stallions not till seven. The mares are generally in season from the beginning of April to the end of June; but their chief ardour for the horse lasts only about fifteen or twenty days, and this critical season should always be embraced. The stallion ought to be sound, well-made, vigorous, and of a good breed. For fine saddle-horses, foreign stallions, as Arabians, Barbs, Turks, and Andalusians, are preferable to all others. Next to these, British stallions are the best; because they originally sprang from those above mentioned, and are very little degenerated. The stallions of Italy, and especially the Neapolitans, are very good. The best stallions for draught or carriage horses, are those of Naples, Denmark, Holstein, and Friezeland. The stallions for saddle-horses should be from fourteen to fifteen hands high, and for draught horses, at least fifteen hands. Neither ought the colour of stallions to be overlooked; as a fine black, grey, bay, sorrel, chestnut, &c. Besides these external qualities, a stallion ought to have courage, tractability, spirit, agility, a sensible mouth, sure limbs, &c. These precautions in the choice of a stallion are the more necessary, because he has been found by experience to communicate to his offspring almost all his good or bad qualities, whether natural or acquired.

To show, more obviously, the reasoning-faculty of brutes, and to distinguish the operations of intellect from those of instinct, we need only contemplate the actions and disposition of the DOG. In a savage state, it must be allowed, that he is fierce, cruel, and voracious; but, when civilized and accustomed to live with men, he is possessed of every amiable quality. He seems to have no other desire than to please and protect his master. He is gentle, obedient, submissive, and faithful. These dispositions, joined to his almost unbounded sagacity, justly claim the esteem of mankind. Accordingly no animal is so much caressed or respected: he is so ductile, and so much formed to please, that he assumes the very air and temper of the family in which he resides. An animal endowed with such uncommon qualities, must answer many useful purposes. His fidelity and vigilance are daily employed to protect our persons, our flocks, or our goods. The acuteness of his smell gains him employment in hunting: he is frequently employed as a turnspit: at Brussels and in Holland he is trained to draw little carts to the herb-market; and in the northern regions draws a sledge with his master in it, or laden with provisions. It is a remarkable instinct in the dog, that, when oppressed with sickness, to which he is very subject, especially in the beginning of summer, and before ill weather, he eats the leaves of the quicken grass, the bearded

bearded wheat-grafs, or the rough cock's-foot grafs, which gives him immediate relief by making him vomit. He does not throw out his excrements promifcuoufly upon every thing that happens to be in the way, but carefully feeks ftones, trunks of trees, or barren places. This is a wife inftitution of nature; for the excrements of a dog deftroy almoft every vegetable or animal fubftance. They are of fuch a putrid nature, that, if a man's fhoe touches them when recently expelled, that particular part will rot in a few days. He obferves the fame method in making his urine, which he throws out at a fide. It is remarkable, that a dog will not pafs a ftone or a wall againft which any other dog has urined, without following his example, although an hundred fhould occur in a few minutes; in fo much that it is aftonifhing how fuch a quantity can be fecreted in fo fhort a time. The principal objection to dogs, is the fhocking circumftance of their going mad, and of communicating the diforder to whatever perfon, or animal, they may chance to bite; and of which the cure has ever been confidered precarious and uncertain. From a minute inveftigation of the poifonous qualities of the hydrophobia, and the effect it has on the blood, as well as from a confideration of what the blood and juices undergo by emerging the body in the fea, I am bold to affirm that my Solar Tincture, adminiftered in the way I have directed, is a certain and infallible cure for this deplorable malady; at leaft as far as human certainty can go with refpect to medicine. I would not however be underftood to encourage a negligence in thofe who keep dogs, to watch well their actions, and, on the fmalleft fufpicion that fuch a misfortune is near, to have them instantly difpatched, as they may be eafily replaced, and much anxiety and diftreff prevented.—With regard to the propagation of dogs, the females admit the males before they are twelve months old. They remain in feafon ten, twelve, or even fifteen days, during which time they will admit a variety of males. They come in feafon generally twice in the year, and more frequently in the cold than in the hot months. The male difcovers the condition of the female by the fmell; but fhe feldom admits him the firft fix or feven days. One coition will make her conceive a great number of young; but, when not reftained, fhe will admit feveral dogs every day; fhe feems to have no choice or predilection, except in favour of large dogs; from this circumftance it fometimes happens, that a fmall female, who has admitted a maffiff, perifhes in bringing forth her young. During the time of copulation, thefe animals cannot feparate themfelves, but remain united fo long as the erection fubfifts. This is owing to the ftructure of the parts. The dog has not only a bone in his penis, but in the middle of the corpus cavernofum there is a large hollow, which is blown up in the time of erection to a confiderable bulk. The female, on the other hand, has a larger clitoris than perhaps any other animal: befides, a large firm protuberance

rises in the time of copulation, and remains perhaps longer than that of the male, and prevents him from retiring till it subsides; accordingly after the act of penetrating is effected, the male turns about in order to rest himself on his legs, and remains in that position till the parts turn flaccid. The female goes with young about nine weeks. They generally bring forth from six to twelve puppies. Those of a small size bring forth five, four, and sometimes but two. They continue to copulate and bring forth during life, which lasts generally about fourteen or fifteen years. The whelps are commonly blind, and cannot open their eyes till the tenth or twelfth day; the males are like the dog, the females like the bitch.—The dog, the wolf, and the fox, are certainly derived from one original parent; and all dogs whatsoever, from the terrible boar-dog to Pompey the little, were all one in the first creation. All the variety we behold in them, is either produced by change of climate, or the accidental effect of soil, food, or situation; or from the issue of human care, experiment, or caprice. Every huntsman knows what a vast alteration may be made in dogs, by industriously improving the breed for twenty or thirty years. Nature wisely tends to render every kind of creature fit for the country where it is to inhabit, or be employed; which is the reason why hounds, and all other animals, degenerate by being removed into contrary climates. This is manifest from the following experiment; if a couple of right southern hounds be removed to the north, and suffered to propagate without art or mixture, they will, by sensible degrees, decline into lighter bodies and shriller accents; and in the same way are all dogs varied, by being carried from one country to another. But the utmost efforts of human industry and contrivance, whether assisted by change of climate, or mixture of breed, could never add one new species to the works of the creation. Nature is still uniform as to the main, nor suffers the Almighty Creator to be imitated by short-sighted mortals. In spite of art, our mules are always barren; nor can the most curious projector produce one amphigeneous animal that will increase and multiply. There appears a distinct specific difference in all living creatures; the horse, the dog, the bear, the goat, however diversified by art, by copulation, or by climate, either in size, shape, or figure, will ever discover something that approximates to the character of their species. Above all, the peculiar instinct and appetite for generation, will prompt them to own and indicate their relation. Animals of different species will never copulate together. This is one of the most undeniable arguments that wolves, foxes, and dogs, are originally the same species, because in coition they are not only all held together in the same manner, but we have some instances of litters of puppies produced from the dog and fox, and also from the dog and wolf. Mr. Brooke, animal-merchant in Holborn, turned a wolf to a Pomeranian bitch in heat;

the congress was immediate, and as usual between dog and bitch; she produced ten puppies. Mr. Pennant saw one of them at Gordon Castle, that had very much the resemblance of a wolf, and also much of its nature; being flipped at a weak deer, it instantly caught at the animal's throat and killed it. I could not learn (says Mr. Pennant) whether this mongrel continued its species; but another of the same kind did, and stocked the neighbourhood of Fochabers, in the county of Moray, (where it was kept,) with a multitude of curs of a most wolfish aspect. There was lately living a mongrel offspring of this kind. It greatly resembled its wolf parent. It was first the property of Sir Wolfstein Dixey; afterwards of Sir Willoughby Aston. During day it was very tame; but at night sometimes relapsed into ferocity. It never barked but rather howled; when it came into fields where sheep were it would feign lameness, but if no one was present would instantly attack them. It had been seen in copulation with a bitch, which afterwards pupped: the breed was imagined to resemble in many respects the supposed fire. It died between the age of five and six.—The woodman of the manor of Mongewell, in Oxfordshire, has a bitch, which constantly follows him, the offspring a tame dog-fox, by a shepherd's cur; and she again has had puppies by a dog. Since there are such authentic proofs of the further continuance of the breed, we may surely add the wolf and fox to the other supposed stocks of these faithful domestics, particularly as most naturalists suppose the dog to have been originally the production of one or other of these animals, tamed and civilized.

Many and wonderful are the instances of sagacity, fidelity, and attention, and even of foresight, which these faithful animals have evinced towards their masters. Some such will doubtless occur to the minds of my readers, as falling under their own observation; I shall therefore only recite two or three such instances, of unquestionable authenticity.—In the year 1791, a person went to a house in Deptford, to take lodgings, under pretence that he was just arrived from the West-Indies; and, after having agreed on terms, said he should send in his trunk that night, and come himself the next day. About nine o'clock in the evening, the trunk was brought in by two porters, and was carried into his bed-room. Just as the family were going to bed, their little house-dog, deserting his usual station in the shop, placed himself close to the door of the chamber where the chest was deposited, and kept up an incessant barking. The moment the chamber door was opened, the dog flew to the chest, against which it barked and scratched with redoubled vehemence and fury. At first they tried to get the dog out of the room; but in vain. Calling in some neighbours, and making them eye-witnesses of the circumstance, they began to move the trunk about, when they quickly discovered that it contained something alive.

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falling very strong, they were induced to open it, when, to their utter astonishment, who should present himself but their new lodger, who had been thus conveyed in, to rob the house!—In the summer of the year 1792, a gentleman went down to Portsmouth for the benefit of sea-bathing. He went to one of Mr. Bradley's machines to be conducted into the water. Being unacquainted with the depth, and no swimmer, he found himself, the instant he quitted the machine, nearly out of his depth. Fright increased the peril of his situation, and unnoticed by the person who attends the machines, he had sunk for the last time in the agonies of drowning. A large Newfoundland dog, standing by accident on the shore, and seeing the distress of this stranger, plunged in after him; and, seizing him by the hair of the head, conducted him safely on-shore, though it was some time before he recovered. The gentleman afterwards purchased the dog at a high price, but values him equally with the sum total of his fortune.—At the seat of the late Earl of Litchfield, three miles from Blenheim, there is a portrait in the dining-room of Sir Henry Lee, by Johnston, with that of a mastiff dog which saved his life. It seems a servant had formed the design of assassinating his master and robbing the house; but the night he had fixed on, the dog, which had never been much noticed by Sir Henry, for the first time followed him up-stairs, got under his bed, and could not be driven hence by either master or man; in the dead of night, the same servant entered the room to execute his horrid design, but was instantly seized by the dog, and, being secured, confessed his intentions. There are ten quaint lines in one corner of the picture, which conclude thus:

But in my dog, whereof I made no store,
I find more love than those I trusted more.

Upon what hypothesis can we account for a degree of foresight and penetration such as this? Or will it be suggested, as a solution of the difficulty, that a dog may possibly become capable in a great measure of understanding human discourse, and of reasoning and acting accordingly; and that, in the present instance, the villain had either uttered his design in soliloquy, or imparted it to an accomplice, in the hearing of the animal? It has been much disputed whether brutes have any language whereby they can express their minds to each other; or whether all the noise they make consists only of cries inarticulate, and unintelligible even to themselves. We may indeed, from analogy, conclude, with great reason, that some of the cries of beasts are really expressions of their sentiments; but whether one beast is capable of forming a design, and communicating that design by any kind of language to others, is what I shall leave to the judgment of the reader,

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after submitting to his consideration the following instance.—A sparrow, finding a nest that a martin had just built standing very conveniently for him, possessed himself of it. The martin, seeing the usurper in her house, called for help to expel him. A thousand martins came full speed, and attacked the sparrow; but the latter, being covered on every side, and presenting only his large beak at the entrance of the nest was invulnerable, and made the boldest of them who durst approach him repent of their temerity. After a quarter of an hour's combat, all the martins disappeared. The sparrow thought he had got the better, and the spectators judged that the martins had abandoned their undertaking. Not in the least. Immediately they returned to the charge; and each of them having procured a little of that tempered earth with which they make their nests, they all at once fell upon the sparrow, and inclosed him in the nest to perish there, though they could not drive him thence. Can it be imagined that the martins could have been able to hatch and concert this design all of them together, without speaking to each other, or without some medium of communication equivalent to language?

From all these extraordinary endowments, manifested by brute animals of different countries and kinds, some philosophers have maintained that brutes are gifted with a soul, though essentially inferior to that of men; and to this soul they have allowed immortality. Father Bougeant, a Jesuit, published, about the year 1740, a treatise expressly on this subject, entitled *A Philosophical Amusement on the Language of Brutes*, in which he infers that they are animated by evil spirits, or devils. The strangeness of this doctrine has induced me to give the outline of his argument, since it cannot fail to prove entertaining to the reader. "Reason (says he) naturally inclines us to believe that beasts have a spiritual soul; and the only thing that opposes this sentiment is, the consequences that might be inferred from it. If brutes have a soul, that soul must either be matter or spirit; it must be one of the two, and yet you dare affirm neither. You dare not say it is a matter, because you must then necessarily suppose matter to be capable of thinking; nor will you say that it is spirit, this opinion bringing with it consequences contrary to the principles of religion; and this, among others, that man would differ from beasts only by the degrees of plus and minus; which would demolish the very foundation of all religion. Therefore, if I can elude all these consequences; if I can assign to beasts a spiritual soul, without striking at the doctrines of religion; it is evident that my system, being moreover the most agreeable to reason, is the only warrantable hypothesis. Now I shall, and can do it, with the greatest ease imaginable. I even have means, by the same method, to explain many very obscure passages in the Holy Scriptures, and to resolve some very great difficulties which are not well confuted. This I shall unfold in a more particular manner. Religion teaches

us, that the devils, from the very moment they had sinned, were reprobate, and that they were doomed to burn for ever in hell ; but the church has not yet determined whether they do actually endure the torments to which they are condemned. It may then be thought that they do not yet suffer them, and that the execution of the verdict brought against them is reserved for the day of final judgment.—Now what I pretend to infer from hence is that, till doomsday comes, God, in order not to suffer so many legions of reprobate spirits to be of no use, has distributed them through the several spaces of the world, to serve the designs of his Providence and make his omnipotence to appear. Some, continuing in their natural state, busy themselves in tempting men, in seducing and tormenting them ; either immediately, as Job's devil, and those that lay hold of human bodies ; or by the ministry of forcerers or phantoms. These wicked spirits are those whom the scripture calls the *powers of darkness*, or the *powers of the air*. God, with the others, makes millions of beasts of all kinds, which serve for the uses of men, which fill the universe, and cause the wisdom and omnipotence of the Creator to be admired. By that means I can easily conceive, on the one hand, how the devils can tempt us ; and, on the other, how beasts can think, know, have sentiments, and a spiritual soul, without any way striking at the doctrines of religion. I am no longer surpris'd to see them have forecast, memory, and judgment. I should rather have occasion to wonder at their having no more, since their soul very likely is more perfect than ours. But I discover the reason of this ; it is because, in beasts as well as in ourselves, the operations of the mind are dependent on the material organs of the machine to which it is united ; and those organs being grosser and less perfect than in us, it follows, that the knowledge, the thoughts, and the other spiritual operations, of beasts, must of course be less perfect than ours ; and, if these proud spirits know their own dismal state, what an humiliation must it be to them thus to see themselves reduced to the condition of beasts ! But whether they know it or no, so shameful a degradation is still, with regard to them, the primary effect of the divine vengeance I just mentioned ; it is an anticipated hell.”—Having mentioned the prejudices against this hypothesis, such particularly as the pleasure which people of sense and religion take in beasts and birds, especially all sorts of domestic animals ; he proceeds, “ Do we love beasts for their own sakes ? No. As they are altogether strangers to human society, they can have no other appointment but that of being useful and amusing. And what care we whether it be a devil or any other creature that amuses us ? The thought of it, far from shocking, pleases me mightily. I with gratitude admire the goodness of the Creator, who gave me so many little devils to serve and amuse me. If I am told that these poor devils are doomed to suffer eternal tortures, I admire God's

decrees, but I have no manner of share in this dreadful sentence; I leave the execution of it to the Sovereign Judge; and notwithstanding this, I live with my little devils as I do with a multitude of people of whom religion informs me that a great number shall be damned. But the cure of a prejudice is not to be effected in a moment; it is done by time and reflection: give me leave then lightly to touch upon this difficulty, in order to observe a very important thing to you. Persuaded as we are that beasts have intelligence, have we not all of us a thousand times pitied them for the excessive evils which the majority of them are exposed to and in reality suffer? How unhappy is the condition of horses! we are apt to say, upon seeing a horse whom an unmerciful carman is murdering with blows. How miserable is a dog whom they are breaking for hunting! How dismal is the fate of beasts living in woods; they are perpetually exposed to the injuries of the weather, always seized with apprehensions of becoming the prey of hunters, or of some wilde, animal; for ever obliged, after long fatigue, to look out for some poor insipid food; often suffering cruel hunger; and subject, moreover, to illness and death! If men are subject to a multitude of miseries that overwhelm them, religion acquaints us with the reason of it; viz. the being born sinners. But what crimes can beasts have committed by birth to be subject to evils so very cruel? What are we, then, to think of the horrible excesses of miseries undergone by beasts? miseries, indeed, far greater than those endured by men. This is, in any other system, an incomprehensible mystery; whereas nothing is more easy to be conceived from the system I propose. The rebellious spirits deserve a punishment still more rigorous, and happy is it for them that their punishment is deferred. In a word, God's goodness is vindicated, and man himself is justified: for what right can we have, without necessity, and often in the way of mere diversion, to take away the life of millions of beasts, if God had not authorised us so to do? And, beasts being as sensible as ourselves of pain and death, how could a just and merciful God have given man that privilege, if they were not so many guilty victims of the divine vengeance?—But hear something still more convincing, and of greater consequence: beasts, by nature, are extremely vicious. We know well that they never sin, because they are not free; but this is the only condition wanting to make them sinners. The voracious birds and beasts of prey are cruel. Many insects of one and the same species devour one another. Cats are perfidious and ungrateful; monkeys are mischievous; and dogs envious. All beasts in general are jealous and revengeful to excess; not to mention many other vices we observe in them: and at the same time that they are by nature so very vicious, they have, say we, neither the liberty nor any helps to resist the bias that hurries them into so many bad actions. They are, according to the schools, necessitated to do evil,

to disconcert the general order, to commit whatever is most contrary to the notion we have of natural justice and to the principles of virtue. What monsters are these in a world originally created for order and justice to reign in? This is, in good part, what formerly persuaded the Manicheans, that there were of necessity two orders of things, one good, and the other bad; and that the beasts were not the work of the good principle: a monstrous error! But how then shall we believe that beasts came out of the hands of their Creator with qualities so very strange! If man is so very wicked and corrupt, it is because he has himself through sin perverted the happy nature God had given him at his creation. Of two things, then, we must say one; either that God has taken delight in making beasts so vicious as they are, and of giving us in them models of what is most shameful in the world; or that they have, like man, original sin, which has perverted their primitive nature.—The first of these propositions finds very difficult access to the mind, and is an express contradiction to the Holy Scriptures; which say, that whatever came out of God's hands, at the time of the creation of the world, was good, yea very good. What good can there be in a monkey's being so very mischievous, a dog so full of envy, a cat so malicious? But then many authors have pretended, that beasts, before man's fall, were different from what they are now; and that it was in order to punish man that they became so wicked. But this opinion is a mere supposition, of which there is not the least footstep in holy scripture. It is a pitiful subterfuge to elude a real difficulty: this at most might be said of the beasts with whom man has a sort of correspondence; but not at all of the birds, fishes, and insects, which have no manner of relation to him. We must then have recourse to the second proposition, that the nature of beasts has, like that of man, been corrupted by some original sin: another hypothesis, void of foundation, and equally inconsistent with reason and religion, in all the systems which have been hitherto espoused concerning the souls of beasts. What side are we to take? Why, admit of my system, and all is explained. The souls of beasts are refractory spirits which have made themselves guilty towards God. The sin in beasts is no original sin; it is a personal crime, which has corrupted and perverted their nature in its whole substance; hence all the vices and corruption we observe in them, though they can be no longer criminal, because God, by irrecoverably reprobating them, has at the same time divested them of their liberty."

These quotations contain the strength of Father Bougeant's hypothesis, which also hath had its followers: but the reply to it is obvious. Beasts, though remarkably mischievous, are not completely so; they are in many instances capable of gratitude and love, which devils cannot possibly be. The very same passions that are in the brutes exist in the human nature: and, if we chose to argue from the
existence

existence of those passions, and the ascendancy they have over mankind at some times, we may say, with as great justice, that the souls of men are devils, as that the souls of brutes are. All that can be reasonably inferred from the greater prevalence of the malignant passions among the brutes than among men, is, that the former have less rationality than men; and accordingly it is found, that among savages, who exercise their reason less than other men, every species of barbarity is practised, without being deemed a crime.—Upon the whole, it is impossible to deduce this variety of action, in animals, from a general and uniform instinct only. For they accommodate their operations to times and circumstances. They combine; they choose the favourable moment; they avail themselves of the occasion, and seem to receive instruction by experience. Many of their operations announce reflection; the bird repairs a shattered nest, instead of constructing instinctively a new one: the hen, who has been robbed of her eggs, changes her place in order to lay the remainder with more security: the cat discovers both care and artifice in concealing her kittens. Again it is evident, that, on many occasions, animals know their faults and mistakes, and correct them; they sometimes contrive the most ingenious methods of obtaining their ends, and, when one method fails, have recourse to another: and they have without doubt, a kind of language for the mutual communication of their ideas. How is all this to be accounted for, unless we suppose them endowed with the powers of perceiving, thinking, remembering, comparing, and judging? They certainly have these powers, in a degree inferior to the human species, and form classes below them in the graduated scale of intelligent beings; but their actions not being directed to moral ends, are consequently not accountable and proper subjects for reward or punishment in a future world.

After all, it does not appear upon what principle of reason and justice it is, that mankind have founded their right over the *life* of every creature that is placed in a subordinate rank of being to themselves. Whatever claim they may have in right of food or self-defence, did they extend their privilege no further, numberless beings might enjoy their lives in peace, who are now hurried out of them by the most wanton and unnecessary cruelties. It is surely difficult to discover why it should be thought less inhuman to crush to death a harmless insect, whose single offence is that he eats that food which nature has prepared for his sustenance, than it would be were we to kill any bulky creature for the same reason. There are few tempers so hardened against the impressions of humanity, as not to shudder at the thought of the latter; and yet the former is universally practised, without the least check of compassion. This seems to arise from the gross error of supposing, that every creature is really in itself contemptible, which happens to be clothed

with

with a body infinitely disproportionate to our own, not considering that great and little are merely relative terms. But the inimitable Shakespeare would teach us, that

—the poor beetle that we tread upon,
In corp'ral suff'rance feels a pang as great
As when a giant dies.—

And, indeed, there is every reason to believe, that the sensations of many insects are as requisite as those of creatures of far more enlarged dimensions, perhaps even more so. The millepede, for instance, rolls itself round upon the slightest touch; and the snail gathers in her horns upon the least approach of our hand. Are not these the strongest indications of their sensibility? and is it any evidence of ours, that we are not therefore induced to treat them with a more sympathizing tenderness?

I cannot conclude these observations on the instinct and œconomy of brute animals, without reciting the following most remarkable account of the land-crab, which inhabits the Bahama Islands, as well as most parts between the tropics, and feeds upon vegetables. These creatures live not only in a kind of orderly society in their retreats in the mountains, but regularly, once a-year, march down to the sea-side in a body of some millions at a time. As they multiply in great numbers, they choose the month of April or May to begin their expedition; and then fall out by thousands from the stumps of hollow trees, from the clefts of rocks, and from the holes which they dig for themselves under the surface of the earth. At that time the whole ground is covered with this band of adventurers; there is no setting down one's foot without treading upon them. The sea is their place of destination, and to that they direct their march with right-lined precision. No geometrician could send them to their destined station by a shorter course; they turn neither to the right nor to the left, whatever obstacles intervene; and, even if they meet with a house, they will attempt to scale the walls to keep the unbroken tenor of their way. But, though this be the general order of their route, they upon other occasions are obliged to conform to the face of the country; and, if it is intersected with rivers, they are then seen to wind along the course of the stream. The procession sets forward from the mountains with the regularity of an army under the guidance of an experienced commander. They are commonly divided into three battalions; of which the first consists of the strongest and boldest males, that, like pioneers, march forward to clear the way, and face the greatest dangers. These are often obliged to halt for want of rain, and to go into the most convenient encampment till

the weather changes. The main body of the army is composed of females, which never leave the mountains till the rain has set in for some time, and then descend in regular battalia, being formed into two columns of fifty paces broad, and three miles deep, and so close that they almost cover the ground. Three or four days after this, the rear guard follows, a straggling undisciplined tribe, consisting of males and females, but neither so robust nor so vigorous as the former. The night is their chief time of proceeding; but, if it rains by day, they do not fail to profit by the occasion; and they continue to move forward in their slow uniform manner. When the sun shines and is hot upon the surface of the ground, they then make an universal halt, and wait till the cool of the evening. When they are terrified, they march back in a confused disorderly manner, holding up their nippers, with which they sometimes tear off a piece of the skin, and then leave the weapon where they inflicted the wound. They even try to intimidate their enemies; for they often clatter their nippers together, as if it were to threaten those that come to disturb them. But, though they thus strive to be formidable to man, they are much more so to each other; for they are possessed of one most unsocial property, which is, that, if any of them by accident is maimed in such a manner as to be incapable of proceeding, the rest fall upon and devour it on the spot, and then pursue their journey.—When, after a fatiguing march, and escaping a thousand dangers, (for they are sometimes three months in getting to the shore,) they have arrived at their destined port, they prepare to cast their spawn. The pease are as yet within their bodies, and not excluded, as is usual in animals of this kind, under the tail; for the creature waits for the benefit of sea-water to help the delivery. For this purpose the crab has no sooner reached the shore, than it eagerly goes to the edge of the water, and lets the waves wash over its body two or three times. This seems only a preparation for bringing their spawn to maturity; for, without further delay, they withdraw to seek a lodging upon land. In the mean time the spawn grows larger, is excluded out of the body, and sticks to the barbs under the flap, or more properly the tail. This bunch is seen as big as a hen's egg, and exactly resembling the roes of herrings. In this state of pregnancy they once more seek the shore for the last time; and, shaking off their spawn into the water, leave accident to bring it to maturity. At this time whole shoals of hungry fish are at the shore in expectation of this annual supply; the sea to a great distance seems black with them; and about two thirds of the crabs' eggs are immediately devoured by these rapacious invaders. The eggs that escape are hatched under the sand; and, soon after, millions at a time of the little crabs are seen quitting the shore,

shore, and slowly travelling up to the mountains. The old ones, however, are not so active to return; they have become so feeble and lean, that they can hardly creep along, and their flesh at that time changes its colour. The most of them, therefore, are obliged to continue in the flat parts of the country till they recover, making holes in the earth, which they cover at the mouth with leaves and dirt, so that no air may enter. There they throw off their old shells, which they leave, as it were, quite whole; the place where they opened on the belly being unseen. At that time they are quite naked, and almost without motion for six days together, when they become so fat as to be delicious food. They have then under their stomachs four large white stones, which gradually decrease in proportion as the shell hardens, and, when they come to perfection, are not to be found. It is at that time that the animal is seen slowly making its way back; and all this is most commonly performed in the space of six weeks.—This animal, when possessed of its retreats in the mountains, is impregnable; for only subsisting on vegetables, it seldom ventures out; and, its habitation being in the most inaccessible places, it remains for a great part of the season in perfect security. It is only when impelled by the desire of bringing forth its young, and when compelled to descend into the flat country, that it is taken. At that time the natives wait for its descent in eager expectation, and destroy thousands; but, disregarding their bodies, they only seek for that small spawn which lies on each side the stomach within the shell, of about the thickness of a man's thumb. They are much more valuable upon their return after they have cast their shell; for, being covered with a skin resembling soft parchment, almost every part except the stomach may be eaten. They are taken in the holes by feeling for them with an instrument; they are sought after by night, when on their journey, by flambeaux. The instant the animal perceives itself attacked, it throws itself on its back, and with its claws pinches most terribly whatever it happens to fasten on. But the dexterous crab-catcher takes them by the hinder legs in such a manner that the nip-pers cannot touch them, and thus he throws them into his bag. Sometimes also they are caught, when they take refuge in the bottoms of holes in rocks by the sea-side, by clapping a stick to the mouth of the hole, which prevents their getting out; and then soon after, the tide coming, enters the hole, and the animal is found, upon its retiring, drowned in its retreat.—These crabs are of various sizes, the largest about six inches wide; they walk side-ways like the sea-crab, and are shaped like it: some are black, some are yellow, some red, and others variegated with red, white, and yellow, mixed. Some of these are poisonous; and several people have died of eating of the crabs, particularly of the black kind.

The light-coloured are reckoned best; and, when full in flesh, are very well tasted. In some of the sugar-islands they are eaten without danger; and are no small help to the negro-slaves, who, on many of these islands, would fare very hard without them.

OF SCENT.

NOTHING more eminently demonstrates the doctrine of atoms, than *scent*. It is an effluvium continually arising from the corpuscles that issue out of all bodies; and, being impregnated with the peculiar state and quality of the blood and juices of that particular animal from which they flow, occasions the vast variety of smells or scents cognizable by the olfactory nerves, or organs of smelling. Hence the reason why one person differs from another in scent, and why a dog will trace the footsteps of his master for a hundred miles together, follow him into any house, church, or other building, and distinguish him from every other person, though surrounded by ten thousand; and when the faithful animal has thus diligently sought out and recognised his master, he is seldom willing even to trust the evidence of his own eyes, until, with erected crest, he has taken a few cordial sniffs, to convince himself he is right. Hence also we perceive how a pack of hounds are enabled to pursue the hare, fox, stag, or any other animal they are trained to hunt, across the scent, and amidst the society of others of the same species, without being diverted from the pursuit of that self-same animal they had *first* on foot. And hence too we discover how it is possible for birds and beasts of prey to be directed to their food at such vast distances; for these corpuscles, issuing from putrid bodies, and floating in the air, are carried by the wind to different quarters; and, striking the olfactory nerves of whatever animals they meet in their way,* immediately conduct them to the spot. It matters not how much the effluvia may be gone off, so as enough remains to irritate the olfactory organ; for, whether it be bird or beast, they try the scent in all directions, till at length they discover that which is stronger and stronger in proportion as they proceed; and this nature has taught them to know is the direct and obvious road to their prey, and prevents them from following the contrary course, which is naturally weaker and weaker, and what in hunting is termed *heel*. This observation is confirmed by the increased eagerness we perceive in all animals, the nearer they approach the object of pursuit; as we see hounds and spaniels in hunting and

* It is by this means the small-pox, measles, putrid fevers, and all epidemic complaints, are communicated, and the plague and pestilence conveyed from one place to another.

shooting, are the more earnest, in proportion as the scent is recent, and as they draw nearer to the game. The same thing, amongst quadrupeds, whether wild or domestic, directs the male to the female that is in season for love; and hence we see the dog, the boar, the bull, and the stallion, when turned loose, apply their nostrils to the ambient air, and proceed accordingly. By the same medium the vermin which infest our dwellings know how to direct their operations, whether to undermine walls, eat through solid boards, cross rivers, or climb spouts; which shows how much stronger the faculty of smelling is possessed by the brute species than by the human; wisely ordained by nature, to enable them to seek their food, and propagate their species, but for which they would often perish, or have long since become extinct.

There are wonderful instances of some animal carcases, which, though flaked with lime, and buried ten feet under ground, have sent forth so strong a scent as to have attracted dogs to the spot, that eagerly endeavoured to dig away the earth to get at them. And an instance happened only a few years since at Petersfield in Hampshire, where an unfortunate female, having privately delivered herself of two children, went and buried them in a deep hole in an adjoining field; but within three days some dogs were attracted to the spot by the scent, dug them up, and partly devoured them before the shocking circumstance was discovered. No wonder then a pack of hounds, which have caught the scent of a polecat or weasel, will pursue it into the thickest forest, and assemble round the very tree up the trunk of which it had run for shelter; or that blood-hounds, as in times of old, should trace out fugitives and robbers in subterraneous caverns, in trees, caves, or forests, or in clefts of inaccessible rocks, of which instances are given by the most reputable historians. It is however to be remarked, that, as all animals hunt for and pursue their prey by its scent, so they seem instinctively to know, that they themselves are hunted and pursued by means of the scent issuing from their own bodies. But, as this subject admits of so much curious and occult speculation, I shall give a few instances of the effects of scent upon different animals, and the sense and sagacity they display in the management of it.— And first, of the hare.

The hare is naturally a timid animal, but emanates a very strong scent. He sleeps in his form or seat during the day; and feeds, copulates, &c. in the night. In a moon-light evening, a number of them are sometimes seen sporting together, leaping and pursuing each other: but the least motion, the falling of a leaf, alarms them; and then they all run off separately, each taking a different route. They are extremely swift in their motion, which is a kind of gallop, or a succession of quick leaps. When pursued, they always take to the

higher grounds: as their fore feet are much shorter than the hind ones, they run with more ease up-hill than down-hill. The hare is endowed with all those instincts which are necessary for his own preservation. In winter he chooses a form exposed to the south, and in summer to the north; and has a thousand contrivances to elude the vigilance of his pursuers, and to cut off his scent from the hounds. If it be rainy, the hare usually takes to the highways; and if she come to the side of a young grove, or spring, she seldom enters, but squats down till the hounds have over-shot her; and then she will return the very way she came, for fear of the wet and dew that hang on the boughs.—When she comes near brook-sides and plashe, she will make all her crossings, doublings, and workings. Some hares have been so crafty, that, as soon as they have heard the sound of a horn, they would instantly start out of their form, though it was at the distance of a quarter of a mile, and go and swim in some pool, and rest upon some rush-bed in the midst of it; and would not stir from thence till they have heard the sound of the horn again, and then have started out, swimming to land, and have stood up before the hounds for hours before they could kill them, swimming and using all subtilties and crossings in the water. Nay, such is the natural craft and subtilty of the hare, that sometimes after she has been hunted three hours, she will drive up a fresh hare, and squat in the same form herself. Others, having been hunted a considerable time, will creep under the door of a sheep-cot, and hide themselves among the sheep; or, when they have been hard hunted, will run in among a flock of sheep, and will by no means be gotten out from among them till the hounds are coupled up, and the sheep driven into their pens. Some of them will take the ground like a rabbit, and run up a wall, and hide in the grass on the top of it. Some hares will go up one side of the hedge and come down the other, the thickness of the hedge being the only distance between the courses. A hare that has been sorely hunted, has got upon a quickset hedge, and run a good way upon the top thereof, and then leapt off upon the ground. And they will frequently betake themselves to furze-bushes, and will leap from one to the other, to cut off the scent, whereby the hounds are frequently at fault.—In the spring-time or summer, a hare will not sit in bushes, because they are frequently infested with pismires, snakes, and adders; but will sit in corn-fields and open places. In the winter-time they sit near towns and villages, in tufts of thorns and brambles, especially when the wind is northerly or southerly.—It is remarkable that the hare, although ever so frequently pursued by the dogs, seldom leaves the place where she was brought forth, or even the form in which she usually sits. It is common to find them in the same place next day, after being long and keenly chased the day before. The females

are more gross than the males, and have less strength and agility; they are likewise more timid, and never allow the dogs to approach so near their form before rising as the males. They likewise practise more arts, and double more frequently, than the males. The hare is diffused almost over every climate; and, notwithstanding they are every-where hunted, their species never diminishes. They are in a condition of propagating the first year of their lives; the females go with young about thirty days, and produce four or five at a time; and, as soon as they have brought forth, they again admit the embraces of the male; so that they may be said to be always pregnant. The eyes of the young are open at birth; the mother suckles them about twenty days, after which they separate from her, and procure their own food. The young never go far from the place where they were brought forth; but still they live solitary, and make forms about thirty paces distant from each other: thus, if a young hare be found any where, you may almost be certain of finding several others within a very small distance.

The fecundity of the rabbit is still greater than that of the hare. They will breed seven times in the year, and the female sometimes brings eight young ones at a time. Supposing this to happen regularly for four years, the number of rabbits from a single pair will amount to one million two hundred seventy-four thousand eight hundred and forty.—They are in a condition for generating when six months old; and, like the hare, the female is almost constantly in season; she goes with young about thirty days, and brings forth from four to eight at a litter. A few days before littering, she digs a hole in the earth, not in a straight line, but in a zig-zag form: the bottom of this hole she enlarges every way, and then pulls off a great quantity of hair from her belly, of which she makes a kind of bed for her young. During the two first days after birth, she never leaves them but when pressed with hunger, and then she eats quickly and returns; and in this manner she suckles and attends her young for six weeks. All this time both the hole and the young are concealed from the male: sometimes, when the female goes out, she, in order to deceive the male, fills up the mouth of the hole with earth, mixed with her own urine. But when the young ones begin to come to the mouth of the hole, and to eat such herbs as the mother brings to them, the father seems to know them; he takes them betwixt his paws, smooths their hair, and caresses them with great fondness.

The fox is esteemed to be the most sagacious and most crafty of all beasts of prey. The former quality he shows in his method of providing himself with an asylum, where he retires from pressing dangers, where he dwells, and where he brings up his young: and his craftiness is chiefly discovered by the schemes he falls upon in order to catch lambs, geese, hens, and all kinds of small birds. The
fox.

fox fixes his abode on the border of a wood, in the neighbourhood of cottages : he listens to the crowing of the cock, and the cries of the poultry. He scents them at a distance; he chooses his time with judgment; he conceals his road as well as his design; he slips forward with caution, sometimes even trailing his body; and seldom makes a fruitless expedition. In this manner he has been seen, on a moon-light night, to enter a pasture where several hares were feeding, when lying down, and taking his tail in his mouth, he has trailed along like a rolling-stone, unsuspected by his prey, till he had got too near for them all to escape. If he can leap the wall, or get in underneath, he ravages the court-yard, puts all to death, and then retires softly with his prey, which he either hides under the herbage, or carries off to his kennel. He returns in a few minutes for another, which he carries off, or conceals in the same manner, but in a different place. In this way he proceeds till the progress of the sun, or some movements perceived in the house, advertise him that it is time to suspend his operations, and to retire to his den. He plays the same game with the catchers of thrushes, woodcocks, &c. He visits the nets and birdlime very early in the morning, carries off successively the birds which are entangled, and lays them in different places, especially near the sides of highways, in the furrows, under the herbage or brushwood, where they sometimes lie two or three days; but he knows perfectly where to find them when he is in need. He hunts the young hares in the plains, seizes old ones in their seats, never misses those which are wounded, digs out the rabbits in the warrens, discovers the nests of partridges and quails, seizes the mothers on the eggs, and destroys a vast quantity of game. The fox is exceedingly voracious; besides flesh of all kinds, he eats, with equal avidity, eggs, milk, cheese, fruits, and particularly grapes. When the young hares and partridges fail him, he makes war against rats, field-mice, serpents, lizards, toads, &c. Of these he destroys vast numbers; and this is the only service he does to mankind. He is so fond of honey, that he attacks the wild bees, wasps, and hornets. They at first put him to flight by a thousand stings; but he retires only for the purpose of rolling himself on the ground to crush them; and he returns so often to the charge, that he obliges them to abandon the hive, which he soon uncovers, and devours both the honey and wax. He will also devour fishes, lobsters, grass-hoppers, &c. Foxes produce but once a-year; and the litter commonly consists of four or five, seldom six, and never less than three. When the female is full, she retires, and seldom goes out of her hole, where she prepares a bed for her young. When she perceives that her retreat is discovered, and that her young have been disturbed, she carries them off one by one, and goes in search of another habitation. The fox, as well as the congenerous wolf, will produce with the dog kind, as noticed before. The fox sleeps sound, and may be easily approached without awakening: he sleeps in a round form, like the dog; but, when he only
 repose

reposes himself, he extends his hind legs, and lies on his belly. It is in this situation that he spies the birds along the hedges, and meditates schemes for catching them. The fox flies when he hears the explosion of a gun, or smells gunpowder. Being exceedingly fond of grapes, he does much mischief in vineyards.—When pursued by the hounds, he seldom fails to deceive and fatigue them, because he purposely passes through the thickest parts of the forest or places of the most difficult access, where the dogs are hardly able to follow him; and, when he takes to the plains, he runs straight out, without stopping or doubling.—He is a great admirer of his own tail, with which he frequently amuses and exercises himself, by running in circles to catch it: and, in cold weather, wraps it round his nose. The smell of this animal is in general very strong, but that of the urine is remarkably fetid. This seems so offensive even to itself, that it will take the trouble of digging a hole in the ground, stretching its body at full length over it; and there, after depositing its water, covers it over with the earth, as the cat does its dung. The smell is so obnoxious, that it has often proved the means of the fox's escape from the dogs; who have so strong an aversion at the filthy effluvia, as to avoid encountering the animal it came from. It is said the fox makes use of its urine as an expedient to force the cleanly badger from its habitation: whether that be the means, is rather doubtful; but that the fox makes use of the badger's hole is certain; not through want of ability to form its own retreat, but to save itself some trouble; for, after the expulsion of the first inhabitant, the fox improves as well as enlarges it considerably, adding several chambers, and providently making several entrances to secure a retreat from every quarter. In warm weather, it will quit its habitation for the sake of basking in the sun, or to enjoy the free air; but then it rarely lies exposed, but chooses some thick brake, that it may rest secure from surprise. Crows, magpies, and other birds, who consider the fox as their common enemy, will often, by their notes of anger, point out his retreat.

The stag or buck is the most crafty of all the species of deer. He conceals himself with great address, is most difficult to trace, and derives superior resources from instinct; for, though he has the misfortune to leave behind him a strong scent, which redoubles the ardour and appetite of the hounds, he knows how to withdraw himself from their pursuit, by the rapidity with which he begins his flight, and by his numerous doublings. He delays not his arts of defence till his strength fails him; but, as soon as he finds that the first efforts of a rapid chace have been unsuccessful, he repeatedly retraces his former steps; and after confounding, by these opposite movements, the direction he has taken, after intermixing the present with the past scent from his body, he rises from the earth by a great bound, and, retiring to a side, he lies down flat on his belly, and in this immovable

situation he allows the whole troop of his deceived enemies to pass very near him. His last refuge, when sorely hunted, is the foil, keeping the middle, fearing left, by touching a bough, or a shrub, he may give greater scent to the hounds. He always swims against the stream, and will often cover himself under water, so as to show nothing but his nose. Where opportunity of water fails, he will fly into herds of cattle, as cows, sheep, &c. and will sometimes leap on an ox, cow, or the like, that he may leave no scent on the ground. What is still more remarkable, it is related by the principal huntsman of Louis XII. that a buck which they had hunted for a long time, being at last hard pressed, leaped into the middle of a very large white-thorn, in order to cut off its scent; and there stood aloft till he was run through by the huntsman, rather than stir from the place to be worried by the dogs.—Their season of love commences about the end of August or beginning of September, when they leave the coppice, return to the forests, and search for the hinds. They cry with a loud voice; their neck and throat swell; they become extremely restless, and traverse in open day the fields and the fallow grounds: they strike their horns against the trees and hedges; in a word, they seem to be transported with fury, and run from country to country, till they find the hinds or females, whom they pursue and compel into compliance; for the female at first avoids and flies from the male, and never submits to his embraces till she is fatigued with the pursuit. The old hinds likewise come in season before the younger ones. When two bucks approach the same hind, they must fight before they enjoy. If nearly equal in strength, they threaten, paw the ground, set up terrible cries, and attack each other with such fury, that they often inflict mortal wounds with the strokes of their horns. The combat never terminates but in the defeat or flight of one of the rivals. The conqueror loses not a moment in enjoying his victory, unless another rival approaches, whom he is again obliged to attack and repel. The oldest stags are always masters of the field; because they are stronger and more furious than the young ones, who must wait patiently till their superiors tire, and quit their mistresses. Sometimes, however, the young stags accomplish their purpose while the old ones are fighting, and, after a hasty gratification, fly off. The hinds prefer the old stags, not because they are most courageous, but because they are much more ardent. It has been alleged, that, attracted by the scent of the hinds, the stags in the rutting-season throw themselves into the sea, and pass from one island to another at the distance of several leagues. They leap still more nimbly than they swim; for, when pursued, they easily clear a hedge or fence of six or seven feet high; and on all pressing occasions show astonishing sense and sagacity.

The senses of the wolf are likewise excellent, particularly his sense of smelling, which often extends farther than his eye. The odour of carrion strikes him at the distance

of more than a league. He likewise scents live animals very far, and hunts them a long time by following their track. When he issues from the wood, he never loses the wind. He stops on the borders of the forest, smells on all sides, and receives the corpuscles of living or dead animals brought to him from a distance by the wind. Though he prefers living to dead animals, yet he devours the most putrid carcases. He is fond of human flesh; and, if stronger, he would perhaps eat no other. Wolves have been known to follow armies, and to come in troops to the field of battle, where bodies are carelessly interred, to tear them up, and to devour them with an insatiable avidity; and, when once accustomed to human flesh, they ever after attack men, prefer the shepherd to the flock, devour women, and carry off children. The wolf, unlike the dog, is an enemy to all society, and keeps no company even with those of his own species. When several wolves unite together, it is not a society of peace, but of war; it is attended with tumult and dreadful howlings, and indicates an attack upon some large animal, as a stag, an ox, or a formidable mastiff. This military expedition is no sooner finished, than they separate, and each returns in silence to his solitude. There is even little intercourse between the males and females: they feel the mutual attractions of love but once a year, and never remain long together. The females come in season in winter: many males follow the same female; and this association is more bloody than the former; for they growl, chase, fight, and tear one another, and often sacrifice him that is preferred by the female. The female commonly flies a long time, fatigues her admirers, and retires, while they sleep, with the most alert or favourite male. The wolves copulate like dogs, and have an osseous penis, surrounded with a ring, which swells and hinders them from separating. When the females are about to bring forth, they search for a concealed place in the inmost recesses of the forest. The puppies come into the world blind, like dogs; the mother suckles them some weeks, and soon teaches them to eat flesh, which she prepares for them by tearing it into small pieces. Some time after she brings them field-mice, young hares, partridges, and live fowls. The young wolves begin by playing with these animals, and at last worry them; then the mother pulls off the feathers, tears them in pieces, and gives a part to each of her young. They never leave their den till the end of six weeks or two months. They then follow their mother, who leads them to drink in the hollow trunk of a tree, or in some neighbouring pool. She conducts them back to the den, or, when any danger is apprehended, obliges them to conceal themselves elsewhere. Though, like other females, the she-wolf is naturally more timid than the male, yet, when her young are attacked, she defends them with intrepidity; she loses all sense of danger, and becomes perfectly furious. She never leaves them till they are so strong as to need no assistance or protection, and till they

they have acquired talents fit for rapine. The wolf has great strength, especially in the anterior parts of the body, in the muscles of the neck, and jaws. He carries a sheep in his mouth, and at the same time outruns the shepherds; so that he can only be stopped or deprived of his prey by dogs. His bite is cruel, and always more obstinate in proportion to the smallness of the resistance; for, when an animal can defend itself, he is cautious and circumspect. He never fights but from necessity, and not from motives of courage. When wounded with a ball, he cries; and yet, when dispatching him with bludgeons, he complains not. When he falls into a snare, he is so overcome with terror, that he may be either killed or taken alive without resistance; he allows himself to be chained, muzzled, and led where you please, without exhibiting the least symptom of resentment or discontent. Wolves are now so rare in the populated part of America, that the inhabitants leave their sheep the whole night unguarded; yet the government of Pennsylvania and New Jersey did some years ago allow a reward of twenty shillings, and the last even thirty shillings, for the killing of a wolf. Tradition informed them what a scourge those animals had been to the colonies; so they wisely determined to prevent the like evil. In their infant state, wolves came down in multitudes from the mountains, often attracted by the smell of the corpses of hundreds of Indians who died of the small-pox, brought among them by the Europeans: but the animals did not confine their insults to the dead, but even devoured in their huts the sick and dying savages.—Britain, a few centuries ago, was much infested by them. They were, as appears by Hollingshead, very noxious to the flocks in Scotland in 1577; nor were they entirely extirpated till about 1680, when the last wolf fell by the hands of the famous Sir Owen Cameron. Edward I. issued out his royal mandate to Peter Corbet to superintend and assist in the destruction of them in the several counties of Gloucester, Worcester, Hereford, Salop, and Stafford; and in the adjacent county of Derby, certain persons at Wormhill held their lands by the duty of hunting and taking the wolves that infested the country, whence they were stiled *wolve-hunt*. To look back into the Saxon times, we find that in Athelstan's reign wolves abounded so in Yorkshire, that a retreat was built at Flixton in that county, "to defend passengers from the wolves, that they should not be devoured by them;" and such ravages did these animals make during winter, particularly in January, when the cold was severest, that the Saxons distinguished that month by the name of the *wolf-month*.—At the Cape of Good Hope, there is a species called the tiger-wolf, which is possessed of the peculiar gift of being enabled, in some measure, to imitate the cries of other animals; by which means this arch-deceiver is sometimes enabled to beguile and attract calves, foals, lambs, and other animals. Near some of the larger farms, where there is a great deal of cattle, this ravenous

beast is to be found almost every night; and at the same time frequently from one hour to another betraying itself by its howlings, gives the dogs the alarm. In this case the cunning of the wolves is so great, that a party of them, half flying and half defending themselves, will decoy the whole pack of dogs to follow them to the distance of a gun-shot or more from the farm, with a view to give an opportunity to the rest of the wolves to come out from their ambushade, and, without meeting with the least resistance, carry off booty sufficient for themselves and their fugitive brethren. The tiger-wolf, though a much larger and stronger animal, does not venture, without being driven to the utmost necessity, to measure its strength with the common dog, which is certainly an evident proof of its cowardice. Notwithstanding this, the Hottentots inform us, that it is still within the memory of man, that the tiger-wolf was bold enough to steal upon them and molest them in their huts, particularly by carrying off their children. This, however, is now no longer the case; a circumstance, perhaps, proceeding from the introduction of fire-arms into the country, an invention which, in these latter times, has caused this as well as other wild beasts to stand in greater awe of man than formerly. I have heard the following story of the tiger-wolf mentioned, which is laughable enough, though perhaps not quite so probable: "At a feast near the Cape one night, a trumpeter who had got his fill was carried out of doors, in order that he might cool himself, and get sober again. The scent of him soon drew thither a tiger-wolf, which threw him on his back, and dragged him along as a corpse, up towards Table-mountain. During this, however, the drunken musician waked, enough in his senses to know the danger of his situation, and to sound the alarm with his trumpet, which he carried fastened to his side. The wild beast, as may easily be supposed, was not less frightened in his turn." Any other besides a trumpeter would in such circumstances have been undoubtedly no better than wolf's meat.

The jackal appears to have the gift of scent equal to a dog, of which it seems to be a wild species. They go in packs of forty, fifty, and even two hundred; and hunt like hounds in full cry from evening to morning. They destroy flocks and poultry, but in a less degree than the wolf or fox: ravage the streets of villages and gardens near towns, and will even destroy children, if left unprotected. They will enter stables and outhouses, and devour skins, or any thing made of leather. They will familiarly enter a tent, and steal whatsoever they find from the sleeping traveller. In default of living prey, they will feed on roots and fruits; and even on the most infected carrion: they will greedily disinter the dead, and devour putrid carcases. They attend caravans, and follow armies, in hopes that death will provide them a banquet. Their voice naturally is a howl. Barking, Mr. Pennant observes, is latently inherent, and in their state of nature seldom exerted; but its different modi-

fications are adventitious, and expreffive of the new paffions and affections gained by a domeftic ftate. Their howlings and clamours in the night are dreadful, and fo loud that people can fcarcely hear one another fpeak. Dellon fays, their voice is like the cries of a great many children of different ages mixed together: when one begins to howl, the whole pack join in the cry. This animal is vulgarly called the *lion's provider*, from an opinion that it roufes the prey for that quadruped. The fact is, every creature in the foreft is fet in motion by the fearful cries of the jackals; the lion, and other beafts of rapine, by a fort of inftinct, attend to the chace, and lie in wait, to feize fuch timid animals as betake themfelves to flight at the noife of this nightly pack.

From what has been ftated, as well as from the contemplation of nature in general, it will appear, that there is an occult inftinctive principle infufed into the whole race of animal beings, whereby they are unerringly led on to the propagation and prefervation of their fpecies; yet fo as that no one fhall become too numerous for the exiftence of another, upon which they prey, or with which they live in a continual ftate of warfare. We may likewise remark, that the more fimilarity we difcover among brutes, the more amicable we find them towards each other, becaufe the corpuscles of their bodies have an agreement pleafing to their fenfitive faculty, without exciting the appetite—but for which the fame fpecies would inceffantly devour each other, and the purpofes of creation would be annihilated by the operation of its own works. Contrary however to fuch a violation of order, we find the beafts of the foreft, and brute animals in general, prey by *antipathy* upon thofe which are oppofite or inimical in fcent and fpecies to themfelves; and affociate by *fympathy* with thofe of fimilar and concordant qualities; but the moft powerful effect of fympathy is to be found between the male and female of one and the fame clafs of beings; as we fhall demonftrate more fatisfactorily and pleafingly, in our confiderations

ON MAN.

MAN is placed at the head of the animal creation; and is a being who feels, reflects, thinks, contrives, and acts; who has power of changing his place upon the earth at pleafure; who poffeffes the faculty of communicating his thoughts by means of fpeech; and who has dominion over all other creatures on the face of the globe. Animated and enlightened by a ray from the Divinity, he furpaffes in dignity every material being. He fpendf lefs of his time in folitude than in fociety, or in obedience to thofe laws which he himfelf has framed.

The hiftory of man is an object of attention highly interefting, whether we confider him in the different periods of his life, or take a view of the varieties of his

species, or examine the wonderful symmetry and construction of his parts in the womb, or the more mature completion and organization of his body in perfect manhood.—I shall therefore attempt first to give a short sketch of him in these different points of view; and then, by considering the actions and passions of his mind, the infirmities of his nature, the affections of his heart, the objects of his pursuits, and the impression of the celestial, elementary, and atmospherical influx; of light, heat, colour, motion, magnetism, electricity, and the universal spirit of nature which acts upon his constitution; deduce those obvious and inevitable causes that result from them, and which it should be the care of every man to know, who would wish to discover the golden KEY to the occult operations of Nature, and to the secret of preserving HEALTH and LONG LIFE.

Nosce teipsum, “Know thyself,” is a precept worthy of the lawgiver of Athens: it has been called the first step to wisdom, and was formerly written in letters of gold over the portal of the Temple of Diana. In pursuit of this important information, MAN may be contemplated in the following respects:

PHYSIOLOGICALLY,—as a frail machine, chiefly composed of nerves and fibres interwoven with each other. His most perfect state is during youth; and he is endowed with faculties more numerous, and in higher perfection, than those of all other animals. “Man, intended for exercising dominion over the whole animal creation, is sent by Nature into the world naked, forlorn, and bewailing his lot; he is then unable to use his hands or feet, and is incapable of acquiring any kind of knowledge without instruction; he can neither speak, nor walk, nor eat, nor perform any action whatever by natural instinct:” *Pliny*.—“We may judge what kind of life is allotted to us by Nature, since it is ordained, as an omen, that we should come weeping into the world:” *Seneca*.—“It is humiliating to the pride of man, to consider the pitiable origin of this most arrogant of all the animals:” *Pliny*.

DIETETICALLY.—*Cura valetudinem*. Bodily health and tranquillity of mind are more to be desired than all the riches, pomp, or glory, of a Cræsus, a Solomon, or an Alexander. Health is to be preserved by moderation; it is destroyed by abstinence, injured by a variety of delicacies, weakened by unusual things, and strengthened by the use of proper and accustomed fare. Man, learned in the pernicious art of cookery, is fond of many dishes, rendered palatable by the injurious effects of fire, and by the baneful addition of wine. “Hunger is satisfied with a small quantity of food, while luxury demands over-abundance. Imagination requires vast supplies; while nature is contented with a moderate quantity of ordinary food, and is burthened by superfluity:” *Seneca*.—According as thou livest, so shall thy life be enjoyed.

PATHOLOGICALLY.—*Memento mori!* The life of man resembles a bubble ready to burst; his fate is suspended by a hair, and is dependent on the uncertain lapse of time. “The earth contains nothing more frail than man:” *Homer*.—“Nothing is weaker than human life: to what dangers, and to how many diseases, is it not exposed! Hence the whole period of a man’s life is but a span: half of it is necessarily spent in a state resembling death; without including the years of infancy, wherein there is no judgment; or the period of old age, fertile in sufferings, during which the senses are blunted, the limbs become stiff, and the faculties of sight and hearing, the powers of walking, and the teeth, the instruments of nourishment, fail before the rest of the body:” *Pliny*.—“Thus a considerable part of death is suffered during life; and death possesses all that belonged to the times which are past. Finally, nature will speedily recal and destroy all the beings which thou seest, and all that thy imagination can suppose to exist hereafter; for death calls equally upon all, whether they be good or whether they be evil:” *Seneca*.

NATURALLY.—*Innocui vivite, Numen adest!* Man, the prince of animated beings, who is a miracle of nature, and for whom all things on this earth were created, is a mimic animal, weeping, laughing, singing, speaking; tractable, judicious, inquisitive, and most wise; he is weak and naked, unprovided with natural weapons, exposed to all the injuries of fortune, needful of assistance from others, of an anxious mind, solicitous of protection, continually complaining, changeable in temper, obstinate in hope, and slow in the acquisition of wisdom. He despises the time which is past, abuses that which is present, and sets his affections on the uncertain future; thus continually neglecting winged time, which, though infinitely precious, can never be recalled: for thus the best and readiest time, in every age, flies on with miserable mortals; some it summons to attend their daily and burthenful labours; some it confines to luxurious inaction, pampered even to suffocation with superfluities; some it solicits in the ever-restless paths of ambition; some it renders anxious for the acquisition of wealth, and distresses by the possession of the thing desired; some it condemns to solitude, and others to have their doors continually crowded with visitors; here one bewails the conduct of his children, there one grieves their loss. Tears will sooner fail us than their causes, which only oblivion can remove. “On every hand our evils overbalance our advantages; we are surrounded with dangers; we rush forward into untried situations; we are enraged without having received provocation; like wild beasts, we destroy those we do not hate; we wish for favourable gales, which lead us only to destruction; the earth yawns wide, ready for our death:” *Seneca*.—“Other animals unite together against enemies of a kind different from their own, while man suffers most injuries from his own species:” *Pliny*.

POLITICALLY.—*Esto antiqua virtute et fide!* Man, instead of following that which is right, is subjected to the guidance of manifest error; this envelopes all his faculties under the thick veil of custom, as soon as he is born; according to its dictates he is fed, educated, brought up, and directed in all things; and by its arbitrary rules his honesty, fortitude, wisdom, morality, and religion, are judged of; thus, governed by opinion, he lives conformably to custom, instead of being guided by reason. Though sent into the world a perishable being, (for all are evidently born to suffer,) instead of endeavouring to secure those things which are most advantageous and truly beneficial, he, infatuated by the smiles of fortune, anxiously collects her gaudy trifles for future enjoyment, and neglects her real benefits; he is driven to madness by envious snarlers; he persecutes with hatred the truly religious for differing from himself in speculative opinions; he excites numberless broils, not that he may do good, but for a purpose that even himself is ignorant of. He wastes his precious and irrecoverable time in trifles; he thinks lightly of immortal and eternal concerns, while regulating the succession of his posterity; and perpetually entering on new projects, forgetful of his real condition, he builds palaces instead of preparing his grave; till at length, in the midst of his schemes, death seizes him; and then, first opening his eyes, he perceives, O man! that all is delusion. “Thus we live as if immortal, and first learn in death that we have to die.” *Seneca.*

MORALLY.—*Benefac et letare!* Man is composed of an animated medullary substance, which prompts him to that which is right; and of a bodily frame liable to impressions which instigate him to the enjoyment of pleasure. In his natural state he is foolish, wanton, an inconsiderate follower of example, ambitious, profuse, dissatisfied, cunning, peevish, invidious, malicious, and covetous; by the influence of just morals he is transformed to be attentive, chaste, considerate, modest, temperate, quiet, sincere, mild, beneficent, grateful, and contented. “Sorrow, luxury, ambition, avarice, the desire of life, and anxiety for the future, are common to all animals.” *Pliny.*

THEOLOGICALLY.—*Memento Creatoris tui!* Man, the ultimate purpose of creation, and masterpiece of the works of Omnipotence, was placed on earth that he might contemplate its perfections; he was endowed with sapient reason, and made capable of forming conclusions from the impressions of his senses, that, from a consideration of created objects he might know their Creator as the Almighty, the Infinite, the Omniscient, the Eternal, God: that we may live morally under his governing care, it is requisite that we have a thorough conviction of his existence; and must have it ever in remembrance. “There are two things which lead to a knowledge of God; creation and revelation.” *Augustine.*—“God, therefore, may

be found out by the light of nature, but is only to be known by the assistance of doctrine:" *Tertullian*.—"Man alone has the inestimable privilege of contemplating the perfections of God, who is the author both of nature and of revelation:" *Ibid*.—"Learn that God has both ordered you to exist, and that you should study to act that part properly which is allotted for you in life:" *Perf. Sat. iii. 71*.

In the *Systema Naturæ*, MAN (*Homo*) is ranked as a distinct genus of the order *Primates* or "Chiefs," belonging to the *Mammalia* class of animals, or those which nourish their young by means of lactiferous teats or paps. Of this genus he is the only species: and denominated *Sapiens*, as being endowed with wisdom far superior to, or rather in exclusion of, all other animals.—He *varies*, from climate, education, and habits; and the following varieties, exclusive of *wild men*, are enumerated by Linnæus.

Americans. "Of copper-coloured complexion, choleric constitution, and remarkably erect."—Their hair is black, lank, and coarse; their nostrils are wide; their features harsh, and the chin is scantily supplied with beard. Are obstinate in their tempers, free and satisfied with their condition; and are regulated in all their proceedings by traditional customs.—Paint their skin with red streaks.

Europeans. "Of fair complexion, sanguine temperament, and brawny form." The hair is flowing, and of various shades of brown; the eyes are mostly blue.—They are of gentle manners, acute in judgment, of quick invention, and governed by fixed laws.—Dress in close vestments.

Asiatics. "Of sooty complexion, melancholic temperament, and rigid fibre."—The hair is strong, black, and lank; the eyes are dark brown. They are of grave, haughty, and covetous, manners; and are governed by opinions.—Dress in loose garments.

Africans. "Of black complexion, phlegmatic temperament, and relaxed fibre." The hair is black and frizzly; the skin soft and silky; the nose flat: the lips are thick; and the female has a natural apron, and long lax breasts.—They are of crafty, indolent, and careless, dispositions, and governed in their actions by caprice.—Anoint the skin with grease.

The following arrangement of the varieties in the human species is offered by Dr. Gmelin as more convenient than that of Linnæus:

a, White, (*Hom. albus*.) Formed by the rules of symmetrical elegance and beauty; or at least what we consider as such.—This division includes almost all the inhabitants of Europe; those of Asia on this side of the Oby, the Caspian, Mount Imaus, and the Ganges; likewise the natives of the north of Africa, of Greenland, and the Esquimaux.

b, Brown:

b, Brown: (*Hom. badius.*) Of a yellowish brown colour; has scanty hair, flat features, and small eyes.—This variety takes in the whole inhabitants of Asia not included in the preceding division.

c, Black: (*Hom. niger.*) Of black complexion; frizzly hair, flat nose, and thick lips.—The whole inhabitants of Africa, excepting those of its more northern parts.

d, Copper-coloured: (*Hom. cupreus.*) The complexion of the skin resembles the colour of copper not burnished.—The whole inhabitants of America, except the Greenlanders and Esquimaux.

e, Tawny: (*Hom. fuscus.*) Chiefly of a dark blackish-brown colour; having a broad nose, and harsh coarse straight hair.—The inhabitants of the southern islands, and of most of the Indian islands.

Monsters. Of these there are several varieties; the first and second of which, in the following list, are occasioned by peculiarity of climate, while the rest are produced by artificial management. 1. *Alpini*: The inhabitants of the northern mountains: they are small in stature, active, and timid in their dispositions. 2. *Patagonici*: The Patagonians of South America; of vast size, and indolent in their manners. 3. *Monorchides*: The Hottentots; having one testicle extirpated. 4. *Imberbes*: Most of the American nations; who eradicate their beards and the hair from every part of the body except the scalp. 5. *Macrocephali*: The Chinese; who have their heads artificially forced into a conical form. 6. *Plagiocephali*: The Canadian Indians, who have the fore part of their heads flattened, when young, by compression.

We have likewise the following account of monsters: *Homines feræ*; described as walking on all-fours, as being dumb, and as covered with hair.—1. A youth found in Lithuania, in 1761, resembling a bear. 2. A youth found in Hesse, in 1544, resembling a wolf. 3. A youth in Ireland resembling a sheep, (*Tulp. Obs. iv. 9.*) 4. A youth in Bamberg resembling an ox, (*Camerarius.*) 5. A wild youth found in 1724 in Hanover. 6. Wild boys found in 1719 in the Pyrenees. 7. A wild girl found in 1717 in Overyssel. 8. A wild girl found in 1631 in Champagne. 9. A wild lad found near Leyden, (*Boerhaave.*)—These and other instances of wild men, their similitudes, extraction, and generation, being foreign to the present subject, I shall treat largely of them in a future work on NATURAL HISTORY.*

Those characters in the form of man by which he is distinguished from brute animals, are reducible to two heads. The first is the strength of the muscles of the legs, by which the body is supported in a vertical position above them: the second consists in the articulation of the head with the neck by the middle of its base. We stand upright, bend our body, and walk, without thinking on the power by which we

* Since published at No. 17, Ave-Maria-Lane, St Paul's, in 14 vols. 8vo. See vol. i. of that work.

we are supported in these several positions. This power resides chiefly in the muscles which constitute the principal part of the calf of the leg. Their exertion is felt, and their motion is visible externally, when we stand upright and bend our body backwards and forwards. This power is no less great when we walk even on an horizontal plane. In ascending a height, the weight of the body is more sensibly felt than in descending. All these motions are natural to man. Other animals, on the contrary, when placed on their hind legs, are either incapable of performing them at all, or do it partially, with great difficulty, and for a very short time. The *gibbon*, and the *jocko* or *ourang-outang*, are the animals most resembling man in their construction: they can stand upright with much less difficulty than other brutes; but the restraint they are under in this attitude plainly shows that it is not natural to them. The reason is, that the muscles in the back part of the leg in the gibbon and the jocko are not, as in man, sufficiently large to form a calf, and consequently not sufficiently strong to support the thighs and body in a vertical line, and to preserve them in that posture.—The attitudes proper to man, and to the animals, are pointed out by the different manners in which the head is articulated with the neck. The two points, by which the osseous part of the head is connected with the first vertebra of the neck, and on which every movement of the head is made with the greatest facility, are placed at the edge of the great foramen of the occipital bone, which in man is situated near the centre of the base of the cranium, affords a passage for the medullary substance into the vertebræ, and determines the place of the articulation of the head with the neck. The body and neck being, according to the natural attitude, in a vertical direction, the head must be placed in equilibrium upon the vertebræ as upon a pivot or point of support. The face is on a vertical line, almost parallel to that of the body and neck. The jaws, which are very short compared with those of most other animals, extend very little farther forwards than the forehead.—No animal has, like man, its hind legs as long as the body, neck, and head, taken together, measuring from the top of the head to the os pubis.—In the frame of the human body the principal parts are nearly the same with those of other animals; but in the connection and form of the bones, there is as great a difference as in the attitudes proper to each. Were a man to assume the natural posture of quadrupeds, and try to walk by the help of his hands and feet, he would find himself in a very unnatural situation; he could not move his feet and head but with the greatest difficulty and pain; and, let him make what exertions he pleased, he would find it impossible to attain a steady and continued pace. The principal obstacles he would meet with would arise from the structure of the pelvis, the hands, the feet, and the head.—The plane of the great occipital foramen, which in man is almost horizontal, puts the head in a kind of equilibrium upon

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the

the neck when we stand erect in our natural attitude; but, when we are in the attitude of quadrupeds, it prevents us from raising our head so as to look forwards, because the movement of the head is stopped by the protuberance of the occiput, which then approaches too near the vertebræ of the neck.—In most animals, the foramen magnum of the occipital bone is situated at the back part of the head; the jaws are very long; the occiput has no protuberance beyond the aperture, the plane of which is in a vertical direction, or inclined a little forwards or backwards; so that the head is pendant, and joined to the neck by its posterior part. This position of the head enables quadrupeds, though their bodies are in a horizontal direction, to present their muzzle forwards, and to raise it so as to reach above them, or to touch the earth with the extremity of their jaws when they bring their neck and head down to their feet. In the attitude of quadrupeds, man could touch the earth only with the fore part or the top of the head.—When man is standing, his heel rests upon the earth as well as the other parts of his foot; when he walks, it is the first part which touches the ground; man can stand on one foot: these are peculiarities in structure and in the manner of moving which are not to be found in other animals. We may therefore conclude that man cannot be ranked in the class of quadrupeds. We may add, that in man the brain is much larger, and the jaws much shorter, than in any other animal. The brain, by its great extent, forms the protuberance of the occipital bone, the forehead, and all that part of the head which is above the ears. In animals, the brain is so small, that most of them have no occiput, or the front is either wanting or little raised. In animals which have large foreheads, such as the horse, the ox, the elephant, &c. they are placed as low, and even lower, than the ears. These animals likewise want the occiput, and the top of the head is of very small extent. The jaws, which form the greatest portion of the muzzle, are large in proportion to the smallness of the brain. The length of the muzzle varies in different animals: in folipede animals it is very long; it is short in the ourang-outang; and in man it does not exist at all. No beard grows on the muzzle.

Anatomists have employed much pains in the study of the material part of man, and of that organization which determines his place in the animal creation. From tracing and combining his different external parts; from observing that his body is in some places covered with hair; that he can walk upon his hands and his feet at the same time, in the manner of quadrupeds; that, like certain animals which hold their food in their paws, he has two clavicles; that the female brings forth her young alive, and that her breasts are supplied with milk; from these circumstances we might be led to assign man a place in the class of viviparous quadrupeds. But, in truth, such an arrangement would be defective, arbitrary, and absurd. Man is

not a quadruped: of all the animals, he alone can support himself continually, and without restraint, in an erect posture; (that is, with his head and body in a vertical line upon his legs.) In this majestic and dignified attitude, he can change his place, survey this earth which he inhabits, and turn his eyes towards the vault of heaven. By a noble and easy gait, he preserves an equilibrium in the several parts of his body, and transports himself from one place to another with different degrees of celerity. To man alone nature has denied a covering; but still he is her masterpiece, the last work which came from the hands of the Almighty Artist, the sovereign and the chief of animals, a world in miniature, the centre which connects the universe together. The form of his body, the organs whereof are constructed in such a manner as to produce a much greater effect than those of other animals, announces his power. Every thing demonstrates the excellence of his nature, and the immense distance placed by the bounty of the Creator between man and beast. Man is a reasonable being; brute animals are deprived of that noble faculty. The weakest and most stupid of the human race is able to manage the most sagacious quadruped; he commands it, and makes it subservient to his use. The operations of brutes are purely the effect of mechanical impulse, and continue always the same; human works are varied without end, and infinitely diversified in the manner of execution. The soul of man is free, independent, and immortal. He is fitted for the study of science, and the cultivation of art; he has the exclusive privilege of examining every thing which has existence, and of holding communication with his fellow-creatures by language, by particular motions of the body, and by marks and characters mutually agreed upon. Hence arises that physical pre-eminence which he enjoys over all animals; and hence that power which he possesses over the elements, and (so to speak) over nature itself. Man, therefore, is unequalled in his kind; but the individuals thereof differ greatly from one another in figure, stature, colour, manners, and dispositions. The globe which man inhabits is covered with the productions of his industry and the works of his hands: it is his labour, in short, which gives a value to the whole terrestrial mass.

Nothing (says M. Buffon) exhibits such a striking picture of our weakness as the condition of an infant immediately after birth. Incapable of employing its organs, it needs assistance of every kind. In the first moments of our existence, we present an image of pain and misery, and are more weak and helpless than the young of any other animal. At birth, the infant passes from one element to another: when it leaves the gentle warmth of the tranquil fluid by which it was completely surrounded in the womb of the mother, it becomes exposed to the impressions of the air, and instantly feels the effects of that active element. The air acting upon the olfactory nerves, and upon the organs of respiration, produces a

shock something like sneezing, by which the breast is expanded, and air is admitted into the lungs. In the mean time, the agitation of the diaphragm presses upon the viscera of the abdomen, and the excrements are thus for the first time discharged from the intestines, and the urine from the bladder. The air dilates the vesicles of the lungs, and, after being rarefied to a certain degree, is expelled by the spring of the dilated fibres re-acting upon this rarefied fluid. The infant now respire; and articulates sounds, or cries.—Most animals are blind for some days after birth: infants open their eyes to the light the moment they come into the world; but they are dull, fixed, and commonly blue. The new-born child cannot distinguish objects, because he is incapable of fixing his eyes upon them. The organ of vision is yet imperfect; the cornea is wrinkled; and perhaps the retina is too soft for receiving the images of external objects, and for communicating the sensation of distinct vision. At the end of forty days, the infant begins to hear and to smile. About the same time it begins to look at bright objects, and frequently to turn its eyes towards the window, a candle, or any light. Now likewise it begins to weep; for its former cries and groans were not accompanied with tears. Smiles and tears are the effect of two internal sensations, both of which depend on the action of the mind. Thus they are peculiar to the human race, and serve to express mental pain or pleasure; while the cries, motions, and other marks of bodily pain and pleasure, are common to man and most of the other animals. Considering the subject as metaphysicians, we shall find that pain and pleasure are the universal power which sets all our passions in motion.

The size of an infant born at the full time is commonly twenty-one inches; and that *fœtus*, which nine months before was an imperceptible bubble, now weighs ten or twelve pounds, and sometimes more. The head is large in proportion to the body; and this disproportion, which is still greater in the first stage of the *fœtus*, continues during the period of infancy. The skin of a new-born child is of a reddish colour, because it is so fine and transparent as to allow a slight tint of the colour of the blood to shine through. The form of the body and members is by no means perfect in a child soon after birth; all the parts appear to be swollen. At the end of three days, a kind of jaundice generally comes on, and at the same time milk is to be found in the breasts of the infant, which may be squeezed out by the fingers. The swelling decreases as the child grows up.

The liquor contained in the amnios leaves a viscid whitish matter upon the body of the child. In this country we have the precaution to wash the new-born infant only with warm water; but it is the custom with whole nations, inhabiting the coldest climates, to plunge their infants into cold water as soon as they are born, without their receiving the least injury. It is even said that the Laplanders leave their

their children in the snow till the cold has almost stopped their respiration, and then plunge them into a warm bath. Among these people, the children are also washed thrice a-day during the first year of their life. The inhabitants of northern countries are persuaded that the cold bath tends to make men stronger and more robust, and on that account accustom their children to the use of it from their infancy. The truth is, that we are totally ignorant of the power of habit, or how far it can make our bodies capable of suffering, of acquiring, or of losing.

The child is not allowed to suck as soon as it is born; but time is given for discharging the liquor and slime from the stomach, and the *meconium* or excrement, which is of a black colour, from the intestines. As these substances might sour the milk, a little diluted wine mixed with sugar is first given to the infant; and the breast is not presented to it before ten or twelve hours have elapsed.

The young of quadrupeds can of themselves find the way to the teat of the mother: it is not so with man; the mother, in order to suckle her child, must raise it to her breast; and, at this feeble period of life, the infant can express its wants only by its cries.

New-born children have need of frequent nourishment. During the day, the breast ought to be given to them every two hours, and during the night as often as they wake. At first they sleep almost continually; and they seem never to wake but when pressed by hunger or pain. Sleep is useful and refreshing to them; and it sometimes becomes necessary to employ narcotic doses, proportioned to the age and constitution of the child, for the purpose of procuring them repose. The common way of appeasing the cries of children is by rocking them in the cradle; but this agitation should be very gentle, otherwise a great risk is run of confusing the infant's brain, and of producing a total derangement. It is necessary to their being in good health, that their sleep be long and natural. It is possible, however, that they may sleep too much, and thereby endanger their constitution. In that case, it would be proper to take them out of the cradle, and awaken them by a gentle motion, or by presenting some bright object to their eyes. At this age we receive the first impressions from the senses, which, without doubt, are more important during the rest of life than is generally imagined. Great care ought to be taken to place the cradle in such a manner that the child shall be directly opposite to the light: for the eyes are always directed towards that part of the room where the light is strongest: and, if the cradle be placed sideways, one of them, by turning towards the light, will acquire greater strength than the other, and the child will squint. For the two first months, no other food should be given to the child but the milk of the nurse; and, when it is of a weak and delicate constitution, this nourishment alone should be continued during the third or fourth month. A child,

however

however robust and healthful, may be exposed to great danger and inconvenience, if any other aliment is administered before the end of the first month. In Holland, Italy, Turkey, and the whole Levant, the food of children is limited to the milk of the nurse for a whole year. The savages of Canada give their children suck for four, five, and sometimes even seven, years. In this country, as nurses generally have not a sufficient quantity of milk to satisfy the appetite of their children, they commonly supply the want of it by panada, or other light preparations.

The teeth usually begin to appear about the age of seven months. The cutting of these, although a natural operation, does not follow the common laws of nature, which act continually on the human body without occasioning the smallest pain, or even producing any sensation. Here a violent and painful effort is made, accompanied with cries and tears. Children at first lose their sprightliness and gaiety; they become sad, restless, and fretful. The gums are red, and swelled; but they afterwards become white, when the pressure of the teeth is so great as to stop the circulation of the blood. Children apply their fingers to their mouth, that they may remove the irritation which they feel there. Some relief is given, by putting into their hands a bit of ivory or of coral, or of some other hard and smooth body, with which they rub the gums at the affected part. This pressure, being opposed to that of the teeth, calms the pain for a moment, contributes to make the membrane of the gum thinner, and facilitates its rupture. Nature here acts in opposition to herself; and an incision of the gum must sometimes take place, to allow a passage to the tooth.

When children are allowed to cry too long and too often, ruptures are sometimes occasioned by the efforts they make. These may easily be cured by the speedy application of bandages; but, if this remedy has been too long delayed, the disease may continue through life. Children are very much subject to worms. Some of the bad effects occasioned by these animals might be prevented by giving them a little wine now and then, for fermented liquors have a tendency to prevent their generation.

Though the body is very delicate in the state of infancy, it is then less sensible of cold than at any other part of life. The internal heat appears to be greater: the pulse in children is much greater than in adults; from which we are certainly intitled to infer, that the internal heat is greater in the same proportion. For the same reason, it is evident that small animals have more heat than large ones; for the beating of the heart and of the arteries is always quicker in proportion to the smallness of the animal. The strokes of the heart in a sparrow succeed one another so rapidly, that they can scarcely be counted.

Till three years of age, the life of a child is very precarious. In the two or three following years, it becomes more certain; and at six or seven years of age, a child has a better chance of living than at any other period of life. From the bills of mortality published in London, it appears, that, of a certain number of children born at the same time, one half of them die the three first years: according to which, one half of the human race are cut off before they are three years of age. But the mortality among children is not near so great every-where as in London. M. Dupré de Saint Maur, from a great number of observations made in France, has shown that half of the children born at the same time are not extinct till seven or eight years have elapsed.

The period of infancy is followed by that of adolescence. This begins, together with puberty, at the age of twelve or fourteen, and commonly ends in girls at sixteen; and in boys at eighteen, but sometimes not till twenty-one, twenty-three, or twenty-five, years of age. According to its etymology (being derived from the Latin word *adolescencia*;) it is completed when the body has attained its full height. Thus, puberty accompanies adolescence, and precedes youth. This is the spring of life; this is the season of pleasures, of loves, and of graces: but alas! this smiling season is of short duration. Hitherto nature seems to have had nothing in view but the preservation and increase of her work: she has made no provision for the infant except what is necessary to its life and growth. It has lived, or rather enjoyed a kind of vegetable existence, which was shut up within itself, and which it was incapable of communicating. In this first stage of life, reason is still asleep: but the principles of life soon multiply; and man has not only what is necessary to his own existence, but what enables him to give existence to others. This redundancy of life, this source of health and vigour, can no longer be confined, but endeavours to diffuse and expand itself.

The age of puberty is announced by several marks. The first symptom is a kind of numbness and stiffness in the groins, accompanied with a new and peculiar sensation in those parts which distinguish the sexes. There, as well as in the arm-pits, small protuberances of a whitish colour appear, which are the germs of a new production, of a kind of hair by which these parts are afterwards to be veiled. The voice, for a considerable time, is rough and unequal; after which it becomes fuller, stronger, and graver, than it was before. This change may easily be distinguished in boys; but less so in girls, because their voices are naturally sharper. These marks of puberty are common to both sexes: but there are marks peculiar to each, such as the discharge of the menses and growth of the breasts, in girls; the beard, and the emission of semen, in boys: in short, the feeling of venereal desire, and the appetite which unites the sexes. Among all races of mankind, the
females

females arrive at puberty sooner than the males; but the age of puberty is different in different nations, and seems partly to depend on the temperature of the climate and the quality of the food. In all the southern countries of Europe, and in cities, the greatest part of girls arrive at puberty about twelve, and boys about fourteen, years of age. But in the northern parts, and in the country, girls scarcely arrive at puberty till they are fourteen or fifteen, and boys not till they are sixteen or seventeen. In our climate, girls, for the greatest part, have attained complete maturity at eighteen, and boys at twenty, years of age.

At the age of adolescence, and of puberty, the body commonly attains its full height. About that time, young people shoot out several inches almost at once. But there is no part of the human body which increases more quickly and more perceptibly than the organs of generation in both sexes. In males, this growth is nothing but an unfolding of the parts, an augmentation in size; but in females, it often occasions a shrinking and contraction, which have received different names from those who have treated of the signs of virginity.

Marriage is a state suitable to man, wherein he must make use of those new faculties which he has acquired by puberty. At this period of life, the desire of producing a being like himself is strongly felt. The external form and the correspondence of the organs of sex occasion without doubt that irresistible attraction which unites the sexes and perpetuates the race. By connecting pleasure with the propagation of the species, nature has provided most effectually for the continuance of her work. *Increase and multiply* is the express command of the Creator, and one of the natural functions of life. We may add, that at the age of puberty a thousand impressions act upon the nervous system, and reduce man to such a situation, that he feels his existence only in that voluptuous sense, which then appears to become the seat of his soul, which engrosses the whole sensibility of which he is susceptible, and which at length proceeds to such a height, that its attacks cannot long be supported without a general derangement of the whole machine. The continuance of such a feeling may sometimes indeed prove fatal to those who indulge in excessive enjoyment; but it is equally dangerous to those who obstinately persist in celibacy, especially when strongly solicited by nature to the contrary. The semen, being too long confined in the femal vessels, may, by its stimulant property, occasion diseases in both sexes, and excite irritations so violent as to reduce man to a level with the brutes, which, when acted upon by such impressions, are perfectly furious and ungovernable. When this irritation proceeds to extremity, it produces what is called the *furor uterinus* in women. The opposite habit, however, is infinitely more common, especially in the temperate, and above all in the frozen, zones. After all, excess is much more to be dreaded than continency.

nency. The number of dissolute and intemperate men afford us plenty of examples. Some have lost their memory, some have been deprived of sight, many have become early bald, and some have died, through mere weakness. In such a case, bleeding is well known to be fatal. Young men cannot be too often warned of the irreparable injury they may do to their health; and parents, to whose care they are entrusted, ought to employ all the means in their power to turn them from such dangerous excesses. But at the age of puberty, young men know not of how great importance it is to prolong this smiling season of their days, whereon the happiness or misery of their future life so much depends. Then they look not forward to futurity, nor reflect on what is past, nor enjoy present pleasures with moderation. How many cease to be men, or at least to have the faculties of men, before the age of thirty? Nature must not be forced: like a true mother, her object is the sober and discreet union of the sexes. It is sufficient to obey when she commands, and to answer when she calls. Neither must we forget here to mention and condemn an outrage committed against nature, the shameful practice of which endangers the loss of health, and the total ruin of the constitution; I mean that solitary libertinism, so extensively explained in the Medical Part of my edition of Culpeper, by which a man or woman, deceiving nature as it were, endeavours to procure those enjoyments which religion has forbidden except when connected with the happiness of being a parent. Such then is the physical order which the Author of Nature, the great preserver of the species as well as the individual, has appointed to induce man, by the attraction of pleasure, to propagate and continue his race.

According to the ordinary course of nature, women are not fit for conception till after the first appearance of the menses. When these stop, which generally happens about forty or fifty years of age, they are barren ever after. Their breasts then shrink and decay, and the voice becomes feebler. Some, however, have become mothers before they have experienced any menstrual discharge; and others have conceived at the age of sixty, and sometimes at a more advanced age. Such examples, though not unfrequent, must be considered as exceptions to the general rule; but they are sufficient to show that the menstrual discharge is not absolutely essential to generation. The age at which man acquires the faculty of procreating is not so distinctly marked. In order to the production of semen, the body must have attained a certain growth, which generally happens between twelve and eighteen years of age. At sixty or seventy, when the body begins to be enervated by old age, the voice becomes weaker, the semen is secreted in smaller quantities, and it is often unprolific. There are instances, however, of old men who have procreated at the age of eighty or ninety. Boys have been found who had the faculty of generating

at nine, ten, or eleven, years of age; and young girls who have become pregnant at the age of seven, eight, or nine. But such facts, which are very rare, ought to be considered as extraordinary phænomena in the course of nature.

At the age of puberty, or a few years after, the body attains its full stature. Some young men grow no taller after fifteen or sixteen, and others continue to grow till the age of twenty or twenty-three. At this period they are very slender; but by degrees the members swell and begin to assume their proper shape; and, before the age of thirty, the body in men has attained its greatest perfection with regard to strength, consistence, and symmetry. Adolescence ends at the age of twenty or twenty-five; and at this period youth (according to the division which has been made of the years of man's life into different ages) begins. It continues till the age of thirty or thirty-five.

The common stature of man is about five feet and three, four, five, six, or seven, inches; and of women about five feet and two, three, and four, inches. Men below five feet are of a small stature. The Laplanders do not exceed four feet and a half; and the natives of some other countries are still smaller. Women attain their full height sooner than men. Haller computes, that, in the temperate climates of Europe, the medium stature of men is about five feet and five or six inches. It is observed by the same author, that in Swisserland the inhabitants of the plains are taller than those of the mountains. It is difficult to ascertain with precision the actual limits of the human stature. In surveying the inhabited earth, we find greater differences in the statures of individuals than in those of nations. In the same climate, among the same people, and sometimes in the same family, there are men whose stature is either too tall or too diminutive.—The body, having acquired its full height during the period of adolescence, and its full dimensions in youth, remains for some years in the same state before it begins to decay. This is the period of manhood, which extends from the age of thirty or thirty-five to that of forty or forty-five years. During this stage, the powers of the body continue in full vigour, and the principal change which takes place in the human figure arises from the formation of fat in different parts. Excessive fatness disfigures the body, and becomes a very cumbersome and inconvenient load.

The body of a well-shaped man ought to be square, the muscles ought to be strongly marked, the contour of the members boldly delineated, and the features of the face well defined. In women, all the parts are more rounded and softer, the features are more delicate, and the complexion brighter. To man belong strength and majesty; gracefulness and beauty are the portion of the other sex.—Every thing in both sexes points them out as the sovereigns of the earth; even the external appearance of man declares his superiority to other living creatures. His body

is erect; his attitude is that of command; his august countenance, which is turned towards heaven, bears the impress of his dignity. The image of his soul is painted in his face; the excellence of his nature pierces through the material organs, and gives a fire and animation to the features of his countenance. His majestic deportment, his firm and emboldened gait, announce the nobleness of his rank. He touches the earth only with his extremity; he views it only at a distance, and seems to despise it. It has been justly observed, that the countenance of man is the mirror of his mind. In the looks of no animal are the expressions of passion painted with such energy and rapidity, and with such gentle gradations and shades, as in those of man. We know, that in certain emotions of the mind, the blood rises to the face, and produces blushing; and that in others the countenance turns pale. These two symptoms, the appearance of which depends on the structure and transparency of the reticulum, especially redness, constitute a peculiar beauty. In our climates, the natural colour of the face of a man in good health is white, with a lively red suffused upon the cheeks. Paleness of the countenance is always a suspicious symptom. That colour which is shaded with black is a sign of melancholy and of vitiated bile; and constant and universal redness is a proof that the blood is carried with too great impetuosity to the brain. A livid colour is a morbid and dangerous symptom; and that which has a tint of yellow is a sign of jaundice or repletion of bile. The colour of the skin is frequently altered by want of sleep or of nourishment, or by looseness and diarrhoea.

Notwithstanding the general similitude of countenance in nations and families, there is a wonderful diversity of features. No one, however, is at a loss to recollect the person to whom he intends to speak, provided he has once fully seen him. One man has liveliness and gaiety painted in his countenance, and announces beforehand, by the cheerfulness of his appearance, the character which he is to support in society. The tears which bedew the cheeks of another man would excite compassion in the most unfeeling heart. Thus the face of man is the rendezvous of the symptoms both of his moral and physical affections; tranquillity, anger, threatening, joy, smiles, laughter, malice, love, envy, jealousy, pride, contempt, disdain or indignation, irony, arrogance, tears, terror, astonishment, horror, fear, shame or humiliation, sorrow and affliction, compassion, meditation, particular convulsions, sleep, death, &c. &c. The difference of these characters is of sufficient importance to form a principal article in the natural history of man.

When the mind is at ease, all the features of the face are in a state of profound tranquillity. Their proportion, harmony, and union, point out the serenity of the thoughts. But, when the soul is agitated, the human face becomes a living canvass, whereon the passions are represented with equal delicacy and energy, where every

emotion of the soul is expressed by some feature, and every action by some mark; the lively impression of which anticipates the will, and reveals by pathetic signs our secret agitation, and those intentions which we are anxious to conceal. It is particularly in the eyes that the soul is painted in the strongest colours and with the most delicate shades.

The different colours of the eyes are, dark hazel, light hazel, green, blue, grey, and whitish-grey. The most common of these colours are hazel and blue, both of which are often found in the same eye. Eyes which are commonly called black are only dark hazel; they appear black in consequence of being contrasted with the white of the eye. Wherever there is a tint of blue, however slight, it becomes the prevailing colour, and outshines the hazel, with which it is intermixed, to such a degree, that the mixture cannot be perceived without a very narrow examination. The most beautiful eyes are those which appear black or blue. In the former, there is more expression and vivacity; in the latter, more sweetness and perhaps delicacy. Next to the eyes, the parts of the face by which the physiognomy is most strongly marked are the eye-brows. Being of a different nature from the other parts, their effect is increased by contrast. They are like a shade in a picture, which gives relief to the other colours and forms.

The forehead is one of the largest parts of the face, and contributes most to its beauty. Every body knows of how great importance the hair is in the physiognomy, and that baldness is a very great defect. When old age begins to make its approach, the hair which first falls off is that which covers the crown of the head and the parts above the temples. We seldom see the hair of the lower part of the temples, or of the back of the head, completely fall off. Baldness is peculiar to men; women do not naturally lose their hair, though it becomes white, as well as that of men, at the approach of old age.

The nose is the most prominent feature of the face; but, as it has very little motion, and that only in the most violent passions, it contributes less to the expression than to the beauty of the countenance. The nose is seldom perpendicular to the middle of the face, but for the most part is turned to one side or the other. The cause of this irregularity, which, according to the painters, is perfectly consistent with beauty, and of which even the want would be a deformity, appears to be frequent pressure on one side of the cartilage of the child's nose against the breast of the mother when it receives suck. At this early period of life, the cartilages and bones have acquired very little solidity, and are easily bent, as may be observed in the legs and thighs of some individuals, who have been injured by the bandages of the swaddling clothes.

Next to the eyes, the mouth and lips have the greatest motion and expression. These motions are under the influence of the passions. The mouth, which is set off by the vermilion of the lips and the enamel of the teeth, marks, by the various forms which it assumes, their different characters. The organ of the voice likewise gives animation to this feature, and communicates to it more life and expression than is possessed by any of the rest. The cheeks are uniform features, and have no motion or expression excepting from that involuntary redness or paleness with which they are covered in different passions; such as shame, anger, pride, and joy, on the one hand; and fear, terror, and sorrow, on the other.

In different passions, the whole head assumes different positions, and is affected with different motions. It hangs forward during shame, humility, and sorrow; it inclines to one side in languor and compassion; it is elevated in pride; erect and fixed in obstinacy and self-conceit; in astonishment it is thrown backwards; and it moves from side to side in contempt, ridicule, anger, and indignation.—In grief, joy, love, shame, and compassion, the eyes swell and the tears flow. The effusion of tears is always accompanied with an extension of the muscles of the face, which opens the mouth.—In sorrow, the corners of the mouth are depressed, the under lip rises, the eye-lids fall down, the pupil of the eye is raised and half concealed by the eye-lid. The other muscles of the face are relaxed, so that the distance between the eyes and the mouth is greater than ordinary; and consequently the countenance appears to be lengthened.—In fear, terror, consternation, and horror, the forehead is wrinkled, the eye-brows are raised, the eye-lids are opened as wide as possible, the upper lid uncovers a part of the white above the pupil, which is depressed and partly concealed by the under lid. At the same time the mouth opens wide, the lips recede from each other, and discover the teeth both above and below.—In contempt and derision, the upper lip is raised at one side and exposes the teeth, while the other side of the lip moves a little, and wears the appearance of a smile. The nostril on the elevated side of the lip shrivels up, and the corner of the mouth falls down. The eye on the same side is almost shut, while the other is open as usual; but the pupils of both are depressed, as when one looks down from a height.—In jealousy, envy, and malice, the eye-brows fall down and are wrinkled; the eye-lids are elevated, and the pupils are depressed. The upper lip is elevated on both sides, while the corners of the mouth are a little depressed, and the under lip rises to join the middle of the upper.—In laughter, the corners of the mouth are drawn back and a little elevated; the upper part of the cheeks rise; the eyes are more or less closed; the upper lip rises, and the under one falls down; the mouth opens; and, in cases of immoderate laughter, the skin of the nose wrinkles. That gentler and more gracious kind of laughter which is called *smiling*, is seated

wholly

wholly in the parts of the mouth. The under lip rises; the angles of the mouth are drawn back; the cheeks are puffed up; the eye-lids approach one another; and a small twinkling is observed in the eyes. It is very extraordinary, that laughter may be excited either by a moral cause without the immediate action of external objects, or by a particular irritation of the nerves without any feeling of joy. Thus an involuntary laugh is excited by a slight tickling of the lips, of the palm of the hand, of the sole of the foot, of the arm-pits, and below the middle of the ribs. We laugh when two dissimilar ideas, the union of which was unexpected, are presented to the mind at the same time; and when one or both of these ideas, or their union, include some absurdity which excites an emotion of disdain mingled with joy. In general, striking contrasts never fail to produce laughter.—A change is produced in the features of the countenance by weeping as well as by laughing. When we weep, the under lip is separated from the teeth, the forehead is wrinkled, the eye-brows are depressed, the dimple, which gives a gracefulness to laughter, forsakes the cheek; the eyes are more compressed, and almost constantly bathed in tears, which in laughter flow more seldom and less copiously.

The arms, hands, and every part of the body, contribute to the expression of the passions. In joy, for instance, all the members of the body are agitated with quick and various motions. In languor and sorrow, the arms hang down, and the whole body remains fixed and immoveable. In admiration and surprise, this total suspension of motion is likewise observed. In love, desire, and hope, the head and eyes are raised to heaven, and seem to solicit the wished-for good; the body leans forward, as if to approach it; the arms are stretched out, and seem to seize beforehand the beloved object. On the contrary, in fear, hatred, and horror, the arms seem to push backward and repel the object of our aversion; we turn away our head and eyes as if to avoid the sight of it; we recoil in order to shun it.

Although the human body is externally much more delicate than that of any other animal, yet it is very nervous, and perhaps stronger in proportion to its size than that of the strongest animals. We are assured that the porters at Constantinople carry burdens of nine hundred pounds weight, yet drink nothing but water. A thousand wonderful stories are related of the Hottentots and other savages, concerning their agility in running. Civilized man knows not the full extent of his powers, nor how much he loses by that effeminacy and inactivity by which they are weakened and destroyed. He is contented even to be ignorant of the strength and vigour which his members are capable of acquiring by motion, and by being accustomed to severe exercises, as is observed in runners, tumblers, and rope-dancers. The conclusion is, therefore, founded on the most just and indisputable induction and

analogy.—The attitude of walking is less fatiguing to man than that in which he is placed when he is stopped in running. Every time he sets his foot upon the ground, he passes over a more considerable space; the body leans forward, and the arms follow the same direction; the respiration increases, and breathing becomes difficult. Leaping begins with great inflexions of the members; the body is then much shortened, but immediately stretches itself out with a great effort. The motions which accompany leaping make it very fatiguing.

It is observed that a cessation from exercise is not alone sufficient to restore the powers of the body when they are exhausted by fatigue. The springs, though not in action, are still wound up while we are awake, even when every movement is suspended. In *sleep* nature finds that repose which is suited to her wants; and the different organs enjoy a salutary relaxation. This is that wonderful state in which man, unconscious of his own existence, and sunk in apparent death, repairs the loss which his faculties have sustained, and seems to assume a new existence. In this state of drowsiness and repose, the senses cease to act, the functions of the body are suspended, and it seems abandoned to itself. The external symptoms of sleep, which alone are the objects of our attention, are easily distinguished. At the approach of sleep, the eyes begin to wink, the eye-lids fall down, the head nods and hangs down: its fall astonishes the sleeper; he starts up, and makes an effort to drive away sleep, but in vain; a new inclination, stronger than the former, deprives him of the power of raising his head; his chin rests upon his breast, and in this position he enjoys a tranquil sleep.

The age of decline extends from forty or forty-five to sixty or sixty-five years of age. At this time of life, the diminution of the fat is the cause of those wrinkles which begin to appear in the face and some other parts of the body. The skin, not being supported by the same quantity of fat, and being incapable, from want of elasticity, of contracting, sinks down and forms folds. In the decline of life, a remarkable change takes place also in vision. In the vigour of our days, the crystalline lens, being thicker and more diaphanous than the humours of the eye, enables us to read letters of a small character at the distance of eight or ten inches. But, when the age of decline comes on, the quantity of the humours of the eye diminishes, they lose their clearness, and the transparent cornea becomes less convex. To remedy this inconvenience, we place what we wish to read at a greater distance from the eye: but vision is thereby very little improved, because the image of the object becomes smaller and more obscure. Another mark of the decline of life is a weakness of the stomach, and indigestion, in most people who do not take sufficient exercise in proportion to the quantity and the quality of their food.—At sixty, sixty-three, or sixty-five, years of age, the signs of decline become more and more

visible, and indicate *old age*. This period commonly extends to the age of seventy, sometimes to seventy-five, but seldom to eighty. When the body is extenuated and bent by old age, man then becomes *crazy*. Craziness therefore is nothing but an *infirm old age*. The eyes and stomach then become weaker and weaker; leanness increases the number of the wrinkles; the beard and the hair become white; the strength and the memory begin to fail.—After seventy, or at most eighty years of age, the life of man is nothing but labour and sorrow: such was the language of David near three thousand years ago. Some men of strong constitutions, and in good health, enjoy old age for a long time without decrepitude; but such instances are not very common. The infirmities of decrepitude continually increase, and at length death concludes the whole. This fatal term is uncertain. The only conclusions which we can form concerning the duration of life, must be derived from observations made on a great number of men who were born at the same time, and who died at different ages.

The signs of *decrepitude* form a striking picture of weakness, and announce the approaching dissolution of the body. The memory totally fails; the nerves become hard and blunted; deafness and blindness take place; the senses of smell, of touch, and of taste, are destroyed; the appetite fails; the necessity of eating, and more frequently that of drinking, are alone felt; after the teeth fall out, mastication is imperfectly performed, and digestion is very bad; the lips fall inwards; the edges of the jaws can no longer approach one another; the muscles of the lower jaw become so weak, that they are unable to raise and support it; the body sinks down; the spine is bent outward; and the vertebræ grow together at the anterior part; the body becomes extremely lean: the strength fails; the decrepid wretch is unable to support himself; he is obliged to remain on a seat, or stretched in his bed: the bladder becomes paralytic; the intestines lose their spring; the circulation of the blood becomes slower; the strokes of the pulse no longer amount to the number of eighty in a minute, as in the vigour of life, but are reduced to twenty-four, and sometimes fewer: respiration is slower; the body loses its heat; the circulation of the blood ceases; death follows; and the dream of life is no more.

Man, however, has no right to complain of the shortness of life. Throughout the whole of living beings, there are few who unite in a greater degree all the internal causes which tend to prolong its different periods. The term of gestation is very considerable; the rudiments of the teeth are very late in unfolding; his growth is slow, and is not completed before about twenty years have elapsed.—The age of puberty, also, is much later in man than in any other animal. In short, the parts of his body, being composed of a softer and more flexible substance, are not

so soon hardened as those of inferior animals. Man, therefore, seems to receive at his birth the seeds of a long life: if he reaches not the distant period which nature seemed to promise him, it must be owing to accidental or acquired causes, foreign to himself. Instead of saying that he has finished his life, we ought rather to say that he has not completed it.—The natural and total duration of life is in some measure proportioned to the period of growth. A tree or an animal, which soon acquires its full size, decays much sooner than another which continues to grow for a longer time. If it be true that the life of animals is eight times longer than the period of their growth, we might conclude that the boundaries of human life may be extended to a century and a half.

It does not appear that the life of man becomes shorter in proportion to the length of time the world has existed. In the days of the Psalmist, the ordinary limits of human life did not exceed seventy or eighty years. No king of Judah lived beyond that period. When the Romans, however, were numbered by Vespasian, there were found in the empire, in that age of effeminacy, ten men aged an hundred and twenty and upwards. Among the princes of modern times, Frederic the Great of Prussia lived to the age of 74. George II. of Britain lived to that of 77. Louis XIV. lived to the same age. Stanislaus King of Poland and Duke of Lorraine exceeded that age. Pope Clement XII. lived to the age of 80. George I. of Britain attained the age of 83. William Lecomte, a shepherd, died suddenly in 1776, in the county of Caux in Normandy, at the age of 110. Cramers, physician to the emperor, saw at Temeswar two brothers, the one aged 110 and the other 112, both of whom were fathers at that age. Saint Paul the hermit was 113 at his death. The Sieur Ifwan-Horwathis, knight of the order of St. Louis, died at Sar-Albe in Lorraine, in 1775, aged almost 111; he was a great hunter; he undertook a long journey a short time before his death, and performed it on horseback. Rosine Iwiwarouska died at Minsk in Lithuania at the age of 113. Fockjel Johannes died at Oldeborn in Friesland, aged 113 years and 16 days. Marsk Jones died in the year 1775 at Villejac in Hungary, aged 119. John Niethen of Bakler in Zealand lived to the age of 120. Eleonora Spicer died in 1773, at Accomack in Virginia, aged 121. John Argus was born in the village of Lastua in Turkey, and died the 6th of March 1779, at the age of 123; having six sons and three daughters, by whom he had posterity to the fifth generation; they amounted to the number of 160 souls, and all lived in the same village: his father died at the age of 120. In December 1777, there lived in Devonshire a farmer named John Brookey, who was 134 years of age, and had been fifteen times married. The Philosophical Transactions mention an Englishman, of the name of Eccleston, who lived to the age of 143. Another Englishman, of the name of Effingham, died in 1757, at
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the age of 144. Niels Jukens, of Hammerfet in Denmark, died in 1764, aged 146. Christian Jacob Drakemberg died in 1770 at Archufen, in the 146th year of his age: this old man of the north was born at Stavangar in Norway in 1624, and at the age of 130 married a widow of 60. In Norway some men have lived to the age of 150. John Rovin, who was born at Szatlova-Carantz-Betcher, in the bannat of Temeswar, lived to the age of 172, and his wife to that of 164, having been married to him during the space of 147 years: when Rovin died, their youngest son was 99 years of age. Peter Zoten, a peasant, and a countryman of John Rovin, died in 1724, at the age of 185: his youngest son was then 97 years of age. The history and whole-length pictures of John Rovin, Henry Jenkins, and Peter Zoten, are to be seen in the library of H. R. H. Prince Charles at Brussels. Hanovins, professor at Dantzic, mentions in his Nomenclature an old man who died at the age of 184; and another still alive in Wallachia, whose age, according to this author, amounted to 186. Thomas Parr, of Shropshire, died November 16, 1635, aged 152. Henry Jenkins, of Yorkshire, died December 8, 1670, aged 169. Robert Montgomery, of Yorkshire, died in 1670, aged 196. James Sands, of Staffordshire, aged 140, and his wife, 120. The Countess of Desmond, of Ireland, aged 140. J. Sagar, of Lancashire, died in 1668, aged 112. — Laurence, of Scotland, aged 140. Simon Sack, of Trionia, died May 30, 1764, aged 141. Col. Thomas Winslow, of Ireland, died August 26, 1766, aged 146. Francis Confiit, of Yorkshire, died in January 1768, aged 150. Margaret Forster, aged 136, and her daughter, aged 104, of Cumberland, were both living in 1771. Francis Bons, of France, died Feb. 6, 1769, aged 121. James Bowels, of Killingworth, aged 152. John Tice, of Worcestershire, died March 1774, aged 125. John Mount, of Scotland, died Feb. 27, 1766, aged 136. A. Goldsmith, of France, died in June 1776, aged 140. Mary Yates, of Shropshire, died in 1776, aged 128. John Bales, of Northampton, died April 5, 1766, aged 126. William Ellis, of Liverpool, died August 16, 1780, aged 130. Louisa Truxo, a negress of Tucomea, South America, was living October 5, 1780, aged 175. Margaret Patten, of Lockneugh near Paisley, aged 138. Janet Taylor, of Fintray, Scotland, died October 10, 1780, aged 108. Richard Lloyd, of Montgomery, aged 133. Sufannah Hilliar, of Piddington, Northamptonshire, died Feb. 19, 1781, aged 110. Ann Cockbolt, of Stoke-Bruerne, Northamptonshire, died April 5, 1775, aged 105. James Ayley, of Middlewich, Cheshire, died March 17, 1781, aged 112. William Walker, who was a soldier at the battle of Edgehill, lived to the age of 112. Hippocrates, physician, of the island of Cos, aged 104. Democritus, philosopher, of Abdera, aged 109. Galen, physician, of Pergamus, aged 140. Albuna Marc, of Ethiopia, aged 150. Dumitur Raduly, of Haromfzeck, Transylvania,

Transylvania, died Jan. 12, 1782, aged 140. Titus Fullomius, of Bononia, aged 150. Abraham Paiba, of Charlestown, South Carolina, aged 142. L. Tertulia, of Arminium, aged 137. Lewis Cornaro, of Venice, aged 100. Robert Blake-ney, Esq. of Armagh, Ireland, aged 114. Margaret Scott, of Dalkeith, Scotland, aged 125. W. Gulstone, of Ireland, aged 140. J. Bright, of Ludlow, aged 105. William Postell, of France, aged 120. Jane Reeves, of Essex, aged 103. W. Paulet, Marquis of Winchester, of Hampshire, aged 106. John Wilson, of Suffolk, aged 116. Patrick Wian, of Lesbury, Northumberland, aged 115. M. Laurence of Arcades, aged 140. Evan Williams, of Caermarthen work-house, was alive in October 1782, aged 145. John Jacobs, of Mount Jura, aged 121. This man, in 1789, at the age of 120, quitted his native hills, and from the summit of Mount Jura undertook a journey to Versailles, to behold and return thanks to the national assembly for the vote which had freed him and his poor countrymen from the feudal yoke. In the early part of his life, he was a servant in the family of the Prince de Beaufremont. His memory continued good to the last day of his life; and the principal inconveniences which he felt from his great age were, that his sight was weakened, and the natural heat of his body was diminished, that he shivered with cold in the middle of the dog-days if he was not fitting by a good fire. This old man was received in the body of the house by the national assembly, indulged with a chair, and directed to keep on his hat lest he should catch cold if he were to sit uncovered. A collection was made for him by the members, which exceeded 500l. sterling; but he lived not to return to Mount Jura. He was buried on Saturday the 31st of January 1790, with great funeral pomp, in the parish-church of St. Eustace, at Paris. Mathew Tait, of Auchinleck, Airshire, died Feb. 19, 1792, aged 123: he served as a private at the taking of Gibraltar in 1704. Donald Macleod, of the Isle of Sky, was living in May 1793, aged 105. There was living in Portsmouth poor-house, in May 1793, one Elizabeth Bennett, aged 104 years.

Before we proceed to assign the common causes of longevity, it is proper to inquire into the manner of life and the situation of those by whom it has been enjoyed. We find, then, that those who have lived to the greatest age have been such as did not attain their full growth till a very advanced period of life, and who have kept their appetites and passions under the most complete subjection. In a word, those who have exceeded 100 years, have in general been robust, laborious, sober, and careful to observe the strictest regimen. Enjoying a good constitution from nature, they have seldom or never been subject to disease. They have even enjoyed the greatest health and vigour, and retained the use of their senses, to the last moment of their lives.

Among those who have led a life of contemplation and study, many have reached a very advanced age. Longevity is frequent among the different orders of religious, who by their statutes are confined to a moderate diet, and obliged to abstain from wine and the use of meat. Some celebrated anchorets have lived to a great age while they fed upon nothing but the wild roots and fruits which they found in the desert whither they had retired. The philosopher Xenophilus, who lived to the age of 106, was of the Pythagorean sect. It is well known, that those philosophers who held the transmigration of souls denied themselves the use of meat, because they imagined that killing an animal would be to assassinate another self. A country life has produced many sound and vigorous old men. It is supposed that a happy old age is attained with greater difficulty in towns than in the country. Sir Hans Sloane, Duverney, and Fontenelle, however, are instances of men whose lives have been spent in cities, and yet extended to a very great length. It has been observed, that men deprived of reason live very long; which is to be imputed to their being exempt from those inquietudes which are the most deadly poison. Persons possessing a sufficiently good understanding, but destitute of ambition, have been found to enjoy very long life. Men who are devoid of pretensions, who are free from those cares which a desire of shining by a display of talents, or of acquiring dignity and power, necessarily brings in its train, who feel no regret for the past nor anxiety about the future, are strangers to those torments of the mind which waste and consume the body. To that tranquillity of soul, which is so excellent a prerogative of infancy, they add that of being long young by physical constitution, on which the moral has a striking and powerful influence.

Premature wisdom, and early talents, are often fitter to excite astonishment than expectation. The rapid unfolding of the moral faculties, by shortening the period of youth, seems to diminish in proportion the total duration of life. We have known a young lady of seventeen, who could speak very correctly seven languages: she translated and wrote Latin, Greek, Italian, Spanish, German, English, and French; but she died at the age of eighteen. The young man by whom she was asked in marriage, having been informed that he could not obtain her hand till he had made himself worthy of her by the same degree of talents and information, died the same year, and at the same age.

From the preceding observations, Haller has attempted to deduce the causes why a few men are longer exempted than others from the common fate.—The circumstances which oppose their influence are independent of our will; such as the ravages of epidemic distempers; trouble and anxiety of mind, which create diseases in the body: or the torments of ambition. It is necessary to live in a salubrious climate; to enjoy a fortune sufficiently easy to exclude those uneasy desires which

create a feeling of want and privation; to be descended from healthy parents, to avoid drinking wine in youth; to drink water; and to eat little meat, and a great deal of vegetables. It is necessary also to be temperate in meals; moderate in pleasures, study, and exercise; to be naturally inclined to cheerfulness; and to allot a due time to sleep and repose.—Long life is certainly very rare; but, as has been already observed, we must distinguish between what is natural to the constitution of man and that which is the consequence of his condition. By the former he is made to be long-lived: but nature is arrested in her course by local and accidental causes, which it is not always in our power to avoid.

Let us take a retrospective view of man's life from his infancy, and enumerate the chief of these different causes. Of a thousand infants, extracted from the London bills of mortality, twenty-three died almost as soon as they came into the world; teething carried off fifty, and convulsions two hundred and seventy-seven: eighty died of the small-pox, and seven of the measles. Among the adult females, eight at least died in child-bed: consumption and asthma, diseases more frequent in England than in France, carried off a hundred and ninety-one of the same sex, and almost a fifth part of the full-grown men. A hundred and fifty died of fevers. At a more advanced age, twelve died of apoplexy, and forty-one of dropsy, without mentioning those to whom diseases of little importance in themselves became mortal. There only remained seventy-eight whose death could be ascribed to old age; and of these twenty-seven lived to the age of eighty and upwards. Among the different diseases of which we have just now seen the fatal effects, and which carry off more than nine-tenths of mankind, not one, it must be allowed, is natural to the constitution. The inhabitants of this island are in general but little subject to diseases, excepting the small-pox and the measles; and many of them enjoy uninterrupted health to old age.—And here it may be proper to mention what are the most prevalent diseases in other countries, which prove equally fatal to the duration of human life. In northern climates, scurvy, the cholic of the Laplanders, and the diseases of the lungs, most frequently occasion death. In temperate climates, dropsy carries off a great many at the beginning of old age, which is the boundary of life in the greatest part of both sexes, when they have escaped the acute diseases, such as putrid fever, &c. Acute diseases are most common in warm countries. In some places, the rays of the sun kill in a few hours those who are exposed to its burning heat. The air of Egypt and of Asia Minor engenders the plague, by which one half of their inhabitants are carried off. Between the tropics men are subject to dysenteries and violent fevers. The cold of the night, in warm climates, occasions sometimes violent diseases, such as palsy, quinsy, and a swelling of the head. Damp and marshy places give rise to fevers

of a different kind, but also very dangerous. The life of sailors has a great tendency to produce scurvy. How many professions prove fatal to the health, and hasten that period which nature would have brought on by slow degrees! Miners, stone-cutters, gilders, persons employed in emptying privies, &c. are subject to diseases of the lungs, and become paralytic. Other professions of life bring on other accidents, of which it would carry us too far to give a particular account. What has been said is sufficient to show, that it is the dangers with which we are surrounded that shorten the period of human existence.

By examining the list of those who have attained a great age, it will be found that mankind are longer lived in northern than in southern countries. It has been observed, that there are more old men in mountainous and elevated situations than in plains and low countries. We repeat it, if the duration of life among the inhabitants of southern climates be compared with the duration of life in northern nations, it will be allowed, that the latter enjoy both longer life and better health than the former. Their growth being retarded by the rigour of the climate, their decay must also be slower, because of the proportion which exists between the growth of animals and the length of their lives. Among ten persons who have lived to the age of an hundred, eight or nine will be found to have lived in the north.

It appears from the bills of mortality, that in the country more boys are born than girls; in cities, on the contrary, the number of females is commonly greatest. Observations made with great care prove, that in most countries there are fewer men alive than women, and that more males die, chiefly at the first and last periods of life. In Sweden, the whole number of females, in 1763, was to that of males in the proportion of ten to nine. The number of old women who exceeded eighty years of age was to that of old men of the same age in proportion of thirty-three to nineteen; and there were more women than men who had attained the age of eighty-six, in proportion of almost two to one.

Dr. Price made observations, after Dr. Percival, on the difference of longevity, and the duration of human life, in towns, country-parishes, and villages; of which the following is the result: a greater number in proportion die in great towns than in small ones, and a greater number in the latter than in villages. The cause of this difference, which is found to be very great, must be, in the first place, the luxury and dissipation which prevail in towns; and, secondly, the badness of the air. In the town of Manchester, according to observation, 1-28th of the inhabitants die annually; whereas in the neighbouring country, the number of deaths does not exceed 1-46th of the whole inhabitants. It may be laid down as a general principle, that in great towns, the number of deaths annually is from

one in nineteen to one in twenty-two or twenty-three; in middling towns, from one in twenty-four to one in twenty-eight; and in country parishes and villages seldom more than one in forty or fifty. In 1763, the number of inhabitants in Stockholm amounted to 72979. The average number of deaths for the six years preceding had been 3802, which makes one in nineteen annually; while throughout all Sweden, including the towns and the country, not more than one in thirty-five die annually. At Rome the inhabitants are numbered every year. In 1771 they were found to amount to 159675: the average number of deaths for ten years was 7367; which makes one in twenty-three and a half annually. In London not less than one in twenty three-fourths of the inhabitants die every year.

M. Daubenton has given, in the *Encyclopédie Méthodique*, a table of the probabilities of the duration of life, constructed from that which is to be found in the seventh volume of the *Supplémens à l'Histoire Naturelle de M. de Buffon*. The following is an abridgement of it:

Of twenty-three thousand nine hundred and ninety-four children, born at the same time, there will probably die,

In one year	-	-	-	-	7998
Remaining 2-3ds, or 15996.					
In eight years	-	-	-	-	11997
Remaining 1-half, or 11997.					
In thirty-eight years	-	-	-	-	15996
Remaining 1-3d, or 7998.					
In fifty years	-	-	-	-	17994
Remaining 1-4th, or 5998					
In sixty-one years	-	-	-	-	19995
Remaining 1-6th, or 3999.					
In seventy years	-	-	-	-	21595
Remaining 1-10th, or 2399.					
In eighty years	-	-	-	-	22395
Remaining 1-40th, or 599.					
In ninety years	-	-	-	-	23914
Remaining 1-300th, or 79.					
In one hundred years	-	-	-	-	23992
Remaining 1-10000th, or 2.					

It thus appears, that a very small number of men indeed pass through all the periods of life, and arrive at the goal marked out by nature. Innumerable causes accelerate our dissolution. The life of man, we have observed, consists in the activity and

and exercise of his organs, which grow up and acquire strength during infancy, adolescence, and youth. No sooner has the body attained its utmost perfection, than it begins to decline. Its decay is at first imperceptible; but in the progress of time the membranes become cartilaginous, the cartilages acquire the consistence of bone; the bones become more solid, and all the fibres are hardened. Almost all the fat wastes away; the skin becomes withered and scaly; wrinkles are gradually formed; the hair grows white; the teeth fall out; the face loses its shape; the body is bent; and the colour and consistence of the crystalline humour become more perceptible. The first traces of this decay begin to be perceived at the age of forty, and sometimes sooner; this is the *age of decline*. They increase by slow degrees till sixty, which is the *period of old age*. They increase more rapidly till the age of seventy or seventy-five. At this period *craziness* begins, and continues always to increase. Next succeeds *decrepitude*, when the memory is gone, the use of the senses lost, the strength totally annihilated, the organs worn out, and the functions of the body almost destroyed. Little now remains to be lost; and, before the age of ninety or a hundred, death terminates at once decrepitude and life.

The body then dies by little and little; its motion gradually diminishes; life is extinguished by successive gradations, and death is only the last term in the succession. When the motion of the heart, which continues longest, ceases, man has then breathed his last; he has passed from the state of life to the state of death; and, as at his birth a breath opened to him the career of life, so with a breath he finishes his course.

This natural cause of death is common to all animals, and even to vegetables. We may observe that the centre of an oak first perishes and falls into the dust, because these parts, having become harder and more compact, can receive no further nourishment. The causes of our dissolution, therefore, are as necessary as death is inevitable; and it is no more in our power to retard this fatal term than to alter the established laws of the universe. Hence the following maxim has been universally adopted; *Contra vim mortis, nullum medicamentum in hortis*. In whatever manner death happens, the time and circumstances thereof are unknown. It is considered, however, as at all times terrible, and the very thoughts of it fill the mind with fear and trouble. It is notwithstanding our duty frequently to direct our thoughts to that event, which must inevitably happen, and by a life of virtue and innocence to prepare against those consequences which we so much dread.

As in women the bones, the cartilages, the muscles, and every other part of the body, are softer and less solid than those of men, they must require more time in hardening to that degree which occasions death.—Women of course ought to live longer than men. This reasoning is confirmed by experience; for, by consulting

the bills of mortality, it appears, that, after women have passed a certain age, they live much longer than men who have arrived at the same age.—In like manner, it is found by experience, that in women the age of youth is shorter and happier than in men, but that the period of old age is longer, and attended with more trouble.

Citius pubescunt, citius senescunt.

After death, the organization of the body begins to be dissolved, and all the parts relax, corrupt, and separate. This is produced by an intestine fermentation, which occasions putrefaction, and reduces the body to volatile alkali, fetid oil, and earth.

The desire of self-preservation, and of protracting the short span of life, is so intimately interwoven with our constitution, that it is justly esteemed one of the first principles of our nature, and, in spite even of pain and misery, seldom quits us to the last moments of our existence. It seems, therefore, to be no less our duty than our interest to examine minutely into the various means that have been considered as conducive to health and long life; and, if possible, to distinguish such circumstances as are essential to that great end, from those which are merely accidental.

It has long been known that fresh air is more immediately necessary to life than food; for a man may live two or three days without the latter, but not many minutes without the former. The vivifying principle contained in the atmosphere, so essential to the support of flame, as well as animal life, concerning which authors have proposed so many conjectures, is nothing else but the pure oxygenated fluid discovered by that ingenious philosopher Lavoisier. The common atmosphere may well be supposed to be more or less healthy in proportion as it abounds with this animating principle. As this exhales in copious streams from the green leaves of all kinds of vegetables, even from those of the most poisonous kind, may we not, in some measure, account why instances of longevity are so much more frequent in the country than in large cities; where the air, instead of partaking so largely of this salutary impregnation, is daily contaminated with noxious animal effluvia.

With respect to climate, various observations conspire to prove, that those regions which lie within the temperate zones are best calculated to promote long life. Hence, perhaps, may be explained, why Italy has produced so many long livers, and why islands in general are more salutary than continents; of which Bermudas and some others afford examples. And it is a pleasing circumstance that our own island appears to contain far more instances of longevity than could well be imagined. The ingenious Mr. Whitehurst assures us, from certain facts, that Englishmen are in general longer lived than North Americans; and that a British constitution will last longer, even in that climate, than a native one. But it must be
allowed

allowed in general, that the human constitution is adapted to the peculiar state and temperature of each respective climate, so that no part of the habitable globe can be pronounced too hot or too cold for its inhabitants. Yet, in order to promote a friendly intercourse between the most remote regions, the Author of nature has wisely enabled the inhabitants to endure great and surprising changes of temperature with impunity.

Though foods and drink of the most simple kinds are allowed to be the best calculated for supporting the body in health, yet it can hardly be doubted but variety may be safely indulged occasionally, provided men would restrain their appetites within the bounds of temperance; for bountiful Nature cannot be supposed to have poured forth such a rich profusion of provisions, merely to tantalize the human species, without attributing to her the part of a cruel step-dame, instead of that of a kind and indulgent parent. Besides, we find, that, by the wonderful powers of the digestive organs, a variety of animal and vegetable substances, of very discordant principles, are happily assimilated into one bland homogeneous chyle; therefore it seems natural to distrust those cynical writers, who would rigidly confine mankind to one simple dish, and their drink to the mere water of the brook. Nature, it is true, has pointed out that mild insipid fluid as the universal diluent, and therefore most admirably adapted for our daily beverage: but experience has equally proved, that vinous and spirituous liquors, on certain occasions, are no less salutary and beneficial, whether it be to support strength against sickness or bodily fatigue, or to exhilarate the mind under the pressure of heavy misfortunes. But, alas! what Nature meant for innocent and useful cordials, to be used only occasionally, and according to the direction of reason, custom and caprice have, by degrees, rendered habitual to the human frame, and liable to the most enormous and destructive abuses. Hence it may be justly doubted, whether gluttony and intemperance have not depopulated the world more than even the sword, pestilence, and famine. True, therefore, is the old maxim, *Modus utendi ex veneno facit medicamentum, ex medicamento venenum.*

It is allowed on all hands, that alternate motion and rest, and sleep and watching, are necessary conditions to health and longevity; and that they ought to be adapted to age, temperament, constitution, temperature of the climate, &c. but the errors which mankind daily commit in these respects become a fruitful source of diseases. While some are bloated and relaxed with ease and indolence, others are emaciated and become rigid through hard labour, watching, and fatigue.—Where the animal functions are duly performed, the secretions go on regularly; and the different evacuations so exactly correspond to the quantity of aliment taken in, in a given time, that the body is found to return daily to nearly the same weight. If any

particular evacuation happen to be preternaturally diminished, some other evacuation is proportionally augmented, and the equilibrium is commonly preserved; but continued irregularities, in these important functions, cannot but terminate in disease.—The due regulation of the passions, perhaps, contributes more to health and longevity than that of any other of the non-naturals. The animating passions, such as joy, hope, love, &c. when kept within proper bounds, gently excite the nervous influence, promote an equable circulation, and are highly conducive to health; while the depressing affections, such as fear, grief and despair, produce the contrary effect, and lay the foundation of the most formidable diseases.

From the light which history affords us, as well as from the foregoing list of long lives, there is great reason to believe, that longevity is in some measure hereditary; and that healthy long-lived parents would commonly transmit the same to their children, were it not for intemperance, and the frequent errors in medical advice, which so evidently tend to the abbreviation of human life.—Where is it, but from these causes, and the unnatural modes of living, that, of all the children which are born in the capital cities of Europe, nearly one half die in early infancy? To what else can we attribute this extraordinary mortality? Such an amazing proportion of premature deaths is a circumstance unheard-of among savage nations, or among the young of other animals! In the earliest ages, we are informed, that human life was protracted to a very extraordinary length; yet how few persons, in these latter times, arrive at that period which nature seems to have designed! Man is by nature a field-animal, and seems destined to rise with the sun, and to spend a large portion of his time in the open air, to inure his body to robust exercises and the inclemency of the seasons, and to make a plain homely repast only when hunger dictates. But art has studiously defeated the kind intentions of nature; and, by enslaving him to all the blandishments of sense, has left him, alas! an easy victim to folly and caprice. Let the consideration of the following subjects direct every one, who values health and long life, to pursue the means nature has pointed out for their preservation and sustenance.

OF NUTRITION.

NUTRITION, in the animal œconomy, is the accession of new parts to the body, either for its augmentation, or for the reparation of such as are worn off, or exhaled through the pores and perspiring vessels, whereby the fluids are diminished, and the body falls away. So that, to preserve life, it is necessary that a restitution be made to the juices and solids of the body, at least equal to what is lost by those motions; which is what we call the *action of nutrition*. Now the lost juices are easily and quickly supplied by aliment, air, &c. but the nutrition

of the solid parts is much more obscure. This, indeed, has proved a subject of infinite doubts and differences among authors; nor had we any rational or satisfactory account of the same, till that of the accurate Boerhaave, whose doctrine is as follows.

Every solid part of the body consists of other smaller ones, in all respects like the larger; vessels, of vesicles, and those of others still smaller; bones, of ossicles, &c. Which structure goes beyond all limits of sense, however assisted by art; as appears by the experiments and observations of Malpighi, Ruysch, Leeuwenhoek, and Hooke. Yet it is scarcely possible this division and subdivision should be infinite, as those of foods and juices are. Again, it appears from microscopes, injections, small wounds, excisions, &c. that the solid parts of the body are very small, compared with the fluids; and it is also demonstrable, from considering the rise and generation of the vessels, and the resolution of the greater vessels into their smaller constituent ones, that all the solid mass of the body is constructed of mere nerves, as its elements. And, in effect, all this mass, an incredible small particle only excepted, at first arose out of what was a very small colliquament, much like the nervous juice itself; as is abundantly shown by the great Malpighi, in his two treatises on incubated eggs. For neither does the white of the egg nourish, till, by means of the incubation, it has passed innumerable degrees of fluidity, from its first thickness, to that exceeding subtilty wherein it terminates. But, even then, the liquor, thus given to the embryo, is exceedingly thick, in comparison with what it is to be when converted into its vessels and viscera. Now, the first tender solids, arising from this subtle humour, do again pass infinite intermediate degrees, before they arrive at their utmost state and consistence; as is shown by Malpighi in eggs, and by Ruysch in embryos and fœtuses. Hence, therefore, it follows, that the solids, in their first formation out of the liquids whence they arise, only differ from them in rest, cohesion, and figure. Therefore such a particle, now in its fluid state, will become a part of the solid to be formed out of it, as soon as there happens to be a power to effect its cohesion with the other solid parts, howsoever that cohesion be effected.

This cohesion is easily produced in a fibre already formed, if there happen to be a proper cavity in the solid, left open by some lost particle; and, at the same time, a particle in the fluid, answerable thereto in bulk, figure, and nature; and, lastly, if there be a power wherewithal to intrude it into that place, or accomodate it thereto. Thus will arise a real nutrition of the solids in the minute vessels, by whose union the large ones are formed; that is, in the nerves, or in vessels similar thereto. Which being impracticable by any other liquid than that brought into these vessels, it appears very evident, that the nervous juice, at least a juice perfectly
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like it, is the immediate matter of nutrition: whence nutrition appears one of the last and most perfect actions of the body; since, to have this laudable; all the precedent actions must of necessity have been so. The chyle, therefore, which some make the immediate matter of nutrition, is, indeed, fitted to fill the larger vessels; but it cannot nourish or restore them. This, when attenuated, changed, more intimately mixed in the lungs by means of respiration, and thus fitted for the passage of certain vessels, is indeed rendered fitter, yet far from being quite fit, to be the matter of nutrition. But, by the repeated action of the lungs, the viscera, vessels, &c. there is formed, out of this humour, a soft, tenacious, plastic, insipid, serum, which, thickening by the fire, becomes perfectly like the white of an egg. This fluid, therefore, has in it all the conditions found in that, from whence, by sure experience, we know all the solid parts of an animal arise by mere incubation. It is, therefore, a step nearer; but is not yet quite disposed for nutriment; much less is the cruor, or red globular part of the blood, so. Neither are yet fitted to enter the vessels; yet both the one and the other are, by different authors, made the nutritive juice. But, as the heat of the incubation, so the action of the viscera and vessels on the serum, introduces various changes therein, till at length a part of it be rendered subtiler enough for the purpose required. This, when exhausted, is instantly repaired: and thus we have the true immediate matter of nutrition.

The matter of nutrition thus ascertained, the manner wherein, and the cause whereby, it is effected, are as follows: A juice being driven directly through a full, conic or cylindric, elastic or rigid, canal; if its course be from a wider to a narrower part, or if it have any thing to oppose its motion, will endeavour to stretch the sides of its canal, according to the axis of its length. This must be the case every-where in the body, except, perhaps, in the veins and receptacles. By this *nifus*, or endeavour, how weak soever, continually repeated, the vessels will be insensibly lengthened out; and, in lengthening, they will be made more and more slender. Hence the last extremities of the vessels, which in man are extremely small, are continually stretched, and rendered less and less coherent, i. e. still nearer and nearer to a dissolution; and thus at length will they cohere so weakly, as scarcely to differ from fluids. While such motion goes on, therefore, and the propulsion is continued, there will, of necessity, happen these two things: First, the outmost particles of the minutest tubes being torn off, will again be converted into a kind of humour, what part of the body soever they stick in. Secondly, the smallest particles, which, by their union, composed the slenderest fibrillæ, will be so separated from each other, as to leave open interstices in those places, where, before, they cohered. Both these effects will be produced at all times, and in all parts of the body, so long as life continues, especially where nature is strong, and

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the actions of the body violent. But the same humour whereby these effects are produced, containing abundance of particles similar to those thus separated and lost, conveys and applies them to those interstices; by that very impetus whereby it endeavours to distend the canals; and, thus intercepted, at length it forms, adapts, and fastens, them, so as to adhere in the same manner as the former. The matter, preparation, application, energy of motion, still remaining the same; what, from time to time, is lost, is thus presently restored; and the solids continue in the same state as before, that is, they are perpetually nourished, and supplied, and preserved.

In this the Creator's wisdom is very conspicuous; in that the same power which inevitably destroys does repair again at the same time, and by the same action; and that, the greater the loss is, the more copious the supply; and, lastly, that those parts first spent in the action of the body are the first restored. Farther, it is evident, that the newer, the more tender, and the nearer to the moving cause, these vessels are, the more easily will they be lengthened, distended, destroyed, and repaired: our bodies, therefore, the nearer to the origin, the more do they grow. For, the action still continuing, the greater vessels become more extended by their fluid; and at the same time the smaller, whereof the membranes or coats, of the larger sort are composed, are compressed, dried, and at last concreted, and grow up; whence arises a firmness, indeed, of the fibres, but a loss of the vesicles. Thus what were formerly vessels commence mere hard ligaments; and thus, the fluids being once fixed, the several vessels coalesce; from the concurrence of these causes arise the strength, hardness, rigidity, and thickness, of the solid parts. Hence the number of vessels is greatest in embryos, and, as age comes on, it sensibly diminishes; and hence it is, that their weakness constantly declines, and their strength and firmness increase. In young people, therefore, the quantity of humours is redundant, and greatly exceeds the solids: in old men, the solids exceed the fluids. And hence we see the reason, manner, and appearance, of growth, state, declension, and, at length, of death from pure old age.

A person who considers this account, and compares it with what is actually observable in the body, will find every circumstance to obtain: thus the whole cuticula is every-where, and at all times, constantly desquamating, peeling off, and again renewing; and thus the hair, nails, teeth, continually rubbed, torn, and worn off, come again: parts taken off from the vessels and the bones soon grow again: and the scordes, or filth, rubbed off from the extremities of the vessels, when examined by a microscope, or diluted, and viewed in water, appear plainly to consist both of solid and fluid parts; and those carried off by washing, shaving, &c. are the same. Hence too, we see, that a general increase of the bulk of the body, with regard to habit, as in fat, fleshy, brawny, persons, does not arise from any

increase of the solids, but by their extension into larger cavities, crowded with stagnant humours. And hence fatness becomes hurtful, as it loads, weakens, and suffocates. Whence arises a very considerable distinction between nutrition and repletion, to which a physician should have special regard; the one strengthening and condensing the vessels; the other weakening, loosening, and extending, the same. Hence, lastly, we see why the fabric of the solids is not destroyed by the contained fluids; how our machine comes to subsist so long; why, when a nerve is corrupted, the nutrition of that part it belongs to ceases; and why the same obtains in an artery; why in an embryo there are no solids, in a foetus very few, in old men a great deal; and why even the nerves, tendons, arteries, and receptacles, become first cartilaginous, and then bony. Dr. Priestley concludes, from some experiments undertaken with a view of discovering the principle of nutrition in vegetable and animal substances, that this principle is phlogiston, in such a state as to be capable of becoming, by putrefaction, a true inflammable air, (hydrogenous gas;) but not generally such as to burn with explosion, but rather with a blue and lambent flame, mixed with a certain proportion of fixed air. This principle in nutrition is immediately held in solution by the gastric juice, and in the chyle formed by it; and, when it has entered into the circulation with the chyle, and answered the purpose in the animal œconomy for which it is designed, it is thrown out again by means of the blood in the lungs, and communicated to the air, which is phlogisticated with it.

OF FOOD, OR ALIMENT.

FROM aliment, or food, by the process of digestion, is prepared a very mild, sweet, and whitish, liquor, resembling milk, and distinguished by the name of *chyle*; which, being absorbed by the lacteal veins, by them conveyed into the circulation, and there assimilated into the nature of blood, affords that supply of nutrition, which, as we have seen above, the continual waste of the body is found to require. Food is the most necessary thing for the preservation of our bodies: and, as on the choice thereof our health greatly depends, it is of much importance to understand, in general, what is the properest for our nourishment; and, in particular deviations from health, what is the best adapted to restore us. Our blood and juices naturally incline to become putrid and acrimonious: fresh chyle, duly received, prevents this destructive tendency, and preserves in them that mild state which alone consists with health. An animal diet affords the most of this bland nutritious mucilage; watery fluids dilute the too gross parts, and carry off what is become unfit for use. It is only the small portion of jelly which is separated from the farinaceous parts of vegetables, that, after being much elaborated, is converted

verted into the animal nature; yet the use of vegetables prevents both repletion and a too great tendency to a putrescent acrimony of the blood. In hot climates, as well as against the constitutional heat of particular persons, vegetables are demanded in the largest portion; animal substances afford the highest relish while our appetite continues; but will sate the appetite before the stomach is duly filled. Vegetables may be eaten after either flesh or fish: few herbs or fruits satiate so much as that the stomach may not be filled with them when it is already satisfied with flesh or fish; whence it may be observed, that no diet which is very nourishing can be eaten to fulness, because its nutritious parts are oily and satiating. Health depends almost wholly on a proper crasis of the blood; and to preserve this, a mixture of vegetables in some degree is always required, for a loathing is soon the consequence of animal food alone: hot acrid habits, too, receive from milk and vegetables the needful for correcting their excesses; but in cold, pituitous, and nervous habits, which want most nourishment from least digestion, and from the smallest quantity of food, animal diet is to be used more freely.

As the blood, the nutritive juice, and in general all the parts of the body, are made up of three elements, viz. of one which is sulphureous, oily, and inflammable; of one of an earthy, subtile, alkaline, nature; and of one of an aqueous nature: so the several kinds and virtues of food may be most commodiously reduced to these three classes; and aliments of these three several qualities, duly mixed with one another, afford a proper nourishment for the human body.—The flesh of animals, especially when roasted, affords the body its principal supply of the sulphureous part; but it is to be observed, that wild animals are preferable in this respect to the tame and domestic kind, because their oils and salts are exalted by habitual exercise. Among the aliments which furnish the blood with its humid parts, of animals, fish; and of vegetables, pot-herbs, the milder roots, and some summer-fruits; are reckoned the principal. To the third class, which supplies the blood with its fixed and earthy parts, belong all kinds of grain, as the several sorts of bread, rice, pease, beans, lentils, chesnuts, almonds, cocoa, cheese, &c. From what has been said, it will appear that all such aliments as are of a mild quality, and resemble the chyle and blood, are fit for nourishment; that all such food as either recedes from, or is quite opposite to, the nature of the chyle and blood, is unfit for nourishing the parts; that all food in which there is too much of an acid, is improper for nourishment, because milk and blood will not mix with an acid, which is quite opposite to their natures, and induces a coagulation of the circulating juices; that all salts, and all foods too highly salted, must be unfit for nourishment, because no salt whatever can be mixed with the blood, chyle, and milk;
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and laſtly, that the free uſe of ſpirits muſt be very detrimental both to health and nourishment, becauſe blood and chyle never incorporate with ſpirituouſ liquors, but rather ſeparate from them.

Thus much being obvious as general principles with reſpect to the matter and quality of our aliment, the valetudinarian may eaſily regulate his diet with ſome advantage to himſelf by an attention to the few enſuing particulars. In winter, eat freely, but drink ſparingly: roaſt meat is to be preferred, and what is drunk ſhould be ſtronger than at other ſeaſons. In ſummer, let thirſt determine the quantity to be drunk; cold ſtomachs never require much: boiled meats and vegetables, if not otherwiſe contradicted, may now be more freely uſed. Lax habits require the winter's diet to be continued all the year, and rigid ones ſhould be confined to that of ſummer. Occaſional faſting will prevent the neceſſity of periodical bleeding, &c. Thoſe who are troubled with eructations occaſioned by their food ſhould drink but little, and uſe ſome unaccuſtomed exerciſe. The thirſty ſhould drink freely, but eat ſparingly. In general, let moderation be obſerved; and, though no dinner hath been had, a light ſupper is at all times to be preferred. After very high ſeaſoned meats, a glaſs of water acidulated with the acid elixir of vitriol, or in very weak ſtomachs the ſweet elixir of vitriol, is far more aſſiſtant to the work of digeſtion than the common method of taking brandy.

As to common drink, water alone is ſufficient and effectual for all the purpoſes of nature. Strong liquors were never deſigned for common uſe. They were formerly kept here in England, as other medicines are, in apothecaries' ſhops, and preſcribed by phyſicians, as they do diaſcordium, and Venice treacle, to reſreſh the weary, ſtrengthen the weak, and raiſe the low-ſpirited. The effect of the ordinary uſe of wine and ſpirituouſ liquors, as natural cauſes will always produce their effects, is to inflame the body into gout, ſtone, and rheumatism, fevers, pleuriſies, ſmall-pox, &c. to dry up the juices, and ſcorch and ſhrivel the ſolids. Thoſe whoſe appetite and digeſtion are good and entire, never want ſtrong liquors to ſupply them with ſpirits; ſuch ſpirits are too volatile and fugitive for any ſolid or uſeful purpoſes of life. Two ounces of fleſh-meat, well digeſted, beget a greater ſtock of more durable and uſeful ſpirits than ten times as much ſtrong liquor.

All ſtrong liquors are as hard to digeſt, and require as much labour of the concoctive powers, as ſtrong food itſelf. Water is the only univerſal diſſolvent, or menſtrum, and the moſt certain diluter of all bodies proper for food. There are a great many ſpirituouſ liquors, which not only will not diſſolve, but which will harden, and make more indigeſtible, certain parts, eſpecially the ſalts of bodies, wherein their active qualities, that is, thoſe which can do moſt harm to human conſtitutions,

stitutions, consist. And we have known persons of tender constitutions, who could neither eat nor digest upon drinking wine, but who, by drinking at meals common water, warmed, have recovered their appetites and digestion, and have thriven and grown plump. It is true, strong liquors, by their heat, and stimulation on the organs of concoction, by increasing the velocity of the motion of the fluids, and thereby quickening the other animal functions, will carry off the load that lies upon the stomach, with more *present* cheerfulness. But then, besides the *future* damage of such a quantity of wine to the stomach and fluids, by its heat and inflammation, the food is hurried into the habit unconcocted, and lays a foundation for a fever, a fit of the cholic, or some chronical disease. With respect to fermented liquors, which are commonly used, it may be observed, that those which are too strong hurt digestion, and are so far from strengthening the body, that they weaken and relax it. They keep up a constant fever, which exhausts the spirits, heats and inflames the blood, disposes to numberless diseases, and occasions a premature old age. But fermented liquors may be too weak, as well as too strong: these must either be drunk new, before the fermentation is over, and in this case will generate air in the bowels, and occasion flatulencies; or they soon become stale, sour the stomach, and injure digestion. On this account all malt liquors, cider, &c. should be sufficiently strong to keep till they are ripe, and then they should be used; and neither sooner nor later. Liquors that are adulterated with a mixture of ingredients of the opiate kind, which are poisonous in their quality, as they mostly are by those who make them for sale, hurt the nerves, relax and weaken the stomach, and spoil its digestive powers.

A due regulation of the quantity and quality of our meat and drink, and a nice adjustment thereof to the concoctive powers, is of the utmost consequence to health and long life. What we expend in motion, excretion, effluvia, &c. is but a determinate quantity; and the supply should only keep pace with the expence; a just proportion of the two would, probably, preserve us from acute distempers, as it certainly would from chronical ones; most or all of which proceed from repletion, as appears from their being cured by evacuation.

Physicians have attempted to determine the healthful quantity of food for a human body. Some say, that in winter, when the perspiration of an unexercised person is only equal to the urine, the diet for twenty-four hours ought not to exceed four pounds, or four pounds and a half. In summer, the diet may be six pounds and a half, which may be carried off without the help of exercise, when the air is hot and dry. If the quantity of food be such as to make the perspiration and urine of a natural day always nearly equal, and the morning weight of the body always nearly the same, that quantity is the truly healthful quantity of food for grown

bodies which use but little exercise. The quantity of food necessary to keep a grown body in health, will be better and more easily digested, when it is so divided as to make the meals equal, than when they are very unequal. The distance between one meal and another should bear some proportion to the largeness of the preceding meal. Good and constant health consists in a just quantity of food, and a just proportion of the meat to the drink; and, in order to be freed from chronical disorders contracted by intemperance, the quantity of food ought to be lessened, and the proportion of the meat to the drink increased, more or less, according to the greatness of the disorders; and both the quantity of food, and the proportion of meat to the drink, ought to be such as shall make perspiration and urine nearly equal at all seasons of the year.

The quantity of animal food consumed by the English is generally pernicious, because it produces but little of that air which is antiseptic: hence they are subject to the scurvy, and its numerous train of consequences, indigestion, low spirits, hypochondriacism, &c. whereas, if vegetables and milk, whose antiseptic quality, arising from the gas or air which they plentifully afford, were more used as food, we should have less scurvy, and likewise fewer putrid and inflammatory fevers. One great reason why leprosy, hot scurvies, dysenteries, plagues, pestilential fevers, and the like distempers, formerly so frequent in London, are now so rare, is the change that has been made in the food of the inhabitants. Hopped beer, and wine, coming into general use, have been a great means of suppressing putrid diseases; greens and fruit are likewise more universally eaten, and salted meats make a much less part of our food than formerly: to which may be added the more general consumption of tea and sugar.

Vegetable food is most proper for scorbutic and hectic persons, and does very well with people who have much exercise; but in other circumstances, a mixed diet of vegetable and animal substances, such as is commonly used, seems best calculated to nourish and preserve the body from decay.

The softer and milder kinds of aliment are proper for children, and for youth the stronger. Old people ought to lessen the quantity of their food, and increase that of their drink: but yet some allowance is to be made for custom, especially in cold climates; for, as in these the appetite is keener, so is the digestion stronger and better performed.

Different sexes also require a different food and regimen. Women are weaker than men, and for that reason require a food and regimen peculiar to themselves; they are of a spongy and lax habit, and for the most part addicted to indolence and pleasure, drink little, have bodies of a highly delicate and sensible nature, much inclined to spasms and convulsive motions, and disposed to generate a redundancy

of blood. Besides, at certain stated times they have a regular evacuation by the veins of the uterus; and in consequences of these circumstances it is necessary that women, rather than men, should observe a regimen and method of living peculiarly and accurately adapted to their habit and constitution.

Hence it is obvious, that the physician acts a preposterous and unaccountable part who to every one prescribes the same method of living; or thinks, that what contributes to the health of one will without distinction or reserve prove salutary to all. For we are sufficiently taught by daily experience, that all substances are not equally adapted to all patients; and that what one may bear without being sensible of any bad effects, may to another prove prejudicial, and even fatal. Time itself has a considerable influence in determining the salutary or noxious effects of aliments; since some substances may safely, and without any bad consequence, be used at one season, which at another may contribute not a little to the destruction of health.

As to the effects of food on the mind, it is plain, that delicacy of feeling, liveliness of imagination, quickness of apprehension, and acuteness of judgment, very frequently accompany a weak state of the body. True it is, indeed, that the same state is liable to timidity, fluctuation, and doubt; while the strong have that steadiness of judgment, and firmness of purpose, which are proper for the higher and more active scenes of life. The most valuable state of the mind, however, appears to reside in somewhat less firmness and vigour of body. Vegetable aliment, as never over-distending the vessels or loading the system, never interrupts the stronger motions of the mind; while the heat, fulness, and weight, of animal food, are an enemy to its vigorous efforts. Temperance, then, does not so much consist in the quantity, for that always will be regulated by our appetite, as in the quality, viz. a large proportion of vegetable aliment.

OF AIR.

IT is no easy task to ascertain the nature and origin of air, as being a fluid imperceptible to all our senses, except that of feeling. Indeed, from the resistance and impression it makes, we know that there is such a body, which every-where surrounds our earth, and is of the utmost importance, not only to mankind, in promoting many useful arts, but absolutely necessary for the preservation of health and life.

The wholesomeness or unwholesomeness of air is certainly owing to the different effluvia with which it abounds, and ought to be particularly attended to by the valetudinarian. The best air is to be met with in open champaign countries; where the soil is dry, not parched or sandy, and spontaneously produces wild
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thyme,

thyme, wild marjoram, and the like sweet-scented plants. That near rivers is rather prejudicial, unless they are small, clear, and have a gravelly channel. The morning air is deemed more refreshing than that of the evening, and air agitated with breezes than that which is serene and still. As good air contributes greatly to health, so that which is bad is no less prejudicial to it. Stagnating air is productive of putrid and malignant disorders, as dysenteries, bilious fevers, &c. and that which is too moist, of inflammatory ones, as coughs, rheumatisms, &c. Moist and rainy seasons, however, differ widely in this respect; since, in marshy countries, intense and continued heats occasion the greatest moisture in the air: whereas frequent showers, during the hot season, cool it, check the excess of vapour, dilute and refresh the corrupted stagnating water, and precipitate all noxious and putrid effluvia.

To the pressure of air we are to attribute the coherence of the parts of bodies. Breathing too, on which depends animal life, is owing to the pressure and spring of the air; and to the same cause may be attributed the production of fire and flame, as appears from the sudden extinction of a coal or candle in the exhausted receiver. It is likewise necessary for the existence and preparation of sounds, for the germination and growth of plants, for conveying all the variety of smells, and for transmitting the rays and influence of the celestial bodies. In short, such is the generating and vivifying power of air, that some of the ancient philosophers considered it as the first principle of all things. Air not only acts upon all bodies by its common properties of weight and elasticity, but by the peculiar virtues of the ingredients whereof it is composed. By means of a corroding acid, it dissolves iron and copper, unless well defended by oil. Even gold, in the chemist's laboratory, when the air is impregnated with the effluvia of aqua regia, contracts a rust like other bodies. It fixes volatile bodies, and volatilizes those which are fixed. From the different effluvia, diffused through the air, proceed a variety of effects. Near mines of copper, it will discolour silver and brass; and in London, the air of which abounds with acid and corrosive particles, metalline utensils rust sooner than in the country. It is very difficult to obtain oil of sulphur in a clear dry air, as its parts are then more ready to evaporate; whereas in a moist cloudy air it may be obtained in abundance. All salts melt most readily in cloudy weather; and separations succeed best in the same state of the air. If pure wine be carried into a place where the air is full of the fumes of wine then fermenting, it will begin to ferment afresh.

Wherever air stagnates long, it becomes unwholesome. Hence the unhappy persons confined in gaols not only contract malignant fevers themselves, but often communicate them to others. Nor are many of the holes, for we cannot call them
houses,

houses, possessed by the poor in great towns, much better than gaols. These low dirty habitations are the very lurking-places of bad air and contagious diseases. Such as live in them seldom enjoy good health; and their children commonly die young. In the choice of a house, those who have it in their power ought always to pay the greatest attention to open free air. The various methods which luxury has invented to make houses close and warm, contribute not a little to render them unwholesome. No house can be wholesome unless the air has a free passage through it. For which reason houses ought daily to be ventilated, by opening opposite windows, and admitting a current of fresh air into every room. Beds, instead of being made up as soon as people rise out of them, ought to be turned down, and exposed to the fresh air from the open windows through the day. This would expel any noxious vapour, and could not fail to promote the health of the inhabitants. In hospitals, gaols, ships, &c. where that cannot be conveniently done, ventilators should be used. The method of expelling foul, and introducing fresh, air, by means of ventilators, is a most salutary invention, and is indeed the most useful of all our modern medical improvements. It is capable of universal application, and is fraught with numerous advantages, both to those in health and in sickness. In all places where numbers of people are crowded together, ventilation becomes absolutely necessary. Air which stagnates in mines, wells, cellars, &c. is extremely noxious. That kind of air is to be avoided as the most deadly poison. It often kills almost as quickly as lightning. For this reason, people should be very cautious in opening cellars that have been long shut, or going down into deep wells, or pits, especially if they have been kept close covered. We have daily accounts of persons who lose their lives by going down into deep wells and other places where the air stagnates. All these accidents might be prevented by only letting down a lighted candle before them, and stopping when they perceive it go out: yet this precaution, simple as it is, is seldom used.

If fresh air be necessary for those in health, it is still more so for the sick, who often lose their lives for want of it. The notion that sick people must be kept very hot, is so common, that one can hardly enter the chamber where a patient lies, without being ready to faint, by reason of the hot suffocating smell. How this must affect the sick any one may judge. No medicine is so beneficial to the sick as fresh air. It is the most reviving of all cordials, if it be administered with prudence. We are not, however, to throw open doors and windows at random upon the sick. Fresh air is to be let into the chamber gradually, and, if possible, by opening the windows of some other apartment.

There are many kinds of air, produced by accidental or artificial causes, of which the following are the most material:

Dephlogifticated air, the oxygenous gas, or vital air, of the new chemistry, is an elastic fluid naturally extricated in the process of vegetation; but artificially procured from nitre, minium, magnesia, water, &c. This is eminently capable of supporting flame and animal life, and is one of the component parts of our atmosphere.

Phlogifticated air, or azotic gas, is produced in great quantities during putrefaction and fermentation; and is also obtained in the calcination of metals and other phlogistic processes. It destroys animal life, and extinguishes flame; but is very friendly to vegetation, and is another of the component parts of our atmosphere.

Fixed air, or carbonic acid gas, derives its name from the property of adhering to certain bodies, and fixing itself in them. It consists of dephlogifticated air united to charcoal; this is obtained by fermentation, and in all phlogistic processes, and manifests the properties of an acid. It extinguishes flame, and destroys animal life.

Inflammable air, (hydrogenous gas,) consists wholly of charcoal and water rarefied by heat; and is remarkable for being the lightest of all gravitating substances. It is produced naturally from all putrid waters, and may be artificially procured from certain metallic solutions, by passing the steam of water over red-hot iron, and by distilling wood, pit-coal, &c. with a strong heat, or by opposing charcoal to the heat of a burning lens in vacuo. It extinguishes flame, unless it be mixed with a certain proportion of atmospherical, or dephlogifticated, air; in which case, it explodes violently. It destroys animal life, but is friendly to vegetation.

Nitrous air, or nitrous gas, is procured artificially by dissolving metallic or other substances in nitrous acid. Being mixed with dephlogifticated air, both the fluids lose their elasticity, and a small quantity of nitrous acid is produced. It instantly kills animals and extinguishes flame. By union with some metals it is converted into volatile alkali. In some cases it may be made to support flame, and even animal life. Its property of condensing with dephlogifticated air, renders it a test of the salubrity of the atmosphere.

Marine acid air, the muriatic acid gas of the new chemistry, is the same as marine acid reduced into vapour, and deprived of most of its waters.

Dephlogifticated marine acid air, or oxygenated muriatic acid gas, is supposed by some to be the marine acid deprived of its phlogiston; by others, to be the same acid with an addition of pure air. It destroys many kinds of colours, and, with inflammable air, regenerates common marine acid.

Alkaline air, or ammoniacal gas, is the same with pure volatile alkali, and is formed by an union of phlogifticated and inflammable air.

Hepatic air, or sulphureous acid gas, is produced from the decomposition of liver of sulphur by acids; and in the common atmosphere it is inflammable, but does not burn with explosion.

Atmospherical air, is composed of dephlogificated and phlogificated air, and thus supports and sustains both animal life and vegetation.

The exterior part of our habitable world is the air or atmosphere, a springy body, that encompasses the solid earth on all sides, and is near a thousand times lighter than water; and the higher it is, the less it is compressed by the superior incumbent air; and so consequently, it being a springy body, the thinner it is. And, as a pillar of air of any diameter is equal in weight to a pillar of quicksilver of the same diameter of between twenty-nine and thirty inches high, we may infer that the top of the atmosphere is not very near the surface of the solid earth. Now, as quicksilver is near fourteen times heavier than water, the atmosphere will sustain a column of water about fourteen times higher than the column of quicksilver, that is, about thirty-four feet; and, if we consider that air is a thousand times lighter than water, then a pillar of air, equal in weight to a pillar of quicksilver of thirty inches high, will be thirty-four thousand feet; whereby we come to know, that the air or atmosphere is at least 34,000 feet, that is, about six miles, high, but probably much more. And if we consider that the air is a springy body, and that that which is nearest the earth is compressed by the weight of all the atmosphere above it, we shall find that the air near the surface of the earth is much denser and thicker than it is in the upper regions. On this theory it may be accounted for why great cities are not so healthful to reside in as small towns and country villages; and why London is much more prejudicial to health, owing to the many works containing noxious effluvia possessed of the component parts mentioned in the different kinds of air, and consequently forms an air to breathe in that is not congenial to the life of Man.

OF EXERCISE.

EXERCISE may be said to be either active or passive. The active is walking, hunting, dancing, playing at bowls, and the like; as also speaking, and other labour of the body and mind. The passive is riding in a coach, on horseback, or in any other manner. Exercise may be continued to a beginning of weariness, and ought to be used before dinner in a pure light air; for which reason, journeys, and going into the country, contribute greatly to preserve and re-establish health. Exercise increases the circulation of the blood, attenuates and divides the fluids, and promotes a regular perspiration, as well as a due secretion of all the humours; for it accelerates the animal spirits, and facilitates their distribution into all the fibres of the body, strengthens the parts, creates an appetite, and helps digestion. Whence it arises, that those who accustom themselves to exercise are generally very robust, and seldom subject to diseases.

Boerhaave recommends bodily exercise in diseases of a weak and lax fibre. By riding on horseback, the pendulous viscera of the abdomen are shaken every moment, and gently rubbed as it were one against another, while in the mean time the pure air acts on the lungs with greater force. But it is to be observed, that a weak man should not ride with a full stomach, but either before dinner or after the digestion is near finished; for, when the stomach is distended, weak people do not bear these concussions of the horse without difficulty; but, when the primæ viæ are near empty, the remaining fæces are discharged by this concussion. Sailing in a ship is also an exercise of great use to weak people. If the vessel moves with an even motion, by increasing perspiration it usually excites a wonderful alacrity, creates an appetite, and promotes digestion. These exercises are more especially serviceable to weak people; but, in order to strengthen the body by muscular motion, running and bodily exercises are to be used. In these we should begin with the most gentle, such as walking, and increase it by degrees till we come to running. Those exercises of the body are more especially serviceable which give delight to the mind at the same time, as tennis, fencing, &c. for which reason, the wisdom of antiquity appointed rewards for those who excelled in these gymnastic exercises, that by this means the bodies of their youth might be hardened for warlike toils.

As nothing is more conducive to health than moderate exercise, so violent exercise dissipates the spirits, weakens the body, destroys the elasticity of the fibres, and exhausts the fluid parts of the blood. No wonder, then, that acute and mortal fevers often arise from too violent exercise of the body; for the motion of the venous blood towards the heart being quickened by the contraction of the muscles, and the veins being thus depleted, the arteries more easily propel their contained humours through the smallest extremities into the now less-resisting veins; and therefore the velocity of the circulation will be increased through all the vessels. But this cannot be performed without applying the humours oftener, or in a greater quantity, to the secretory organs in the same time, whence the more fluid parts of the blood will be dissipated, and what remains will be inspissated; and, by the greater action of the vessels upon their contained fluids, and of the re-acting fluids upon the vessels, the blood acquires an inflammatory density. Add to this, that by the violent attrition of the solids and fluids, together with the heat thence arising, all the humours will incline to a greater acrimony, and the salts and oils of the blood will become more acrid and volatile. Hence those fevers which arise from too much exercise or motion, are cured by the rest of body and mind, with such aliments and medicines as moisten, dilute, and soften or allay acrimony.

The exercise of a soldier in camp, considered as conducive to health, Dr. Pringle distinguishes into three heads; the first relating to his duty, the second to his

living more commodiously, and the third to his diversions. The first, consisting chiefly in the exercise of his arms, will be no less the means of preserving health than of making him expert in his duty: and frequent returns of this, early, and before the sun grows hot, will be more advantageous than repeating it seldom, and staying out long at a time; for, a camp affording little convenience for refreshment, all unnecessary fatigue is to be avoided. As to the second article, cutting boughs for shading the tents, making trenches round them for carrying off the water, airing the straw, cleaning their clothes and accoutrements, and assisting in the business of the messes, ought to be no disagreeable exercise to the men for some part of the day. Lastly, as to diversions, the men must be encouraged to them either by the example of their officers, or by small premiums to those who shall excel in such kind of sports as shall be judged most conducive to health: but herein great caution is necessary, not to allow them to fatigue themselves too much, especially in hot weather or sickly times; but above all, that their clothes be kept dry, wet clothes being frequent causes of diseases and death.

Exercise, above all, is peculiarly necessary to the philosopher, the student, and young gentlemen at school. How useful, how agreeable soever, study may be to the mind, it is very far from being equally salutary to the body. Every one observes, that the Creator has formed an intimate connection between the body and the mind; a perpetual action and re-action, by which the body instantly feels the disorders of the mind, and the mind those of the body. The delicate springs of our frail machines lose their activity and become enervated, and the vessels are choaked by obstructions, when we totally desist from exercise; and the consequences necessarily affect the brain: a life entirely studious and sedentary is therefore equally prejudicial to body and mind. The limbs likewise become stiff; we contract an awkward constrained manner; a certain disgusting air attends all our actions, and we are very near being as disagreeable to ourselves as to others. An inclination to study is highly commendable; but it ought not, however, to inspire us with an aversion to society. The natural lot of man is to live among his fellows: and, whatever may be the condition of our birth or our situation in life, there are a thousand occasions where a man must naturally desire to render himself agreeable; to be active and adroit; to dance with a grace; to command the fiery steed; to defend himself against a brutal enemy; to preserve his life by dexterity, as by leaping, swimming, &c. Many rational causes have therefore given rise to the practice of particular exercises; and the most sagacious and benevolent legislators have instituted, in their academies and universities, proper methods of enabling youth, who devote themselves to study, to become expert also in laudable athletic exercises.

Whoever considers the structure of the human body will soon be convinced of the necessity of exercise for the health of children. The body is composed of an infinite number of vessels, whose fluids cannot be pushed on without the action and pressure of the muscles. But, if the fluids remain inactive, obstructions must happen, and the humours will, of course, be vitiated, which cannot fail to occasion diseases. Nature has furnished both the vessels which carry the blood and lymph with numerous valves, in order that the action of every muscle might push forward their contents; but, without action, this admirable contrivance can have no effect. This part of the animal œconomy proves to a demonstration the necessity of exercise for the preservation of health. Without exercise, the circulation of the blood cannot be properly carried on, nor the different secretions duly performed; without exercise, the humours cannot be properly prepared, nor the solids rendered strong or firm. The action of the heart, the motion of the lungs, and all the vital functions, are greatly assisted by exercise. But to point out the manner in which these effects are produced, would lead us farther into the œconomy of the human body than most of those for whom this treatise is intended would be able to follow. We shall therefore only add, that, where exercise is neglected, none of the animal functions can be duly performed; and, when that is the case, the whole constitution must go to wreck.

The love of activity shows itself very early in man. So strong is this principle, that a healthy youth cannot be restrained from exercise, even by the fear of punishment. Our love of motion is surely a strong proof of its utility. Nature implants no disposition in vain. It seems to be a catholic law throughout the whole animal creation, that no creature, without exercise, should enjoy health, or be able to find subsistence. Every creature, except man, takes as much of it as is necessary. He alone, and such animals as are under his direction, deviate from this original law; and they suffer accordingly. Inactivity never fails to induce an universal relaxation of the solids, which disposes the body to innumerable diseases. When the solids are relaxed, neither the digestion nor any of the secretions can be duly performed. In this case, the worst consequences must ensue. How can persons who loll all day in easy chairs, and sleep all night on beds of down, fail to be relaxed? Nor do such greatly mend the matter, who never stir abroad but in a coach, sedan, or such like. These elegant pieces of luxury are become so common, that the inhabitants of great towns seem to be in some danger of losing the use of their limbs altogether. It is now below any one to walk, who can afford to be carried. How ridiculous would it seem, to a person unacquainted with modern luxury, to behold the young and healthy swinging along on the shoulders of their fellow-creatures! or to see a fat carcase, over-run with diseases occasioned by inactivity, dragged through the streets by half a dozen horses!

Glandular obstructions, now so common, generally proceed from inactivity. These are the most obstinate of maladies. So long as the liver, kidneys, and other glands, duly perform their functions, health is seldom impaired; but, when they fail, nothing can restore it. Exercise is almost the only cure we know for glandular obstructions; indeed, it does not always succeed as a *remedy*; but there is reason to believe that it would seldom fail to *prevent* these complaints, were it used in due time. One thing is certain, that, amongst those who take sufficient exercise, glandular diseases are very little known; whereas the indolent and inactive are seldom free from them. Weak nerves are the constant companions of inactivity. Nothing but exercise and open air can brace and strengthen the nerves, or prevent the endless train of diseases which proceed from a relaxed state of these organs. We seldom hear the active or laborious complain of nervous diseases; these are reserved for the sons of ease and affluence. Many have been completely cured of these disorders by being reduced from a state of opulence to labour for their daily bread. This plainly points out the sources from whence nervous diseases flow, and the means by which they may be prevented. It is absolutely impossible to enjoy health, where the perspiration is not duly carried on; but that can never be the case where exercise is neglected. When the matter which ought to be thrown off by perspiration is retained in the body, it vitiates the humours, and occasions the gout, fevers, rheumatism, &c. Exercise alone would prevent many of those diseases which cannot be cured, and would remove others where medicine proves ineffectual.

No piece of indolence hurts the health more than the modern custom of lying a-bed too long in a morning. This is the general practice in great towns. The inhabitants of cities seldom rise before nine or ten o'clock; but the morning is undoubtedly the best time for exercise, while the stomach is empty, and the body refreshed with sleep. Besides, the morning air braces and strengthens the nerves, and, in some measure, answers the purpose of a cold bath. Let any one who has been accustomed to lie a-bed late, rise by six or seven, spend a couple of hours in walking, riding, or any active diversion without doors, and he will find his spirits cheerful and serene through the day, his appetite keen, and his body braced and strengthened. Custom soon renders early rising agreeable, and nothing contributes more to the preservation of health. The inactive are continually complaining of pains of the stomach, flatulencies, indigestions, &c. These complaints, which pave the way to many others, are not to be removed by medicine: they can only be cured by a vigorous course of exercise, to which they seldom fail to yield.

Exercise, if possible, ought always to be taken in the open air. When that cannot be done, various methods may be contrived for exercising the body within doors.

doors. It is not necessary to adhere strictly to any particular kind of exercise. The best way is to take them by turns, and to use that longest which is most suitable to the strength and constitution. Those kinds of exercise which give action to most of the bodily organs, are always to be preferred, as walking, running, riding, digging, swimming, and such like. It is much to be regretted, that active and manly diversions are now so little practised. Diversions make people take more exercise than they otherwise would do, and are of the greatest service to such as are not under the necessity of labouring for their bread. As active diversions lose ground, those of a sedentary kind seem to prevail. Sedentary diversions are of no other use but to consume time. Instead of relieving the mind, they often require more thought than either study or business. Every thing that induces people to sit still, unless it be some necessary employment, ought to be avoided.

The diversions which afford the best exercise are hunting, shooting, playing at cricket, bowls, &c. These exercise the limbs, promote perspiration, and the other secretions. They likewise strengthen the lungs, and give firmness and agility to the whole body. Such as can, ought to spend two or three hours a-day on horseback; those who cannot ride, should employ the same time in walking. Exercise should never be continued too long. Over-fatigue prevents the benefit of exercise, and instead of strengthening the body tends to weaken it. Every man should lay himself under some sort of necessity to take exercise. Indolence, like other vices, when indulged, gains ground, and at length becomes agreeable. Hence many who were fond of exercise in the early part of life, become quite averse from it afterwards. This is the case of most hypochondriac and gouty people, which renders their diseases in a great measure incurable. Indolence not only occasions diseases, and renders men useless to society, but promotes all manner of vice. To say a man is lazy, is little better than calling him vicious. The mind, if not engaged in some useful pursuit, is constantly in quest of ideal pleasures, or impressed with the apprehension of some imaginary evil. From these sources proceed most of the miseries of mankind. Certainly man was never intended to be idle. Inactivity frustrates the very design of his creation: whereas an active life is the best guardian of virtue, and the greatest preservative of health.

OF SLEEP.

SLEEP, as well as food, ought to be duly regulated. Too little sleep weakens the nerves, exhausts the spirits, and occasions diseases; and too much renders the mind dull, the body gross, and disposes to apoplexies, lethargies, and other complaints of a similar nature. A medium ought therefore to be observed; but this is not easy to fix. Children require more sleep than grown persons, the laborious than

than the idle, and such as eat and drink freely than those who live abstemiously. Besides, the real quantity of sleep cannot be measured by time, as one person will be more refreshed by five or six hours sleep than another by eight or ten. Children may always be allowed to take as much sleep as they please; but, for adults, six or seven hours are certainly sufficient, and no one ought to exceed eight. Those who lie a-bed more than eight hours may slumber, but they can be hardly said to sleep; such generally toss and dream away the fore part of the night, sink to rest towards morning, and doze till noon. The best way to make sleep sound and refreshing is to rise betimes. The custom of lying a-bed for nine or ten hours, not only makes the sleep less refreshing, but weakens the constitution. Nature points out night as the proper season for sleep. Nothing more certainly destroys the constitution than night-watching. It is a great pity that a practice so destructive to health should be so much in fashion. How quickly the want of rest in due season will blast the most blooming complexion, or ruin the best constitution, is evident from the ghastly countenances of those who, as the phrase is, turn day into night, and night into day. To make sleep refreshing, the following things are requisite: First, to take sufficient exercise in the open air; to avoid strong tea or coffee; next, to eat a light supper; and lastly, to lie down with a mind as cheerful and serene as possible.

It is certain that too much exercise will prevent sleep, as well as too little. We seldom, however, hear the active and laborious complain of restless nights. It is the indolent and slothful who generally have these complaints. Is it any wonder that a bed of down should not be refreshing to a person who sits all day in an easy chair? A great part of the pleasure of life consists in alternate rest and motion; but they who neglect the latter can never relish the former. The labourer enjoys more true luxury in plain food and sound sleep, than is to be found in sumptuous tables and downy pillows, where exercise is wanting. That light suppers cause sound sleep, is true even to a proverb. Many persons, if they exceed the least at that meal, are sure to have uneasy nights; and, if they fall asleep, the load and oppression on their stomach and spirits occasion frightful dreams, broken and disturbed repose, the night-mare, &c. Were the same persons to go to bed with a light supper, or sit up till that meal was pretty well digested, they would enjoy sound sleep, and rise refreshed and cheerful. There are indeed some people who cannot sleep unless they have some solid food at night; but this does not imply the necessity of a heavy supper.

Nothing more certainly disturbs our repose than anxiety. When the mind is not at ease, one seldom enjoys sound sleep. That greatest of human blessings flies the wretched, and visits the happy, the cheerful, and the gay. This is a sufficient

reason why every man should endeavour to be as easy in his mind as possible when he goes to rest. Many, by indulging grief and anxious thought, have banished sound sleep so long, that they could never afterwards enjoy it. Sleep, when taken in the fore part of the night, is generally reckoned most refreshing. Whether this be the effect of habit or not is hard to say; but, as most people are accustomed to go early to bed when young, it may be presumed that sleep, at this season, will prove most refreshing to them ever after. Whether the fore part of the night be best for sleep or not, surely the fore part of the day is fittest both for business and amusement; and we hardly ever find an early-riser who does not enjoy a good state of health.

Experience proves that, the more a person sleeps, the more he is inclined to sleep: if in the morning we sleep an hour beyond our custom, the consequence is, that we shall be dull and heavy all the day; and, as to these facts, there are some very remarkable.—A youth in Germany, of immense wealth, was summoned by his prince to take up a title of nobility; on which occasion he drank to such an excess, that the prince, in order to cure him of such a scandalous vice, had him carried into a dark and remote place, where he slept three days and three nights; for, whenever he awoke, believing it to be the middle of the night, he betook himself to sleep again.—The Memoirs of the Academy of Sciences at Paris mention a sleep of two months, caused by a catalepsy, a disease by which the patient is instantly rendered as immoveable as a statue.—Samuel Chilton, a labourer in Somersetsshire, fell, and without any visible cause, into a profound sleep, out of which no means could recover him, till, after a month's time, he arose of himself. His mother, fearing he would be starved in that fullen humour, as she called it, put bread and cheese and small beer by him, and it was daily spent. On the ninth of April, 1696, he was seized with a like sleepy fit, which lasted till the seventh of August, when he awoke, without knowing he had slept above a night. He occasionally used the food set by him, and had evacuations, till, about the tenth week, his jaws seemed to be set, and his teeth clinched so close that his mouth could not be opened; and all the nourishment he received, during these seven weeks, was about three pints of tent insinuated through a cavity in one of his teeth. He had made water but once, and never had a stool all the time. On the 17th of August, 1697, his fit returned; and Dr. Oliver, the author of the memoir, in order to try whether there might not be some imposture in this extraordinary phenomenon, went to the house; he put his mouth to his ear, and called him several times, by his name, as loud as he could; pulled him by the shoulders, pinched his nose, stopped his mouth and nose at the same time; lifted up his eye-lids, when he found the balls drawn up under the brows; he, farther, held a phial of spirit of sal ammoniac

niac under one nostril; that producing no effect, he poured up his nose near a half-ounce bottle, and the spirit, he says, being drawn from quicklime, was almost as hot as fire itself. Not satisfied with this, he crammed the same nostril with powder of white hellebore: all these experiments producing no other effect than to make his eyes shiver a little. Dr. Oliver left him, convinced that he was really asleep. A few days after, an apothecary drew some ounces of blood from his arm, and bound up the orifice, without his making the least motion: likewise, a gentleman, though somewhat indiscreetly, ran a pin into his arm, up to the very bone; and in this state of insensible sleep he continued till the nineteenth of November; during all this time he ate and evacuated, but never fouled his bed. The above instance of sleep is to be seen at large in Jones's Abridgement of the Philosophical Transactions, vol. v.

OF DREAMS.

SCARCELY any part of nature is less open to our observation than the human mind in this state. The dreamer himself cannot well observe the manner in which dreams arise or disappear to him. When he awakes, he cannot recollect the circumstances of his dreams with sufficient accuracy. Were we to watch over him with the most vigilant attention, we could not perceive with certainty what emotions are excited in his mind, or what thoughts pass through it, during his sleep. But, even though we could ascertain these phenomena, many other difficulties would still remain. What parts of a human being are active, what dormant, when he dreams? Why does he not always dream while asleep? Or why dreams he at all? Do any circumstances in our constitution, situation, and peculiar character, determine the nature of our dreams? We may lay before the reader such facts as have been ascertained concerning dreaming, and the most plausible conjectures that have been offered to explain those particulars, about which we can only conjecture, or have at least hitherto obtained nothing more certain than conjecture.

In dreaming, we are not conscious of being asleep. This is well known from a thousand circumstances. When awake, we often recollect our dreams; and we remember on such occasions, that, while those dreams were passing through our minds, it never occurred to us that we were separated by sleep from the active world. We are often observed to act and talk in dreaming as if we were busily engaged in the intercourse of social life. In dreaming we do not consider ourselves as witnessing or bearing a part in a fictitious scene; we seem not to be in a similar situation with the actors in a dramatic performance, or the spectators before whom they exhibit, but engaged in the business of real life. All the varieties of thought that pass through our minds when awake may also occur in dreams; all the images

which imagination presents in the former state she is also able to call up in the latter all the same emotions may be excited, and we are often actuated by equal violence of passion; none of the transactions in which we are capable of engaging while awake is impossible in dreams: in short, our range of action and observation is equally wide in one state as in the other; and, while dreaming, we are not sensible of any distinction between our dreams and the events and transactions in which we are actually concerned in our intercourse with the world.

Though in dreams imagination appears to be free from all restraint, and indulges in the most wanton freaks, yet it is generally agreed, that the imaginary transactions of the dreamer bear always some relation to his particular character in the world, his habits of action, and the circumstances of his life. The lover, we know, dreams of his mistress, and the miser of his money; the philosopher renews his researches in sleep often with the same pain and fatigue as when awake; and even the merchant, at times, returns to balance his books, and compute the profits of an adventure, when slumbering on his pillow. And not only do the more general circumstances of a person's life influence his dreams; his passions and habits are nearly the same when asleep as when awake. *A person whose habits of life are virtuous, does not in his dreams plunge into a series of crimes; nor are the vicious reformed when they pass into this imaginary world.* The choleric man finds himself offended by slight provocations as well in his dreams as in his ordinary intercourse with the world, and a mild temper continues pacific in sleep. The character of a person's dreams is influenced by his circumstances when awake in a still more unaccountable manner. Certain dreams usually arise in the mind after a person has been in certain situations. Dr. Beattie relates, that he once, after riding thirty miles in a high wind, passed a part of the succeeding night in dreams beyond description terrible. The state of a person's health, and the manner in which the vital functions are carried on, have a considerable influence in determining the character of dreams. After too full a meal, or after eating of an unusual sort of food, a person has always dreams of a certain nature. In dreaming, the mind for the most part carries on no intercourse through the senses with surrounding objects. Touch a person gently who is asleep, he feels not the impression. You may awake him by a smart blow; but, when the stroke is not sufficiently violent to effect that, he remains insensible of it. We speak softly beside a person asleep without fearing that he overhears us. His eye-lids are shut; and, even though light should fall upon the eye-ball, yet still his powers of vision are not awakened to active exertion, unless the light be so strong as to rouse him from sleep. He is insensible both to sweet and disagreeable smells. It is not easy to try whether his organs of taste retain their activity, without awakening him; yet from analogy it may be presumed

that

that these too are inactive. With respect to the circumstances here enumerated, it is indifferent whether a person be dreaming or buried in sleep.

Yet there is one remarkable fact concerning dreaming which may seem to contradict what has been here asserted. In dreams, we are liable not only to speak aloud in consequence of the suggestions of imagination, but even to get up, and walk about, and engage in little enterprises, without awaking. Now, as we are in this instance so active, it seems that we cannot be then insensible of the presence of surrounding objects. The sleep-walker is really sensible, in a certain degree, of the presence of the objects around him; but he does not attend to them with all their circumstances, nor do they excite in him the same emotions as if he were awake. He feels no terror on the top of a house, or the brink of a precipice; and, in consequence of being free from fear, he is also without danger in such a situation, unless suddenly awaked. This is one of the most inexplicable phenomena of dreaming. There is also another fact not quite consonant with what has been above advanced. It is said, that in sleep a person will continue to hear the noise of a cataract in the neighbourhood, or regular strokes with a hammer, or any similar sound sufficiently loud, and continued uninterruptedly from before the time of his falling asleep. We know not whether he awakes on the sudden cessation of the noise. This fact is asserted on sufficient evidence: it is curious. Even when awake, if very deeply intent on any piece of study, or closely occupied in business, the sound of a clock striking in the neighbourhood, or the beating of a drum, will escape us unnoticed: and it is therefore the more surprising that we should thus continue sensible to sounds when asleep. Not only do a person's general character, habits of life, and state of health, influence his dreams; but those concerns in which he has been most deeply interested during the preceding day, and the views which have arisen most frequently to his imagination, very often afford the subjects of his dreams. When I look forward with anxious expectation towards any future event, I am likely to dream either of the disappointment or the gratification of my wishes. Have I been engaged through the day, either in business or amusements which I have found exceedingly agreeable, or in a way in which I have been extremely unhappy, either my happiness or my misery is likely to be renewed in my dreams. Though dreams have been regarded among almost all nations through the world, at least in some periods of their history, as prophetic of future events, yet it does not appear that this popular opinion has been established on good grounds. Christianity, indeed, teaches us to believe, that the Supreme Being may, and actually does, operate on our minds, and influence at times the determinations of our will, without making us sensible of the restraint to which we are thus subjected. And, in the same manner, no doubt, the suggestions which arise to us in dreams may be

produced. The imaginary transactions in which we are then engaged, may be such as are actually to occupy us in life; the strange and seemingly incoherent appearances which are then presented to the mind's eye, may allude to some events which are to befall ourselves or others. It is, therefore, by no means impossible, or inconsistent with the general analogy of nature, that dreams should have a respect to futurity. We have no reason to regard the dreams which are related in the Holy Scriptures to have been prophetic of future events as not inspired by heaven, or to laugh at the idea of a prophetic dream as absurd or ridiculous.

We know of no other facts that have been fully ascertained concerning dreaming. But we are by no means sufficiently acquainted with this important phenomenon in the history of the mind. We cannot tell by what laws of our constitution we are thus liable to be so frequently engaged in imaginary transactions, nor what are the particular means by which the delusion is accomplished. The delusion is indeed remarkably strong. One will sometimes have a book presented to him in a dream, and fancy that he reads, and actually enter into the nature of the composition before him, and even remember, after he awakes, what he knows that he only fancied himself reading. Can this be delusion? If delusion, how or for what purposes is it produced? The mind, it would appear, does not, in sleep, become inactive like the body; or at least is not always inactive while we are asleep. When we do not dream, the mind must either be inactive, or the connection between the mind and the body must be considered as in some manner suspended: and, when we dream, the mind, though it probably acts in concert with the body, yet does not act in the same manner as when we are awake. It seems to be clouded or bewildered, in consequence of being deprived for a time of the service of the senses. Imagination becomes more active and more capricious: and all the other powers, especially judgment and memory, become disordered and irregular in their operation.

Various theories have been proposed to explain what appears here most inexplicable. The ingenious Mr. Baxter, in his treatise on the Immateriality of the Human Soul, endeavours to prove that dreams are produced by the agency of some spiritual beings, who either amuse or employ themselves seriously in engaging mankind in all those imaginary transactions with which they are employed in dreaming. This theory, however, is far from being plausible. It leads us entirely beyond the limits of our knowledge. It requires us to believe without evidence. It is unsupported by any analogy. It creates difficulties still more inexplicable than those which it has been proposed to remove. Till it appear that our dreams cannot possibly be produced without the interference of other spiritual agents, possessing such influence over our minds as to deceive us with fancied joys, and involve

us in imaginary afflictions, we cannot reasonably refer them to such a cause. Besides, from the facts which have been stated as well known concerning dreams, it appears that their nature depends both on the state of the human body and on that of the mind. But, were they owing to the agency of other spiritual beings, how could they be influenced by the state of the body? Those must be a curious set of spiritual beings who depend in such a manner on the state of our corporeal frame. Better not to allow them existence at all, than to place them in such a dependance.

Wolfius, and after him M. Formey, have supposed, that dreams never arise in the mind except in consequence of some of the organs of sensation having been previously excited. Either the ear or the eye, or the organs of touching, tasting, or smelling, communicate information, somehow, in a tacit, secret, manner; and thus partly rouse its faculties from the lethargy in which they are buried in sleep, and engage them in a series of confused and imperfect exertions. But what passes in dreams is so very different from all that we do when awake, that it is impossible for the dreamer himself to distinguish whether his powers of sensation perform any part on the occasion. It is not necessary that imagination be always excited by sensation. Fancy, even when we are awake, often wanders from the present scene. Absence of mind is incident to the studious; the poet and the mathematician many times forget what they are. We cannot discover, from any thing that a person in dreaming displays to the observation of others, that his organs of sensation take a part in the imaginary transactions in which he is employed. In those instances, indeed, in which persons asleep are said to hear sounds; the sounds which they hear are said also to influence, in some manner, the nature of their dreams. But such instances are singular. Since then it appears that the person who dreams is himself incapable of distinguishing either during his dreams, or by recollection when awake, whether any new impressions are communicated to him in that state by his organs of sensation; that even by watching over him, and comparing our observations of his circumstances and emotions, in his dreams, with what he recollects of them after awaking, we cannot, except in one or two singular instances, ascertain this fact; and that the mind is not incapable of acting while the organs of sensation are at rest, and on many occasions refuses to listen to the information which they convey; we may, without hesitation, conclude, that the theory of Wolfius and Formey has been too hastily and incautiously advanced.

Other physiologists tell us, that the mind, when we dream, is in a state of delirium. Sleep, they say, is attended with what is called a collapse of the brain; during which either the whole or a part of the nerves of which it consists, are in a state in which they cannot carry on the usual intercourse between the mind and the organs of sensation. When the whole of the brain is in this state, we become en-

tirely unconscious of existence, and the mind sinks into inactivity : when only a part of the brain is collapsed, as they term it, we are then neither asleep nor awake, but in a sort of delirium between the two. This theory, like the last-mentioned, supposes the mind incapable of acting without the help of sensation : it supposes that we know the nature of a state of which we cannot ascertain the phenomena ; it also contradicts a known fact, in representing dreams as confused images of things around us, not fanciful combinations of things not existing together in nature or in human life. We must consider it likewise, therefore, as a baseless fabric.

Instead of the attendant spirits watching over our bodies, and inciting us to good or evil in our dreams, may we not more rationally suppose, that these incitements, or rather exertions towards real and sensible actions, are produced by the soul or spirit within us, which, being immortal, never sleeps ; but which rather, during that passive state of the body, assumes an endeavour to act without it, or to escape from it, as from a prison, wherein it is restrained to certain limits, and obliged to act under the will of its keeper. This surely will best explain the facts attending sleep-walkers, who, in the darkest nights visit different apartments, walk up and down stairs, lock and unlock doors, open windows, and crawl over the roofs of houses, with the utmost ease and celerity ; which, if the persons were awake, would be impossible. May we not likewise attribute to the same source, those elevated ideas, and sublime compositions, which Milton and other celebrated authors have confessed, were communicated nightly in their dreams ?

It lately happened, that a young gentleman, about fifteen years of age, from one of the public schools, slept in the same room with me. He chose to go to bed early ; and, when I came into the same apartment about two hours after, he appeared remarkably intent upon his studies, though fast locked in the arms of sleep. I stood some time at his bed-side, and heard him repeat several lines from Homer and Virgil. After this he repeated, with a bold and nervous accent, the whole of the Hebrew alphabet : then, turning, seemed to fall into a more composed sleep. The next morning at breakfast I related this circumstance to the company, in the presence of the young gentleman ; and all began to commend the great progress he must have made in his studies. The young man instantly declared, that, however conversant he might be with Virgil and Homer, he had never heard the Hebrew alphabet repeated, nor did he ever know the name of any one of its characters.—The nature of the connection by which the soul and body are united, seems to be almost beyond our comprehension ; and, till we can apply experiment and observation in a better manner to this branch of
 physiology,

physiology, it must undoubtedly remain unknown. To something mysterious in the nature of that connection, the delusion produced in dreams is in all probability owing.

Amid this uncertainty with respect to the manner in which our powers of mind and body perform their functions in dreaming, it is pleasing to find that we can, however, apply to useful purposes the imperfect knowledge which we have been able to acquire concerning the series of phenomena. Our dreams are affected by the state of our health, by the manner in which we have passed the preceding day, by our general habits of life, by the hopes which we most fondly indulge, and the fears which prevail most over our fortitude when we are awake. From recollecting our dreams, therefore, we may learn to correct many improprieties in our conduct; to refrain from bodily exercises, or from meats and drinks, that have unfavorable effects on our constitution; to resist in due time evil habits that are stealing upon us; and to guard against hopes and fears which detach us from our proper concerns, and unfit us for the duties of life. Instead of thinking what our dreams may forebode, we may, with much better reason, reflect by what they have been occasioned, and look back to those circumstances in our past life to which they are owing. The sleep of innocence and health is sound and refreshing; their dreams delightful and pleasing. A distempered body, and a polluted or perturbed mind, are haunted in sleep with frightful, impure, and unpleasing, dreams.

OF INTEMPERANCE.

It is universally agreed, that temperance and exercise are the two best physicians in the world, and that, if these were duly regarded, there would be little occasion for any other. *Temperance may justly be called the parent of health*; yet numbers of mankind act as if they thought diseases and death too slow in their progress, and, by intemperance and debauch, seem, as it were, to solicit their approach. The danger of intemperance appears from the very construction of the human body. Health depends on the state of the solids and fluids which fits them for the due performance of the vital functions; and, while these go regularly on, we are found and well; but whatever disturbs them necessarily impairs health. Intemperance never fails to disorder the whole animal œconomy; it hurts the digestion, relaxes the nerves, renders the different secretions irregular, vitiates the humours, and occasions numberless diseases.

The analogy between the nourishment of plants and animals affords a striking proof of the danger of intemperance. Moisture and manure greatly promote vegetation; yet an over-quantity of either will entirely destroy it. The best things become hurtful, nay destructive, when carried to excess. Hence we learn, that

the highest degree of human wisdom consists in regulating our appetites and passions so as to avoid all extremes. It is this chiefly which entitles us to the character of rational beings. The slave of appetite will ever be the disgrace of human nature.—The Supreme Being hath endued us with various passions for the propagation of the species, the preservation of the individual, &c. Intemperance is the abuse of these passions; and moderation consists in the proper regulation of them. Men, not contented with satisfying the simple calls of Nature, create artificial wants, and are perpetually in search of something that may gratify them; but imaginary wants can never be gratified. *Nature is content with little; but luxury knows no bounds.* Hence the epicure, the drunkard, and the debauchee, seldom stop their career, till their money, or their constitution, fails: then, indeed, they generally see their error when too late.

It is impossible to lay down fixed rules with regard to diet, on account of the different constitutions of mankind. The most ignorant person, however, certainly knows what is meant by excess; and it is in the power of every man, if he chooses, to avoid it. The great rule of diet is to study simplicity. Nature delights in the most plain and simple food; and every animal, except man, follows her dictates. Man alone riots at large, and ransacks the whole creation in quest of luxuries, to his own destruction. An elegant writer of the last age speaks thus of intemperance in diet: “For my part, when I behold a fashionable table set out in all its magnificence, I fancy that I see gout and dropsies, fevers and lethargies, with other innumerable distempers, lying in ambush among the dishes.” Nor is intemperance in other things less destructive than in diet. How quickly does the immoderate pursuit of carnal pleasures, or the abuse of intoxicating liquors, ruin the best constitution! Indeed these vices generally go hand in hand. Hence it is that we so often behold the votaries of Bacchus and Venus, even before they have arrive at the prime of life, worn out with disease, and hastening with swift pace to an untimely grave. Did men reflect on the painful diseases, and premature deaths, which are daily occasioned by intemperance, it would be sufficient to make them shrink back with horror from the indulgence even of their darling pleasures.

Intemperance does not hurt its votaries alone; the innocent too often feel the direful effects of it. How often do we behold the miserable mother, with her helpless infants, pining in want, while the cruel father is indulging his insatiate appetites? Families are not only reduced to misery, but even extirpated, by intemperance. *Nothing tends so much to prevent propagation, and to shorten the lives of children, as the intemperance of parents.* The poor man who labours all day, and at night lies down contented with his humble fare, can boast a numerous offspring; while his pampered lord, sunk in ease and luxury, often languishes without

without an heir to his ample fortunes. Even states and empires feel the influence of intemperance, and rise or fall as it prevails. Instead of mentioning the different kinds of intemperance, and pointing out their influence upon health, we shall only, by way of example, make a few observations on one particular species of that vice, viz. the abuse of intoxicating liquors.

Every act of intoxication puts Nature to the expense of a fever, in order to discharge the poisonous draught. When this is repeated almost every day, it is easy to foresee the consequences. That constitution must be strong indeed, which is able long to hold out under a daily fever! *But fevers occasioned by drinking do not always go off in a day; they frequently end in an inflammation of the breast, liver, or brain, and produce fatal effects.* Though the drunkard should not fall by an acute disease, he seldom escapes those of a chronic kind. Intoxicating liquors, when used to excess, weaken the bowels, and spoil the digestion; they destroy the power of the nerves, and occasion paralytic and convulsive disorders: they likewise heat and inflame the blood, destroy its balsamic quality, render it unfit for circulation, and for the nourishment of the body. Hence obstructions, atrophies, dropsies, and consumptions of the lungs. These are the common ways in which drunkards make their exit. Diseases of this kind, when brought on by hard drinking, seldom admit of a cure. *Many people injure their health by drinking, who seldom get drunk.* The continual habit of foaking, as it is called, though its effects be not so violent, is not less pernicious. When the vessels are kept constantly full and upon the stretch, the different digestions can neither be duly performed, nor the humours properly prepared. Hence most people of this character are afflicted with the gout, the gravel, ulcerous sores in the legs, &c. If these disorders do not appear, they are seized with low spirits, hypochondriacal affections, and other symptoms of indigestion.

Consumptions are now so common, that it is thought one-tenth of the inhabitants of great towns die of that disease. Hard drinking is no doubt one of the causes to which we must impute the increase of consumptions. The great quantities of viscid malt-liquor drunk by the common people of England cannot fail to render the blood fizy and unfit for circulation; from whence proceed obstructions and inflammations of the lungs. There are few great ale-drinkers who are not phthical; nor is that to be wondered at, considering the glutinous and almost indigestible nature of strong ale. Those who drink ardent spirits or strong wines run still greater hazard; these liquors heat and inflame the blood, and tear the tender vessels of the lungs in pieces; yet, so great is the consumption of them in this country, that one would almost be induced to think the inhabitants lived upon them. The habit of drinking proceeds frequently from misfortunes in life. The misera-

ble fly to it for relief. It affords them indeed a temporary ease. But alas! this solace is short-lived; and, when it is over, the spirits sink as much below their usual tone as they had before been raised above it. Hence a repetition of the dose becomes necessary; and every fresh dose makes way for another, till the unhappy wretch becomes a slave to the bottle, and at length falls a sacrifice to what at first perhaps was taken only as a medicine. No man is so dejected as the drunkard when his debauch is gone off. Hence it is, that those who have the greatest flow of spirits while the glass circulates freely, are of all others the most melancholy when sober, and often put an end to their own miserable existence in a fit of spleen or ill humour.

Drunkenness not only proves destructive to health, but likewise to the faculties of the mind. It is strange that creatures who value themselves on account of a superior degree of reason to that of brutes should take pleasure in sinking so far below them. Were such as voluntarily deprive themselves of the use of reason to continue ever after in that condition, it would seem but a just punishment; and, though this be not the consequence of one act of intoxication, it seldom fails to succeed a course of it. By a habit of drinking, the greatest genius is often reduced to a mere idiot. *Intoxication is peculiarly hurtful to young persons.* It heats their blood, impairs their strength, and obstructs their growth; besides, the frequent use of strong liquors in the early part of life destroys any benefit that might arise from them afterwards. *Those who make a practice of drinking generous liquors when young, cannot expect to reap any benefit from them as a cordial in the decline of life.* Drunkenness is not only in itself a most abominable vice, but is an inducement to many others. There is hardly any crime so horrid that the drunkard will not perpetrate for the love of liquor. We have known mothers sell their children's clothes, the food that they should have eaten, and afterwards even the infants themselves, in order to purchase the accursed draught.

It is amazing that our improvements in arts, learning, and politeness, have not put the barbarous custom of drinking to excess out of fashion. It is indeed less common in South Britain than it was formerly: but it still prevails very much in the North, where this relic of barbarity is mistaken for hospitality. In Ireland, no man is supposed to entertain his guests well, who does not make them drunk. Forcing people to drink, is certainly the greatest piece of rudeness that any man can be guilty of. Bravado, complaisance, or mere good-nature, may induce a man to take his glass, if urged to it, at a time when he might as well take poison. The custom of drinking to excess has long been out of fashion in France; and, as it begins to lose ground among the politer part of the English, we hope it will soon be banished from every part of the united kingdom.

OF THE PASSIONS.

THE passions have great influence both in the cause and cure of diseases. How the mind affects the body, will, in all probability, ever remain a secret. It is sufficient for us to know, that there is established a reciprocal influence betwixt the mental and corporeal parts, and that whatever injures the one disorders the other.

OF ANGER.—The passion of anger ruffles the mind, distorts the countenance, hurries on the circulation of the blood, and disorders the whole vital and animal functions. It often occasions fevers, and other acute diseases, and sometimes even sudden death. This passion is peculiarly hurtful to the delicate, and those of weak nerves. I have known such persons frequently lose their lives by a violent fit of anger, and would advise them to guard against the excess of this passion with the utmost care. It is not indeed always in our power to prevent being angry; but we may surely avoid harbouring resentment in our breast. Resentment preys upon the mind, and occasions the most obstinate chronic disorders, which gradually waste the constitution. Nothing shows true greatness of mind more than to forgive injuries: it promotes the peace of society, and greatly conduces to our own ease, health, and felicity. Such as value health should avoid violent gusts of anger as they would the most deadly poison. Neither ought they to indulge resentment, but endeavour at all times to keep their minds calm and serene. Nothing tends so much to the health of the body as a constant tranquillity of mind. Add to this, the indecency of extravagant anger; how it renders us, whilst it lasts, the scorn and sport of all about us, of which it leaves us, when it ceases, sensible and ashamed; the inconveniences and irretrievable misconduct into which our irascibility has sometimes betrayed us; the friendships it has lost us; the distresses and embarrassments in which we have been involved by it, and the fore repentance which on one account or other it always costs us.

Physicians and naturalists afford instances of very extraordinary effects of this passion.—Borrichius cured a woman of an inveterate tertian ague, which had baffled the art of physic, by putting the patient in a furious fit of anger. Valeriola made use of the same means, with the like success, in a quartan ague.—The same passion has been equally salutary to paralytic, gouty, and even dumb, persons; to which last it has sometimes given the use of speech. Etmuller gives divers instances of very singular cures wrought by anger; among others, he mentions a person laid up in the gout, who, being provoked by his physician, flew upon him, and was cured. It is true, the remedy is somewhat dangerous in the application, when a patient does not happen to use it with moderation. We meet with several in-

stances of princes to whom it has proved mortal; for example, Valentinian the First, Wenceslas, Matthias Corvinus king of Hungary, and others. There are also instances wherein it has produced the epilepsy, jaundice, cholera-morbus, diarrhœa, &c. In fact, this passion is of such a nature, that it quickly throws the whole nervous system into preternatural commotions, by a violent stricture of the nervous and muscular parts; and surprisngly augments not only the systole of the heart and of its contiguous vessels, but also the tone of the fibrous parts in the whole body. It is also certain that this passion, by the spasmodic stricture it produces in the parts, exerts its power principally on the stomach and intestines, which are highly nervous and membranous parts; whence the symptoms are more dangerous, in proportion to the greater consent of the stomach and intestines with the other nervous parts, and almost with the whole body. The unhappy influence of anger, likewise, on the biliary and hepatic ducts, is very surprisng; since, by an intense constriction of these, the liver is not only rendered scirrhus, but stones also are often generated in the gall-bladder and biliary ducts; these accidents have scarcely any other origin than an obstruction of the free motion and efflux of the bile, by means of this violent stricture. From such a stricture of these ducts likewise proceeds the jaundice, which in process of time lays a foundation for calculous concretions in the gall-bladder. Lastly, by increasing the motion of the fluids, or the spasms of the fibrous parts, by means of anger, a larger quantity of blood is propelled with an impetus to certain parts; whence it happens that they are too much distended, and the orifices of the veins distributed there are too much opened. It is evident from experience, that anger has a great tendency to excite hæmorrhages, either from the nose, the aperture of the pulmonary artery, the veins of the anus; or, in women, from the uterus, especially in those previously accustomed and disposed to such evacuations.

OF FEAR.—The influence of fear, both in occasioning and aggravating diseases, is very great. No man ought to be blamed for a decent concern about life; but too great a desire to preserve it, is often the cause of losing it. Fear and anxiety, by depressing the spirits, not only dispose us to diseases, but often render those diseases fatal which an undaunted mind would overcome. Sudden fear has generally violent effects. Epileptic fits, and other convulsive disorders, are often occasioned by it. Hence the danger of that practice, so common among young people, of frightening one another. Many have lost their lives, and others have been rendered miserable, by frolics of this kind. It is dangerous to tamper with the human passions. The mind may easily be thrown into such disorder as never again to act with regularity.

But

But the gradual effects of fear prove most hurtful. The constant dread of some future evil, by dwelling upon the mind, often occasions the very evil itself. Hence it comes to pass, that so many die of those very diseases of which they long had a dread, or which had been impressed on their minds by some accident or foolish prediction. This, for example, is often the case with women in child-bed. Many of those who die in that situation are impressed with the notion of their death a long time before it happens; and there is reason to believe, that this impression is often the cause of it. The methods taken to impress the minds of women with the apprehensions of the great pain and peril of child-birth, are very hurtful. Few women die in labour, though many lose their lives after it; which may be thus accounted for. A woman after delivery, finding herself weak and exhausted, immediately apprehends she is in danger; and this fear seldom fails to obstruct the necessary evacuations upon which her recovery depends. Thus the sex often fall a sacrifice to their own imaginations, when there would be no danger, did they apprehend none. It seldom happens, when two or three women, in a great town, die in child-bed, but their death is followed by many others. Every woman of their acquaintance who is with child dreads the same fate, and the disease becomes epidemical by the mere force of imagination. This should induce pregnant women to despise fear, and by all means to avoid those tattling gossips who are continually buzzing in their ears the misfortunes of others. Every thing that may in the least alarm a patient, or a child-bed woman, ought with the greatest care to be guarded against.

In general, the effects of terror are a contraction of the small vessels and a repulsion of the blood in the large and internal ones; hence proceed a suppression of perspiration, a general oppression, trembling, and anguish of the heart and lungs, overcharged with blood. Frights often occasion incurable diseases, as epilepsy, stupor, madness, &c. In acute diseases, they have evidently killed many, by the agitation into which they have thrown the spirits, already too much disordered. We have also accounts of persons absolutely killed by terrors when in perfect health at the time of receiving the shock from them: people ordered to be executed, but with private orders for a reprieve, have expired at the block without a wound.

Out of many instances of the fatal effects of fear recorded in writers, the following is selected as one of the most singular. "George Grochantzy, a Polander, who had enlisted as a soldier in the service of the King of Prussia, deserted during the war. A small party was sent in pursuit of him; and, when he least expected it, they surpris'd him singing and dancing among a company of peasants, who were got together at an inn and were making merry. This event, so sudden and unforeseen, and at the same time so dreadful in its consequences, struck him in such a manner,

manner, that, giving a great cry, he became at once altogether stupid and insensible, and was seized without the least resistance. They carried him away to Glogau, where he was brought before the council of war, and received sentence as a deserter. He suffered himself to be led and disposed of at the will of those about him, without uttering a word, or giving the least sign that he knew what had happened or would happen to him. He remained immovable as a statue wherever he was placed, and was wholly passive with respect to all that was done to him or about him. During all the time that he was in custody, he neither ate, nor drank, nor slept, nor had any evacuation. Some of his comrades were sent to see him; after that he was visited by some officers of his corps and by some priests; but he still continued in the same state, without discovering the least signs of sensibility. Promises, intreaties, and threatenings, were equally ineffectual. The physicians who were consulted upon his case were of opinion, that he was in a state of hopeless idiotcy. It was at first suspected, that those appearances were feigned; but these suspicions necessarily gave way when it was known that he took no sustenance, and that the involuntary functions of nature were in great measure suspended. After some time they knocked off his fetters, and left him at liberty to go whither he would. He received his liberty with the same insensibility that he had shown on other occasions: he remained fixed and immovable; his eyes turned wildly here and there without taking cognizance of any object, and the muscles of his face were fallen and fixed like those of a dead body. Being left to himself, he passed twenty days in this condition, without eating, or having any evacuation, and died on the twentieth day. He had been sometimes heard to fetch deep sighs; and once he rushed with great violence on a soldier, who had a mug of liquor in his hand, forced the mug from him, and, having drank the liquor with great eagerness, let the mug drop to the ground."

When a person is affected with terror, the principal endeavour should be to restore the circulation to its due order, to promote perspiration, and to allay the agitation of the patient. For these purposes he may drink a little warm liquor, as camomile-tea, &c. the feet and legs may be put into warm water, the legs rubbed, and the camomile-tea repeated every six or eight minutes; and when the skin is warm, and there is a tendency to perspiration, sleep may be promoted by a gentle opiate. But frights have been known not only to cause, but also to cure, diseases. Mr. Boyle mentions agues, gout, and sciatica, cured by this means.

To turn from the serious to the ludicrous effects of fear, the following instance of the latter sort, quoted from a French author by Mr. Andrews in his volume of Anecdotes, shows upon what slight occasions this passion may be sometimes excited in a very high degree, even in persons the most unlikely to entertain such a

guest. "Charles Gustavus (the successor of Christina of Sweden) was besieging Prague, when a boor of most extraordinary visage desired admittance to his tent; and, being allowed entrance, offered, by way of amusing the king, to devour a whole hog of one hundred weight in his presence. The old general Koningmark, who stood by the king's side, and who, soldier as he was, had not got rid of the prejudices of his childhood, hinted to his royal master that the peasant ought to be burnt as a forcerer. 'Sir,' said the fellow, irritated at the remark, 'if your majesty will but make that old gentleman take off his sword and his spurs, I will eat him immediately, before I begin the hog.' General Koningmark (who had, at the head of a body of Swedes, performed wonders against the Austrians, and who was looked upon as one of the bravest men of the age) could not stand this proposal, especially as it was accompanied by a most hideous and preternatural expansion of the frightful peasant's jaws. Without uttering a word, the veteran suddenly turned round, ran out of the tent, nor thought himself safe until he had arrived at his own quarters, where he remained above twenty-four hours locked up securely, before he got rid of the panic which had so severely affected him."

Fear should not rise higher than to make us attentive and cautious; when it gains an ascendancy in the mind, it becomes an insupportable tyranny, and renders life a burden. The object of fear is evil; and to be exempt from fear, or at least not enslaved to it, gives dignity to our nature, and invigorates all our faculties. Yet there are evils which we ought to fear. Those that arise from ourselves, or which it is in our power to prevent, it would be madness to despise, and audacity not to guard against. External evils, which we cannot prevent, or could not avoid without a breach of duty, it is manly and honourable to bear with fortitude. Insensibility to danger is not fortitude, any more than the incapacity of feeling pain can be called patience; and to expose ourselves unnecessarily to evil is worse than folly, and very blameable presumption.

OF IMPOTENCY OCCASIONED BY FEAR.

IT has been proved by Dr. Hunter, that impotency is frequently the result of fear. He observes, that as the "parts of generation are not necessary for the existence or support of the individual, but have a reference to something else in which the mind has a principal concern; so a complete action in those parts cannot take place without a perfect harmony of body and of mind: that is, there must be both a power of body and disposition of mind; for the mind is subject to a thousand alarms which affect the actions of these parts. Copulation is an act of the body, the spring of which is in the mind; but it is not volition: and according

to the state of the mind, so is the act performed. To perform this act well, the body should be in health, and the mind perfectly confident of the powers of the body: the mind should be in a state entirely disengaged from every thing else; it should have no difficulties, no fears, no apprehensions, not even an anxiety to perform the act well; for even this anxiety is a state of mind different from what should prevail; there should not be even a fear that the mind itself may find a difficulty at the time the act should be performed. Perhaps no function of the machine depends so much upon the state of the mind as this.—The will and reasoning faculty have nothing to do with this power; they are only employed in the act, so far as voluntary parts are made use of; and if they ever interfere, which they sometimes do, it often produces another state of mind which destroys that which is proper for the performance of the act; it produces a desire, a wish, a hope, which are all only diffidence and uncertainty, and create in the mind the idea of a possibility of the want of success, which destroys the proper state of mind, or necessary confidence.—There is perhaps no act in which a man feels himself more interested, or is more anxious to perform well; his pride being engaged in some degree, which, if within certain bounds, would produce a degree of perfection in an act depending upon the will, or an act in voluntary parts; but, when it produces a state of mind contrary to that state on which the perfection of the act depends, a failure must be the consequence.—The body is not only rendered incapable of performing this act by the mind being under the above influence of fear, but also by the mind being, though perfectly confident of its power, yet conscious of an impropriety in performing it; this, in many cases, produces a state of mind which shall take away all power. The state of a man's mind respecting his sister takes away all power. A conscientious man has been known to lose his powers on finding the woman he was going to be connected with unexpectedly a virgin.—Shedding tears arises entirely from the state of the mind, although not so much a compound action as the act in question; for none are so weak in body that they cannot shed tears; it is not so much a compound action of the mind and strength of body joined, as the other act is; yet, if we are afraid of shedding tears, or are desirous of doing it, and that anxiety is kept up through the whole of an affecting scene, we certainly shall not shed tears, or at least not so freely as would have happened from our natural feelings.”

From this account of the necessity of having the mind independent respecting the act, we must see that it may very often happen that the state of mind will be such as not to allow the animal to exert his natural powers; and every failure increases the evil. We must also see from this state of the case, that this act must be often interrupted; and, the true cause of this interruption not being known, it will be

laid to the charge of the body, or want of powers. As these cases do not arise from real inability, they are to be carefully distinguished from such as do; and perhaps the only way to distinguish them is, to examine into the state of mind respecting this act. So trifling often is the circumstance which shall produce this inability depending on fear, that the very desire to please shall have that effect, as in making the woman the sole object to be gratified.

Cases of this kind we see every day; one of which I shall relate as an illustration of this subject, and also of the method of cure.—A gentleman told me, that he had lost his virility. After above an hour's investigation of the case, I made out the following facts: that he had at unnecessary times strong erections, which showed that he had naturally this power; that the erections were accompanied with desire, which are all the natural powers wanted; but that there was still a defect somewhere, which I supposed to be from the mind. I inquired if all women were alike to him? His answer was, No; some women he could have connection with as well as ever. This brought the defect, whatever it was, into a smaller compass: and it appeared there was but one woman that produced this inability, and that it arose from a desire to perform the act with this woman well; which desire produced in the mind a doubt or fear of the want of success, which was the cause of the inability of performing the act. As this arose entirely from the state of the mind produced by a particular circumstance, the mind was to be applied to for the cure; and I told him that he might be cured, if he could perfectly rely on his own power of self-denial. When I had explained what I meant, he told me that he could depend upon every act of his will or resolution. I then told him that, if he had a perfect confidence in himself in that respect, he was to go to bed to this woman, but first promise to himself that he would not have any connection with her for six nights, let his inclinations and powers be what they would; which he engaged to do, and also to let me know the result. About a fortnight after, he told me, that this resolution had produced such a total alteration in the state of his mind, that the power soon took place; for, instead of going to bed with the fear of inability, he went with fears that he should be possessed with too much desire, too much power, so as to become uneasy to him; which really happened; for he would have been happy to have shortened the time: and, when he had once broke the spell, the mind and powers went on together, and his mind never returned to its former state.

Impotency also happens from a want of proper correspondence between the action of the testicles and penis: for we find that an irregularity in the actions of these parts sometimes happens in men, producing impotence; and something similar probably may be one cause of barrenness in women. In men the parts subservient

to generation may be divided into two; the essential and the accessory. The testicles are the essential; the penis, &c. the accessory. As this division arises from their uses or actions in health, which exactly correspond with one another, a want of exactness in the correspondence or susceptibility of those actions may also be divided into two: where the actions are reversed, the accessory taking place without the first or essential, as in the erections of the penis, where neither the mind nor the testicles are stimulated to action; and the second is where the testicles perform the action of secretion too readily for the penis, which has not a corresponding erection. The first is called *priapism*; and the second is what ought to be called *seminal weakness*.—The mind has considerable effect on the correspondence of the actions of these two parts: but it would appear in many instances, that erections of the penis depend more on the state of the mind than the secretion of the semen does; for many have the secretion, but not the erection; but in such, the want of erection appears to be owing to fears of the mind only.

Priapism often arises spontaneously; and often from visible irritation of the penis, as in the venereal gonorrhœa, especially when violent. The sensation of such erections is rather uneasy than pleasant; nor is the sensation of the glands at the time similar to that arising from the erections of desire, but more like to the sensation of the parts immediately after coition. Such as arise spontaneously are of more serious consequence than those from inflammation, as they proceed probably from causes not curable in themselves or by any known methods. The *priapism* arising from inflammation of the parts, as in a gonorrhœa, is attended with nearly the same symptoms; but generally the sensation is that of pain, proceeding from the inflammation of the parts. It may be observed, that what is said of *priapism* is only applicable to it when a disease in itself, and not when a symptom of other diseases, which is frequently the case.

Seminal weakness, or a secretion and emission of the semen without erection, is the reverse of a *priapism*, and is by much the worst disease of the two. There is great variety in the degrees of this disease, there being all the gradations from the exact correspondence of the actions of all the parts to the testicles acting alone; in every case of the disease, there is too quick a secretion and evacuation of the semen. Like to the *priapism*, it does not arise from desires and abilities; although when mild it is attended with both, but not in a due proportion; a very slight desire often producing the full effect. The secretion of the semen shall be so quick, that simple thought, or even toying, shall make it flow.—Dreams have produced this evacuation repeatedly in the same night; and even when the dreams have been so slight, that there has been no consciousness of them when the sleep has been broken by the act of emission. I have known cases where the testicles have been

so ready to secrete, that the least friction on the glans has produced an emission: I have known the simple action of walking or riding produce this effect, and that repeatedly in a very short space of time. A young man, about four or five and twenty years of age, not so much given to venery as most young men, had these last-mentioned complaints upon him. Three or four times in the night he would emit; and if he walked fast, or rode on horseback, the same thing would happen. He could scarcely have connection with a woman before he emitted, and in the emission there was hardly any spasm. He tried every supposed strengthening medicine, as also the cold bath and sea-bathing, but with no effect. By taking twenty drops of laudanum on going to bed, he prevented the night-emissions; and, by taking the same quantity in the morning, he could walk or ride without the before-mentioned inconvenience. I directed this practice to be continued for some time, although the disease did not return, that the parts might be accustomed to this healthy state of action; and I have reason to believe the gentleman is now well. It was found necessary, as the constitution became more habituated to the opiate, to increase the dose of it.—The spasms, upon the evacuation of the semen in such cases, are extremely slight, and a repetition of them soon takes place; the first emission not preventing a second; the constitution being all the time but little affected. When the testicles act alone, without the accessory parts taking up the necessary and natural consequent action, it is still a more melancholy disease: for the secretion arises from no visible or sensible cause, and does not give any visible or sensible effect, but runs off similar to involuntary stools or urine. It has been observed that the semen is more fluid than natural in some of these cases.

There is great variety in the diseased action of these parts; of which the following case may be considered as an example. A gentleman has had a stricture in the urethra for many years, for which he has frequently used a bougie, but of late has neglected it. He has had no connection with women for a considerable time, being afraid of the consequences. He has often in his sleep involuntary emissions, which generally awake him at the paroxysm; but what surprises him most is, that often he has such without any semen passing forwards through the penis, which makes him think that at those times it goes backwards into the bladder. This is not always the case, for at other times the semen passes forwards. At the time the semen seems to pass into the bladder, he has the erection, the dream; and is awaked with the same mode of action, the same sensation, and the same pleasure, as when it passes through the urethra, whether dreaming or waking. My opinion is, that the same irritation takes place in the bulb of the urethra without the semen, that takes place there when the semen enters, in consequence of all the natural preparatory steps, whereby the very same actions are excited as if it came into

the passage; from which one would suppose, that either the semen is not secreted, or, if it be, that a retrograde motion takes place in the action of the acceleratores urinæ. But, if the first be the case, then we may suppose, that in the natural state the action of those muscles does not arise simply from the stimulus of the semen in the part, but from their action being a termination of a preceding one, making part of a series of actions. Thus they may depend upon the friction, or the imagination of a friction, on the penis: the testicles not doing their part, and the spasm in such cases arising from the friction and not from the secretion. In many of those cases of irregularity, when the erection is not strong, it shall go off without the emission; and at other times an emission shall happen almost without an erection; but these arise not from debility, but affections of the mind. In many of the preceding cases, washing the penis, scrotum, and perinæum, with cold water, is often of service; and, to render it colder than we find it in some seasons of the year, common salt may be added to it, and the parts washed when the salt is almost dissolved.

OF GRIEF.

GRIEF is the most destructive of all the passions. Its effects are permanent, and when it sinks deep into the mind, it generally proves fatal. Anger and fear, being of a more violent nature, seldom last long; but grief often changes into a fixed melancholy, which preys upon the spirits, and wastes the constitution. This passion ought not to be indulged. It may generally be conquered at the beginning; but, when it has gained strength, all attempts to remove it are vain. No person can prevent misfortunes in life; but it shows true greatness of mind to bear them with serenity. Many persons make a merit of indulging grief; and, when misfortunes happen, they obstinately refuse all consolation, till the mind, overwhelmed with melancholy, sinks under the load. Such conduct is not only destructive to health, but inconsistent with reason, religion, and common sense.

Change of ideas is as necessary for health as change of posture. When the mind dwells long upon one subject, especially of a disagreeable nature, it hurts the whole functions of the body. Hence grief indulged spoils the digestion and destroys the appetite; by which means the spirits are depressed, the nerves relaxed, the bowels inflated with wind, and the humours, for want of fresh supplies of chyle, vitiated. Thus many an excellent constitution has been ruined by a family-misfortune, or any thing that occasions excessive grief. It is utterly impossible, that any person of a dejected mind should enjoy health. Life may indeed be dragged out for a few years: but whoever would live to a good old age must be good-humoured

humoured and cheerful. This indeed is not altogether in our own power; yet our temper of mind, as well as our actions, depend greatly upon ourselves. We can either associate with cheerful or melancholy companions, mingle in the amusements and offices of life, or sit still and brood over our calamities, as we choose.

These, and many such things, are certainly in our power; and from these the mind generally takes its cast. The variety of scenes which present themselves to the senses, were certainly designed to prevent our attention from being too long fixed upon any one object. Nature abounds with variety; and the mind, unless fixed down by habit, delights in contemplating new objects. This at once points out the method of relieving the mind in distress. Turn the attention frequently to new objects: examine them for some time: when the mind begins to recoil, shift the scene: by this means a constant succession of new ideas may be kept up, till the disagreeable ones entirely disappear. Thus travelling, the study of any art or science, reading or writing on such subjects as deeply engage the attention, will sooner expel grief than the most sprightly amusements.

It has already been observed, that the body cannot be healthy unless it be exercised; neither can the mind. Indolence nourishes grief. When the mind has nothing else to think of but calamities, no wonder that it dwells there. Few people who pursue business with attention are hurt by grief. Instead therefore of abstracting ourselves from the world or business, when misfortunes happen, we ought to engage in it with more than usual attention, to discharge with double diligence the functions of our station, and to mix with friends of a social and cheerful temper. Innocent amusements are by no means to be neglected. These, by leading the mind insensibly to the contemplation of agreeable objects, help to dispel the gloom which misfortunes cast over it. They make time seem less tedious, and have many other happy effects. Some persons, when overwhelmed with grief, betake themselves to drinking. This is making the cure worse than the disease. It seldom fails to end in the ruin of fortune, character, and constitution.

OF LOVE.

LOVE is perhaps the strongest of all the passions; at least, when it becomes violent, it is less subject to the controul either of the understanding or will than any of the rest. Fear, anger, and several other passions, are necessary for the preservation of the individual; but love is necessary for the continuation of the species itself: it was therefore proper that this passion should be deeply rooted in the human breast.—Though love be a strong passion, it is seldom so rapid in its progress as several of the others. Few persons fall desperately in love all at once. We would therefore advise every one, before he tampers with this passion, to consider

sider well the probability of his being able to obtain the object of his love. When that is not likely, he should avoid every occasion of increasing it. He ought immediately to fly the company of the beloved object; to apply his mind attentively to business or study; to take every kind of amusement; and, above all, to endeavour, if possible, to find another object which may engage his affections, and which it may be in his power to obtain. There is no passion with which people are so ready to tamper as love, although none is more dangerous. Some men make love for amusement, others from mere vanity, or on purpose to show their consequence with the fair. This is perhaps the greatest piece of cruelty which any one can be guilty of. What we eagerly wish for, we easily credit. Hence the too-credulous fair are often betrayed into a situation which is truly deplorable, before they are able to discover that the pretended lover was only in jest. But there is no jesting with this passion. When love is got to a certain height, it admits of no other cure but the possession of its object, which, in this case, ought always, if possible, to be obtained. The conduct of parents with regard to the disposal of their children in marriage is often very blameable. An advantageous match is the constant aim of parents; while their children often suffer a real martyrdom between their inclination and their duty. The first thing which parents ought to consult, in disposing of their children in marriage, is certainly their inclinations. Were due regard always paid to these, there would be fewer unhappy couples; and parents would not have so often cause to repent the severity of their conduct, after a ruined constitution, a lost character, or a distracted mind, has shown them their mistake.

With regard to love in its usual and more appropriate signification, it may be defined, "that affection which, being compounded of animal desire, esteem, and benevolence, becomes the bond of attachment and union between individuals of the different sexes; and makes them feel in the society of each other a species of happiness which they experience no-where else." We call it an *affection* rather than a passion, because it involves a desire of the happiness of its object: and that its constituent parts are those which have been just enumerated, we shall first endeavour to prove, and then proceed to trace its rise and progress from a selfish appetite to a generous sentiment.

Animal desire is the actual energy of the sensual appetite; and that it is an essential part of the complex affection, which is properly called love, is apparent from this consideration, that, though a man may have sentiments of esteem and benevolence towards women who are both old and ugly, he never supposes himself to be in love with any woman towards whom he feels not the sensual appetite to have a stronger tendency than to other individuals of her sex. On the other hand, that

animal desire alone cannot be called the affection of love is evident; because he who gratifies such a desire without esteeming its object, and wishing to communicate at the same time that he receives enjoyment, loves not the woman, but himself. Mere animal desire has nothing in view but the species and the sex of its object; and, before it make a selection, it must be combined with sentiments very different from itself. The first sentiment with which it is combined, and by which a man is induced to prefer one woman to another, seems to be that by which we are delighted with gracefulness of person, regularity of features, and beauty of complexion. It is not indeed to be denied that there is something irresistible in female beauty. The most severe will not pretend that they do not feel an immediate prepossession in favour of a handsome woman; but this prepossession, even when combined with animal desire, does not constitute the whole of that affection which is called love. Savages feel the influence of the sensual appetite, and it is extremely probable that they have some ideas of beauty; but among savages the affection of love is seldom felt. Even among the lower orders in civil society it seems to be a very gross passion, and to have in it more of the selfishness of appetite than of the generosity of esteem. To these observations many exceptions will no doubt be found; but we speak of savages in general, and of the great body of the labouring poor, who in the choice of their mates do not study—who indeed are incapable of studying—that rectitude of mind and those delicacies of sentiment, without which neither man nor woman can deserve to be esteemed.

In the savage state, and even in the first stages of refinement, the bond of union between the sexes seems to consist of nothing more than mere animal desire and instinctive tenderness for their infant progeny. The former impels them to unite for the propagation of the species; and the latter preserves the union till the children, who are the fruit of it, are able to provide for their own subsistence. That in such unions, whether casual or permanent, there is no mutual esteem and benevolence, is apparent from the state of subjection in which women are held in rude and uncultivated nations, as well as from the manner in which marriages are in such nations contracted.

Sweetness of temper, a capital article with us in the female character, displays itself externally in mild looks and gentle manners, and is the first and perhaps the most powerful inducement to love in a cultivated mind. But such graces are scarcely discernible in a female savage; and even in the most polished woman would not be perceived by a male savage. Among savages, strength and boldness are the only valuable qualities. In these females are commonly deficient; for which reason they are contemned by the males as beings of an inferior order. The North-American tribes glory in idleness; the drudgery of labour degrades a man in their

opinion, and is proper for woman only. To join young persons in marriage is accordingly the business of the parents; and it would be unpardonable meanness in the bridegroom to show any fondness for the bride. In Guiana a woman never eats with her husband, but after every meal attends him with water for washing; and in the Caribbee islands she is not permitted to eat even in the presence of her husband. Dampier observes in general, that among all the wild nations with which he was acquainted the women carry the burdens, while the men walk before, and carry nothing but their arms; and that women even of the highest rank are not better treated. In Siberia, and even in Russia, the capital excepted, men till very lately treated their wives in every respect like slaves. It might indeed be thought, that animal desire, were there nothing else, should have raised women to some degree of estimation among men; but male savages, utter strangers to decency and refinement, gratify animal desire with as little ceremony as they do hunger or thirst.

Hence it was that in the early ages of society a man purchased a woman to be his wife as one purchases an ox or a sheep to be food; and valued her only as she contributed to his sensual gratification. Instances innumerable might be collected from every nation of which we are acquainted with the early history; but we shall content ourselves with mentioning a few. Abraham bought Rebekah, and gave her to his son Isaac for a wife. Jacob, having nothing to give, served Laban fourteen years for two wives. To David, demanding Saul's daughter in marriage, it was said, "The king desireth not any dowry, but an hundred foreskins of the Philistines." In the Iliad, Agamemnon offers his daughter to Achilles for a wife; and says that he would not demand for her any price. By the laws of Ethelbert, king of England, a man who committed adultery with his neighbour's wife was obliged to pay the husband a fine, and to buy him another wife. But it is needless to multiply instances; the practice has prevailed universally among nations emerging from the savage state, or in the rudest stage of society; and, wherever it prevailed, men could not possibly have for the sex any of that tender regard and esteem which constitute so essential a part of the complex affection of love.

But, if among savages and the vulgar love be unknown, it cannot possibly be an instinctive affection; and therefore it may be asked, How it gets possession of the human heart; and by what means we can judge whether in any particular instance it be real or imaginary? These questions are of importance, and deserve to be fully answered; though many circumstances conspire to render it no easy task to give to them such answers as shall be perfectly satisfactory. Love can subsist only between individuals of the different sexes. A man can hardly love two women at the same time; and we believe that a woman is still less capable of loving

at once more than one man. Love, therefore, has a natural tendency to make men and women pair; or, in other words, it is the source of marriage: but in polished society, where alone this affection has any place, so many things besides mutual attachment are necessary to make the married life comfortable, that we rarely see young persons uniting from the impulse of love, and have therefore but few opportunities of tracing the rise, progress, and consequences, of the affection. We shall, however, throw together such reflections as have occurred to us on the subject, not without indulging a hope, that they may be useful to the younger part of our readers when forming the most important connection in life.

We have said, that the perfection of beauty, combined with animal desire, is the first inducement which a man can have to prefer one woman to another. It may be added, that elegance of figure, a placid masculine countenance, with a person which indicates strength and agility, are the qualities which first tend to attach any woman to a particular man. Beauty is defined, "That particular form which is the most common of all particular forms to be met with in the same species of beings." Let us apply this definition to our own species, and try, by means of it, to ascertain what constitutes the beauty of the human face. It is evident, that of countenances we find a number almost infinite of different forms, of which forms one only constitutes beauty, whilst the rest, however numerous, constitute what is not beauty, but deformity or ugliness. To an attentive observer, however, it is evident, that of the numerous particular forms of ugliness, there is not one which includes so many faces as are formed after that particular cast which constitutes beauty. Every particular species of the animal as well as of the vegetable creation may be said to have a fixed or determinate form, to which, as to a centre, nature is continually inclining. Or it may be compared to pendulums vibrating in different directions over one central point; and, as they all cross the centre, though only one passes through any other point, so it will be found that perfect beauty is oftener produced by nature than deformity: we do not mean than deformity in general, but than any one kind and degree of deformity. To instance in a particular part of a human feature: the line which forms the ridge of the nose is deemed beautiful when it is straight; but this is likewise the central form, which is oftener found than any one particular degree of concave, convex, or any other irregular form that shall be proposed. As we are then more accustomed to beauty than deformity, we may conclude that to be the reason why we approve and admire it, just as we approve and admire fashions of dress for no other reason than that we are used to them. The same thing may be said of colour as of form: it is custom alone which determines our preference of the colour of the Europeans to that of the Ethiopians, and which makes them prefer their own colour

colour to ours; so that, though habit and custom cannot be the cause of beauty, they are certainly the cause of our liking it. That we do like it cannot be denied. Every one is conscious of a pleasing emotion when contemplating beauty either in man or woman; and, when that pleasure is combined with the gratification of the sensual appetite, it is obvious that the sum of enjoyment must be greatly increased. The perception of beauty, therefore, necessarily directs the energy of the sensual appetite to a particular object; but still this combination is a mere selfish feeling, which regards its object only as the best of many similar instruments of pleasure. Before it can deserve the name of love, it must be combined with esteem, which is never bestowed but upon moral character and internal worth; for, let a woman be ever so beautiful, and of course ever so desirable as an instrument of sensual gratification, if she be not possessed of the virtues and dispositions which are peculiar to her sex, she will inspire no man with a generous affection. With regard to the outlines, indeed, whether of internal disposition or of external form, men and women are the same; but nature, intending them for mates, has given them dispositions, which, though concordant, are however different, so as to produce together delicious harmony. The man, more robust, is fitted for severe labour, and for field-exercises; the woman, more delicate, is fitted for sedentary occupations, and particularly for nursing children. The man, bold and vigorous, is qualified for being a protector; the woman, delicate and timid, requires protection. Hence it is, that a man never admires a woman for possessing bodily strength or personal courage; and women always despise men who are destitute of them. The man, as a protector, is directed by nature to govern; the woman, conscious of inferiority, is disposed to obey. Their intellectual powers correspond to the destination of nature. Men have penetration and solid judgment to fit them for governing; women have understanding to make an engaging figure under good government: a greater proportion would excite dangerous rivalry between the sexes, which nature has avoided by giving them different talents. Women have more imagination and sensibility than men, which make all their enjoyments more exquisite; at the same time that they are better qualified to communicate enjoyment. Add another capital difference of disposition: the gentle and insinuating manners of the female sex tend to soften the roughness of the other sex; and, wherever women are indulged with any freedom, they polish sooner than men.

These are not the only particulars that distinguish the sexes. With respect to the ultimate end of love, it is the privilege of the male, as superior and protector, to make a choice: the female, preferred, has no privilege but barely to consent or to refuse. Whether this distinction be the immediate result of the originally-different dispositions of the sexes, or only the effect of associations inevitably form-

ed, may be questioned; but among all nations it is the practice for men to court, and for women to be courted: and, were the most beautiful woman on earth to invert this practice, she would forfeit the esteem, however by her external grace she might excite the desire, of the man whom she addressed. The great moral virtues, which may be comprehended under the general term *integrity*, are all absolutely necessary to make either men or women estimable; but, to procure esteem to the female character, the *modesty* peculiar to their sex is a very essential circumstance. Nature hath provided them with it as a defence against the artful solicitations of the other sex before marriage, and also as a support of conjugal fidelity.

A woman, therefore, whose dispositions are gentle, delicate, and rather timid than bold, who is possessed of a large share of sensibility and modesty, and whose manners are soft and insinuating, must, upon moral principles, command the esteem and benevolence of every individual of the other sex who is possessed of sound understanding; but, if her person be deformed, or not such as to excite some degree of animal desire, she will attract no man's love. In like manner, a man whose moral character is good, whose understanding is acute, and whose conversation is instructive, must command the esteem of every sensible and virtuous woman; but, if his figure be disagreeable, his manners unpolished, his habits slovenly, and, above all, if he be deficient in PERSONAL COURAGE, he will hardly excite desire in the female breast. It is only when the qualities which command esteem are, in the same person, united with those which excite desire, that the individual so accomplished can be an object of love to one of the other sex; but, when these qualities are thus united, each of them increases the other in the imagination of the lover. The beauty of his mistress gives her, in his apprehension, a greater share of gentleness, modesty, and every thing which adorns the female character, than perhaps she really possesses; whilst this persuasion of her internal worth makes him, on the other hand, apprehend her beauty to be absolutely unrivalled.

The affection thus generated is more or less pure, and will be more or less permanent, according as the one or the other part of which it is compounded predominates. Where desire of possession prevails over our esteem of the person and merits of the desirable object, love loses its benevolent character; the appetite for gratification becomes ungovernable, and tends violently to its end, regardless of the misery that must follow. In that state, love is no longer a sweet agreeable affection; it becomes a selfish, painful, passion, which, like hunger and thirst, produces no happiness but in the instant of fruition; and, when fruition is over, disgust and aversion generally succeed to desire. On the other hand, where esteem, founded on a virtuous character and gentle manners, prevails over animal desire,

the lover would not for the world gratify his appetite at the expence of a lady's honour or peace of mind. He wishes, indeed, for enjoyment; and to him enjoyment is more exquisite than to the mere sensual lover, because it unites sentiment with the gratification of sense; at the same time that, so far from being succeeded by disgust or aversion, it increases his benevolence to the woman, whose character and manners he esteems, and who has contributed so much to his pleasure. Benevolence to an individual, having a general end, admits of acts without number, and is seldom fully accomplished. Hence mutual love, which is composed chiefly of esteem and benevolence, can hardly be of a shorter duration than its objects. Frequent enjoyment endears such lovers to each other, and makes constancy a pleasure; and, when the days of sensual enjoyment are over, esteem and benevolence will remain in the mind, making sweet, even in old age, the society of that pair, in whom are collected the affections of husband, wife, lover, friend—the tenderest affections of human nature.

From the whole of this investigation, we think it appears, that the affection between the sexes which deserves the name of love, is inseparably connected with virtue and delicacy: that a man of gallantry cannot be a faithful or a generous lover; that in the breast of him, who has ranged from woman to woman for the mere gratification of his sensual appetite, desire must have effaced all esteem for the female character; and that, therefore, the maxim too generally received, “that a reformed rake makes the best husband,” has very seldom a chance to be true. We think it may likewise be inferred, that thousands fancy themselves in love who know not what love is, or how it is generated in the human breast; and therefore we beg leave to advise such of our readers as may imagine themselves to be in that state, to examine their own minds, with a view to discover, whether, if the object of their love were old and ugly, they would still esteem them for the virtues of their character, and the propriety of their manners. This is a question which deserves to be well weighed by the young and amorous, who, in forming the matrimonial connection, are too often blindly impelled by mere animal desire, inflamed by beauty. It may indeed happen, after the pleasure of gratifying that desire is gone, (and if not refined by esteem and benevolence, goes it must with a swift pace,) that a new bond of attachment may be formed upon more dignified and more lasting principles; but this is a dangerous experiment. Even supposing good sense, good temper, and internal worth of every sort, yet a new attachment, even upon such qualifications, is rarely formed; because it commonly, or rather always, happens, that such qualifications, the only solid foundation of an indissoluble connection, if they did not originally make esteem predominate over animal desire, are afterwards rendered altogether invisible by satiety of enjoyment creating disgust, which

which is generally the case with violent love founded on the desire of enjoyment only. As the delicate nature of female honour and decorum, and the inexpressible grace of a chaste and modest behaviour, are the surest and indeed the only means of kindling at first, and ever after of keeping alive, this tender and elegant flame, and of accomplishing the excellent ends designed by it; to attempt by fraud to violate the one, or under pretence of passion to fully and corrupt the other, and, by so doing, to expose the too-often credulous and unguarded object, with a wanton cruelty, to the hatred of her own sex and the scorn of ours, and to the lowest infamy of both,—is a conduct not only base and criminal, but inconsistent with that truly rational and refined enjoyment, the spirit and quintessence of which is derived from the bashful and sacred charms of virtue kept untainted, and therefore ever alluring to the lover's heart.

The symptoms produced by love as a disease are as follow: The eye-lids often twinkle; the eyes are hollow, and yet appear as if full with pleasure; the pulse is not peculiar to the passion, but the same with that which attends solicitude and care. When the object of this affection is thought of, particularly if the idea is sudden, the spirits are confused, the pulse changes, and its force and time are very variable: in some instances, the person is sad and watchful; in others, not being conscious of his state, he pines away, is slothful, and regardless of food. As the passion prevails, sighs grow deeper; a tremor affects the heart and pulse; the countenance is alternately pale and red; the voice is suppressed; the eyes grow dim: cold sweats break out; sleep absents itself; the secretions become disturbed, and a loss of appetite, a hectic fever, melancholy, or perhaps madness, or death, constitutes the sad catastrophe. On this subject the curious may consult *Ægineta*, lib. iii. cap. 7. *Oribat. Synop.* lib. viii. cap. 9. or a treatise professedly written on Love, as it is a distemper, by James Ferrard, Oxford, 1640.

The ancients were much addicted to amulets and potions to excite love in the object of their desire, the operation of which was violent and dangerous, and frequently deprived such as drank them of their reason. Some of the most remarkable ingredients of which they were composed were these: the hippomanes, the jynx, insects bred from putrefaction, the fish remora, the lizard, brains of a calf, the hairs on the tip of a wolf's tail, his secret parts, the bones of the left side of a toad eaten with ants, the blood of doves, bones of snakes, feathers of screech-owls, twisted cords of wool in which a person had hanged himself, rags, torches, reliques, a nest of swallows buried and famished in the earth, bones snatched from hungry bitches, the marrow of a boy famished in the midst of plenty, dried human liver; to these may be added several herbs growing out of putrid substances. Such were the ingredients that entered into the composition of that infernal draught a love-
potiou.

potion. The antidotes against love were generally *agnus castus*, which has the power of weakening the generative faculty; sprinkling the dust in which a mule has rolled herself; tying toads in the hide of a beast newly slain; applying amulets of minerals or herbs, which were supposed of great efficacy.

OF MELANCHOLY.

THE pathology of melancholy and mania is very obscure; as coming on without any fever, or disturbance in the blood's motion. Often also they are hereditary, depending on the original structure of the body, especially of the brain; the fault of which, however, cannot be detected by the nicest anatomist. But it is well known, that various diseases of the brain, obstructions, tumors, either of the brain itself or of the cranium pressing upon it, any injury done to the head, and, as some physicians relate, the hardness and dryness of the brain, and some peculiar irritations affecting the nervous system, are capable of bringing on this malady. And indeed so great are the irritations affecting the nervous system in mad people, that they often sleep little or none for a long time. Yet even this so defective and imperfect knowledge of the diseases of the brain and nerves, is by no means free from difficulties. For, though we know that the brain, or a certain part of it, is hurt, or that it is irritated, by a swelling, or a pointed bone growing into it, nobody can foretel how great, or what, may be the nature of the malady from such a hurt: for examples are not wanting of people who, after losing a large part of the brain, have recovered and lived a long time; or of those who have perceived no inconvenience from a large portion of that viscus being corrupted, until at length they have fallen suddenly down and died in convulsions.

Many persons of a religious turn of mind behave as if they thought it a crime to be cheerful. They imagine the whole of religion consists in certain mortifications, or denying themselves the smallest indulgence, even of the most innocent amusements. A perpetual gloom hangs upon their countenances, while the deepest melancholy preys upon their minds. At length the fairest prospects vanish, every thing puts on a dismal appearance, and those very objects which ought to give delight afford nothing but disgust. Life itself becomes a burden, and the unhappy wretch, persuaded that no evil can equal what he feels, often puts an end to his own miserable existence. It is great pity that ever religion should be so far perverted as to become the cause of those very evils which it was designed to prevent. Nothing can be better calculated than true religion to raise and support the mind of its votaries under every affliction that can befall them. It teaches them that even the sufferings of this life are preparatory to the happiness

of the next; and that all who persist in a course of virtue shall at length arrive at complete felicity.

Persons whose business it is to recommend religion to others, should beware of dwelling too much on gloomy subjects. That peace and tranquillity of mind, which true religion is calculated to inspire, is a more powerful argument in its favour, than all the terrors that can be uttered. Terror may indeed deter men from outward acts of wickedness; but can never inspire them with that love of God, and real goodness of heart, in which alone true religion consists. In short, the best way to counteract the violence of any passion, is to keep the mind closely engaged in some useful pursuit.

OF THE PROGNOSTICS OF DISEASES; WITH RULES FOR PRESERVING HEALTH.

PROGNOSTIC is a judgment of the event either of a state of health, or of a disease; as, Whether it shall end in life or death, be long or short, mild or malignant, &c. taken from certain symptoms thereof. When, by the following remarks, the person shall judge what disorder is coming upon him, or already present, a safe and effectual remedy will in general be found in the Medical Part of the Herbal; but, whenever that work is not sufficiently full to the purpose, I shall add such occasional observations for prevention and cure as have occurred to me in my late practice.

Hippocrates was the first who treated of medicine in a regular and rational manner, and he is therefore justly considered as the father of physic. Hippocrates remarked four stages in distempers; viz. The beginning of the disease, its augmentation, its state or height, and its declination. In such diseases as terminate fatally, death comes in place of declination. In the third stage, therefore, the change is most considerable, as it determines the fate of the sick person; and this is most commonly done by means of a *crisis*. By this word he understood any sudden change in sickness, whether for the better or for the worse, whether health or death succeed immediately. Such a change, he says, is made at that time by nature either absolving or condemning the patient. Hence we may conclude, that Hippocrates imagined diseases to be only a disturbance of the animal economy, with which Nature was perpetually at variance, and using her utmost endeavours to expel the offending cause. Her manner of acting on these occasions is to reduce to their natural state those humours whose discord occasions the disturbance of the whole body, whether in relation to their quantity, quality, mixture, motion, or any other way in which they become offensive. The principal means employed by nature for this

end is what Hippocrates calls *concoction*. By this he understood the bringing the morbid matter lodged in the humours to such a state, as to be easily fitted for expulsion by whatever means nature might think most proper. When matters are brought to this pass, whatever is superfluous or hurtful immediately empties itself, or nature points out to physicians the way by which such an evacuation is to be accomplished. The crisis takes place either by bleeding, stool, vomit, sweat, urine, tumors or abscesses, scabs, pimples, spots, &c. But these evacuations are not to be looked upon as the effects of a true crisis, unless in considerable quantity; small discharges not being sufficient to make a crisis; which, on the contrary, are a sign that nature is depressed by the load of humours, and that she lets them go through weakness and continual irritation. What comes forth in this manner is crude, because the distemper is yet too strong; and, while matters remain in this state, only a bad or imperfect crisis is to be expected. This shows that the distemper triumphs, or at least is equal in strength to nature, which prognosticates death, or a prolongation of the disease. In this last case, however, nature often has an opportunity of attempting a new crisis more happy than the former, after having made fresh efforts to advance the concoction of the humours.—It must here be observed however, that, according to Hippocrates, concoction cannot be made but in a certain time, as every fruit has a limited time to ripen; for he compares the humours which nature has digested to fruits come to maturity. The time required for concoction depends on the differences among distempers mentioned above. In those which Hippocrates calls very acute, the digestion or crisis happens by the fourth day; in those which are only acute, it happens on the seventh, eleventh, or fourteenth, day; which last is the longest period generally allowed by Hippocrates in distempers that are truly acute, though in some places he stretches it to the twentieth or twenty-first, nay, sometimes to the fortieth or sixtieth, days. All diseases that exceed this last term are called *chronical*. And while, in those diseases that exceed fourteen days, he considers every fourth day as critical, or at least remarkable, by which we may judge whether the crisis on the fourth day will be favourable or not; so in those which run from twenty to forty he reckons only the sevenths, and in those that exceed forty he begins to reckon by twenty. Beyond the hundred and twentieth he thinks that the number of days has no power over the crisis. They are then referred to the general changes of the season; some terminating about the equinoxes; others about the solstices; others about the rising or setting of the stars of certain constellations; or, if numbers have yet any place, he reckons by months, or even whole years. Thus (he says) certain diseases in children have their crises in the seventh month after their birth, and others in their seventh or even their fourteenth year.

Though Hippocrates mentions the twenty-first as one of the critical days in acute distempers, as already noticed; yet, in other places of his works, he mentions also the twentieth. The reason he gives for this in one of those places of his works is, that the days of sickness were not quite entire. In general, however, he is much attached to the odd days: inasmuch that in one of his aphorisms he tells us, "The sweats that come out upon the third, fifth, seventh, ninth, eleventh, fourteenth, seventeenth, twenty-first, twenty-seventh, thirty-first, or thirty-fourth, days, are beneficial; but those that come out upon other days signify that the sick shall be brought low, that his disease shall be very tedious, and that he shall be subject to relapses." He farther says, that "the fever which leaves the sick upon any but an odd day is usually apt to relapse." Sometimes, however, he confesses that it is otherwise; and he gives an instance of a salutary crisis happening on the sixth day. But these are very rare instances, and therefore cannot, in his opinion, overthrow the general rule. Besides the crisis, however, or the change which determines the fate of the patient, Hippocrates often speaks of another, which only changes the species of the distemper, without restoring the patient to health; as when a vertigo is turned to an epilepsy, a tertian fever to a quartan, or to a continual, &c.

But what chiefly contributed to procure the vast respect generally paid to Hippocrates, was his accuracy in prognostics: thus he not only distinguished one disease from another by the signs which properly belonged to each; but by comparing the same sort of distemper which happened to several persons, and the accidents which usually appeared before and after, he could often foretell a disease before it came, and afterwards give a right judgment of the event of it. By this way of prognosticating, he came to be exceedingly admired; and this he carried to such a height, that it may justly be said to be his master-piece; and Celsus, who lived after him, remarks that succeeding physicians, though they found out several new things relating to the management of diseases, yet were obliged to the writings of Hippocrates for all that they knew of signs; and let us add, that we are obliged to Celsus for a true understanding of the works of Hippocrates. The first thing Hippocrates considered, when called to a patient, was his looks.—It was a good sign with him to have a visage resembling that of a person in health, and the same with what the sick man had before he was attacked by the disease. As it varied from this, so much the greater danger was apprehended. The following is the description which he gives of the looks of a dying man:—"When a patient (says he) has his nose sharp, his eyes sunk, his temples hollow, his ears cold and contracted, the skin of his forehead tense and dry, and the colour of his face tending to a pale-green or lead-colour, one may give out for certain that death is very near at hand; unless the strength of the patient has been exhausted all at once by long watchings, or by a looseness,

looseness, or being a long time without eating." This observation has been confirmed by those of succeeding physicians, who have, from him, denominated it the *Hippocratic face*. The lips hanging relaxed and cold, are likewise looked upon by this author as a confirmation of the foregoing prognostic. He took also his signs from the disposition of the eyes in particular. When a patient cannot bear the light; when he sheds tears involuntarily; when, in sleeping, some part of the white of the eye is seen, unless he usually sleeps after that manner, or has a looseness upon him: these signs, as well as the foregoing ones, prognosticate danger. The eyes deadened, with a mist before them, or their brightness lost, presages death, or great weakness. Eyes sparkling, fierce, and fixed, denote the patient to be delirious, or that he soon will be seized with a frenzy. When the patient sees any thing red, and like sparks of fire and lightning pass before his eyes, you may expect an hæmorrhage; and this often happens before those crises which are to be attended by a loss of blood. The condition of the patient is also shown by his posture in bed. If you find him lying on one side, his body, neck, legs, and arms, a little contracted, which is the posture of a man in health, it is a good sign: on the contrary, if he lies on his back, his arms stretched out, and his legs hanging down, it is a sign of great weakness; and particularly when the patient slides or lets himself fall down towards the feet, it denotes the approach of death. When a patient in a burning fever is continually feeling about with his hands and fingers, and moves them up before his face and eyes as if to take away something that passed before them; or on his bed-covering, as if picking or searching for little straws, or taking away some filth, or drawing out little flocks of wool; all this is a sign that he is delirious, and that he will die. Amongst the other signs of a present or approaching delirium, he also adds this: When a patient who naturally speaks little begins to talk more than he used to do, or when one that talks much becomes silent, this change is to be reckoned a sort of delirium, or is a sign that the patient will soon fall into one. The frequent trembling or starting of the tendons of the wrists presages likewise a delirium. As to the different sorts of delirium, Hippocrates is much more afraid of those that run upon mournful subjects than such as are accompanied with mirth.

When a patient breathes fast, and is oppressed, it is a sign that he is in pain, and that the parts above the diaphragm are inflamed. Breathing long, or when the patient is a great while in taking his breath, shows him to be delirious; but easy and natural respiration is always a good sign in acute diseases. Hippocrates depended much on the respiration in making his prognostics; and therefore has taken care in several places to describe the different manner of a patient's breathing. Continual watching in acute diseases, are signs of present pain, or a delirium near at hand. Hippocrates also drew signs from all excrements, whatever they are, that are sepa-

rated from the body of man. His most remarkable prognostics, however, were from the urine. The patient's urine, in his opinion, is best when the sediment is white, soft to the touch, and of equal consistence. If it continue so during the course of the distemper, and till the time of the crisis, the patient is in no danger, and will soon be well. This is what Hippocrates called *concocted urine*, or what denotes the concoction of the humours; and he observed, that this concoction of the urine seldom appeared thoroughly but on the days of the crisis which happily put an end to the distemper. "We ought (said Hippocrates) to compare the urine with the purulent matter which runs from ulcers. As the pus, which is white, and of the same quality with the sediment of the urine we are now speaking of, is a sign that the ulcer is on the point of closing, so that which is clear, and of another colour than white, and of an ill smell, is a sign that the ulcer is virulent, and therefore very difficult to be cured: the urines that are like this we have described are only those which may be named good; all the rest are ill, and differ from one another only in the degrees of more and less. The first never appear but when nature has overcome the disease; and are a sign of the concoction of humours, without which you cannot hope for a certain cure. On the contrary, the last are made as long as the crudity remains, and the humours continue unconcocted. Among the urines of this last sort, the best are reddish, with a sediment that is soft, and of an equal consistence; which denotes, that the disease will be somewhat tedious, but without danger. The worst are those which are very red, and at the same time clear and without sediment; or that are muddy and troubled in the making. In urine there is often a sort of cloud hanging in the vessel in which it is received; the higher this rises, or the farther distant it is from the bottom, or the more different from the colour of the laudable sediment above-mentioned, the more there is of crudity. That which is yellow, or of a sandy colour, denotes abundance of bile; that which is black is the worst, especially if it has an ill smell, and is either altogether muddy or altogether clear. That whose sediment is like large ground wheat, or little flakes or scales spread one upon another, or bran, presages ill, especially the last. The fat or oil that sometimes swims upon the top of the urine, and appears in a form something like a spider's web, is a sign of a consumption of the flesh and solid parts. The making of a great quantity of urine is the sign of a crisis, and sometimes the quality of it shows how the bladder is affected. We must also observe, that Hippocrates compared the state of the tongue with the urine; that is to say, when the tongue was yellow, and charged with bile, the urine he knew must of course be of the same colour; and, when the tongue was red and moist, the urine was of its natural colour. His prognostics from the excretions by stool are as follow: Those that are soft, yellowish, of some consistence, and not of an extraordinary ill

smell, that answer to the quantity of what is taken inwardly, and that are voided at the usual hours, are the best of all. They ought also to be of a thicker consistence when the distemper is near the crisis; and it ought to be taken for a good prognostic, when some worms, round and long, are evacuated at the same time with them. The prognosis, however, may still be favourable, though the matter excreted be thin and liquid, provided the evacuation be not in a very large quantity and too often, so as to make the patient faint. All matter that is watery, white, of a pale green or red, or frothy and viscous, is bad. That which is blackish, or of a livid hue, is the most pernicious. That which is pure black, and nothing else but a discharge of black bile, always prognosticates very ill; this humour, from what part soever it comes, showing the ill disposition of the intestines. The matter that is of several different colours denotes the length of the distemper, and, at the same time, that it may be of dangerous consequence: Hippocrates places in the same class the matter that is bilious or yellow, mixed with blood, or green and black, or like the dregs or scrapings of the guts. The stools that consist of pure bile, or entirely phlegm, he also looks upon to be very bad. Matter cast up by vomiting ought to be mixed with bile and phlegm; where one of these humours only is observed, it is worse. That which is black, livid, green, or the colour of a leek, indicates alarming consequences. The same is to be said of that which smells very ill; and, if at the same time it be livid, death is not far off. The vomiting of blood is very often mortal. The spittings which give ease in diseases of the lungs and in pleurifies, are those that come up readily and without difficulty: and it is good if they be mixed at the beginning with much yellow: but if they appear of the same colour, or are red, a great while after the beginning of the distemper, are salt and acrimonious, and cause violent coughings, they are not good. Spittings purely yellow are bad; and those that are white, viscous, and frothy, give no ease. Whiteness is a good sign of concoction in regard to spittings; but they ought not all to be viscous, nor too thick, nor too clear. We may make the same judgment of the excrements of the nose according to their concoction and crudity. Spittings that are black, green, and red, are of bad consequence. In inflammations of the lungs, those that are mixed with bile and blood preface well if they appear at the beginning, but are bad if they arise not about the seventh day. But the worst sign in these distempers is, when there is no expectoration at all, and the too great quantity of matter that is ready to be discharged this way makes a rattling in the breast. After spitting of blood, the discharge of purulent matter often follows, which brings on a consumption, and at last death. A kind good sweat is that which arises on the day of the crisis, and is discharged in abundance all over the body, and at the same time from all parts of the body, and thus carries off the fever.

ver. A cold sweat is alarming, especially in acute fevers, for in others it is only a sign of long continuance. When the patient sweats no-where but on the head and neck, it is a sign that the disease will be long and dangerous. A gentle sweat in some particular part, of the head and breast for instance, gives no relief, but denotes the seat of the distemper, or the weakness of the part. This kind of sweat was called by Hippocrates *epidrosis*. The hypochondria, or the abdomen in general, ought always to be soft and even, as well on the right side as on the left. When there is any hardness or unevenness in those parts, or heat and swellings, or when the patient cannot bear to have it touched, it is a sign the intestines are indisposed.

Hippocrates also inquired into the state of the pulse, or the beating of the arteries. The most ancient physicians, however, and even Hippocrates himself, for a long time, by this word understood the violent pulsation that is felt in an inflamed part, without putting the fingers to it. It is observed by Galen, and other physicians, that Hippocrates touches on the subject of the pulse more slightly than any other on which he treats. But that our celebrated physician understood something even on this subject, is easily gathered from several passages in his writings; as when he observes, that in acute fevers the pulse is very quick and very great; and when he makes mention, in the same place, of trembling pulses, and those that beat slowly; when he observes, that in some diseases incident to women, when the pulse strikes the finger faintly, and in a languishing manner, it is a sign of approaching death. He remarks also, in the *Coacæ Prænotiones*, that he whose vein, that is to say whose artery of the elbow, beats, is just going to run mad, or else that the person is at that time very much under the influence of anger. Many other variations of the pulse are enumerated by physicians, but most of them uncertain, and not confirmed by experience. See the Article *PULSE*, in the Medical Part of the Herbal, p. 106. where the subject is more fully treated.

We shall now proceed to some farther remarks on the **PROGNOSTICS OF PARTICULAR DISEASES.**

The *tertian ague* hath one prognostic peculiar to itself, namely, dry scabby ulcers breaking out upon the lips; these sometimes appear about the third or fourth paroxysm; and then we may venture to foretel that the disease will go off spontaneously after the seventh.

The following are the prognostics of a *nervous fever*; and therefore, when they appear, people should take precautions accordingly, by consulting the Medical Part of the Herbal, p. 128, for a safe and certain preventative and cure. The patient at first grows somewhat listless, and feels slight chills, and shudders, with uncertain flushes of heat, and a kind of weariness all over, like what is felt after great fatigue. This is always attended with a sort of heaviness and dejection of spirits, and more or less

less of a load, pain, or giddiness of the head; a nausea, or disrelish of every thing, soon follows, without any considerable thirst, but frequently with urging to vomit, though little but insipid phlegm is brought up. Though a kind of lucid interval of several hours sometimes intervenes, yet the symptoms return with aggravation, especially towards night; the head grows more giddy or heavy; the heat greater; the pulse quicker, but weak; with an oppressive kind of breathing. A great torpor, or obtuse pain and coldness, affects the hinder-part of the head frequently, and oftentimes a heavy pain is felt on the top all along the coronary suture; this, and that of the back part of the head, generally attend nervous fevers, and are commonly succeeded by some degree of delirium. In this condition the patient often continues for five or six days, with a heavy, pale, sunk, countenance, seemingly not very sick, and yet far from being well; restless, anxious, and commonly quite void of sleep, though sometimes very drowsy and heavy: but, although he appears to those about him actually to sleep, he is utterly insensible of it, and denies that he doth so. The pulse during all this time is quick, weak, and unequal; sometimes fluttering, and sometimes for a few moments slow; nay, even intermitting, and then, with a sudden flush in the face, immediately very quick, and perhaps soon after surprisingly calm and equal; and thus alternately.

Prognostics of a scarlet fever. With various general symptoms of fever, the patient at first complains of a dejection of spirits, a slight soreness or rather stiffness in the neck, with a sense of straitness in the muscles of the neck and shoulders, as if they were bound with cords. The second day of the fever this soreness in the throat increases, and the patient finds a difficulty in swallowing; but the difficulty seems less occasioned by the pain excited in the attempt, or by the straitness of the passage, than by an inability to throw the necessary muscles into action. The skin feels hot and dry, but not hard; and the patients experience frequent small pungent pains, as if touched with the point of a needle. The breath is hot and burning to the lips, and thirst makes them wish to drink; but the tendency to sickness, and the exertions necessary in deglutition, are so unpleasent, that they seldom care to drink much at a time. They have much uneasiness also from want of rest during the night. In the morning of the third day, the face, neck, and breast, appear redder than usual: in a few hours this redness becomes universal; and increases to such a degree of intensity, that the face, body, and limbs, resemble a boiled lobster in colour, and are evidently swollen.

The signs of an impending *phrenitis*, or *inflammation of the brain*, are fully explained in the Medical Part of this work, p. 139. In this disease, the following are the most fatal symptoms: A continual and furious delirium, with watching; thin watery

urine, white fæces, the urine and stools running off involuntarily, or a total suppression of these excretions; a disposition to become stupid, or to faint, trembling, rigour, chattering of the teeth, convulsions, hiccough, coldness of the extremities, trembling of the tongue, shrill voice, a sudden cessation of pain, with apparent tranquillity. The following are favourable: Sweats, apparently critical, breaking out; a seeming effort of nature to terminate the disease by a diarrhœa: a large hemorrhage from the nose; swellings of the glands behind the ears; hæmorrhoids.

A *vertigo* is observed to be both the symptom and forerunner of some dangerous disease; such as apoplexy, epilepsy, or hysteria; hæmorrhages from the nose and other parts; suppression of the menses; plethora; fevers, as well as such as are accompanied with debility as those in which there is an increased impetus of the blood towards the head.—Though a vertigo be for the most part a symptom and concomitant of other diseases, yet it is sometimes a primary disease, returning at intervals, increasing gradually, and equally impeding and destroying the functions of the body and mind.

A *delirium* accompanies fevers of many different kinds. Sometimes it is slight, easily removed, and scarcely to be accounted a bad sign. Often, however, it is very violent, and one of the very worst of signs, requiring the utmost care and attention. A delirium is either fierce or mild. The fierce delirium is preceded and accompanied by a redness of the countenance, a pain of the head, a great beating of the arteries, and noise in the ears; the eyes in the mean time looking red, inflamed, fierce, shining, and unable to bear the light; there is either no sleep at all, or sleep troubled with horrid dreams; the wonted manners are changed, an unusual peevishness and ill-nature prevail. The depravation of judgment is first observed between sleep and waking, and by the person's crediting his imagination, while the perceptions of sense are neglected, and the ideas of memory occur in an irregular manner. Fury at last takes place, and sometimes an unusual and incredible degree of bodily strength, so that several people can scarcely keep a single patient in his bed. The mild delirium, on the contrary, is often accompanied with a weak pulse, a pale collapsed countenance, and a vertigo when the patient sits in an erect posture; he is seldom angry, but often stupid, and sometimes remarkably grieved and fearful. The loss of judgment, as in the former kinds, is first perceived when the patient is half awake; but a temporary recovery ensues upon the admission of the light and the conversation of friends. The patient mutters much to himself, and attends little to the things around him; at last, becoming quite stupid, he neither feels the sensation of hunger or thirst, nor any of the other propensities of nature, by which means the urine and excrements are voided involuntarily. As the

disorder increases, it terminates in subfultus tendinum, tremors, convulsions, fainting, and death. The other species of delirium also frequently terminates in this, when the spirits and strength of the patient begin to fail. The symptoms accompanying either of these kinds of delirium show an unusual, inordinate, and unequal, motion of the blood through the brain, and a great change in that state of it which is necessary to the exercise of the mental powers. It is sufficiently probable, that an inflammation of the brain, more or less violent and general, sometimes takes place, although the signs of universal inflammation are frequently slight. This we learn from the dissection of dead bodies, which often show an universal redness of the brain or of some of its parts, or sometimes an effusion or suppuration.

The prognostics of the *malignant, putrid, or ulcerous, sore throat*, are very different in different persons. Sometimes a rigour, with fulness, and soreness of the throat and painful stiffness of the neck, are the first symptoms complained of. Sometimes alternate chills and heats, with some degree of giddiness, drowsiness, or head-ach, usher in the distemper. It seizes others with much more feverish symptoms; great pain of the head, back, and limbs; a vast oppression of the præcordia, and continual sighing. Some grown persons go about for whole days in a drooping state, with much uneasiness and anxiety, till at last they are obliged to take to their beds.—Thus various is the disease at the onset. But it commonly begins with chills and heats, load and pain of the head, soreness of throat, and hoarseness; some cough, sickness at stomach, frequent vomiting and purging, in children especially, and sometimes very severe; though a contrary state is more common to the adult. There is commonly a very great dejection of spirits, very sudden weakness, great heaviness on the breast, and faintness, from the very beginning. The pulse in general is quick, small, and fluttering; though sometimes heavy and undulating. The eyes heavy, reddish, and as it were weeping; the countenance often full, flushed, and bloated, though sometimes pale and sunk. The following are the prognostics in the disease:—If a gentle easy sweat comes on the third or fourth day; if the pulse becomes more slow, firm, and equal; if the sloughs of the fauces cast off in a kindly manner, and appear at the bottom tolerably clean, and florid; if the breathing is more soft and free, and some degree of vigour and quickness return in the eyes; all is well, and a salutary crisis follows soon, by a continuance of the sweat, and a turbid, subsiding, farinaceous, urine, a plentiful expectoration, and a very large desquamation of the cuticle. But if a rigour comes on, and the exanthemata suddenly disappear or turn livid; if the pulse grows very small and quick, and the skin remains hot and parched as it were; the breathing more difficult, the eyes dead and glassy, the urine pale and limpid; a phrenzy or coma may be expected to succeed, with

with a coldish clammy sweat on the face or extremities; life will now be despaired of, especially if a singultus and choaking or gulping in the throat should attend, with sudden, liquid, involuntary, livid, stools, intolerably fetid.

Symptoms of the *croup*, or *inflammation of the glottis*. A hoarseness, with some shrillness and ringing sound, both in speaking and coughing, as if the noise came from a brazen tube. At the same time there is a sense of pain about the larynx, some difficulty of respiration, with a whizzing sound in inspiration, as if the passage of the air were straitened. The cough which attends it is commonly dry; and, if any thing be spit up, it is a matter of a purulent appearance, and sometimes films resembling portions of a membrane. With all these symptoms, there is a frequency of pulse, a restlessness, and an uneasy sense of heat. When the internal fauces are viewed, they are sometimes without any appearance of inflammation; but frequently a redness, and even swelling, appears; and sometimes there is an appearance of matter like to that rejected by coughing, together with the symptoms now described, and particularly a great difficulty of breathing, and a sense of strangling in the fauces, by which the patient is sometimes suddenly taken off.

In a *pleurisy*, the pathognomonic signs are a cough, a difficulty of breathing, a pain of the side, and a continued fever; the adjunct signs are the various sorts of matter expectorated, which are sometimes bloody, sometimes bilious, &c. When the pains, which at first affected one side only, shall afterwards spread into the other; or when, leaving the side first affected, they pass entirely into the other; these are always marks of a dangerous disease. A delirium coming on during a pneumonic inflammation is always a symptom denoting much danger. Bleeding is the remedy chiefly to be depended on; and may be done in either arm, as the surgeon finds most convenient; and the quantity taken away ought in general to be as large as the patient's strength will allow. Yet the patient must keep out of bed as much as he can bear; should have plenty of warm diluting drinks, impregnated with vegetable acids, accompanied with nitre or some other cooling neutral salt; and the belly also ought to be kept open by emollient clysters or cooling laxative medicines. Vomiting in the beginning is dangerous; but in a somewhat advanced state of the disease emetics have been found the best means of promoting expectoration. Fomentations and poultices to the pained part have been found useful; but blistering is found to be much more effectual. A blister, however, ought not to be applied till at least one bleeding hath been premised, as venesection is less effectual when the irritation of a blister is present. If the disease be moderate, a blister may be applied immediately after the first bleeding; but in violent cases, where it may be presumed that a second bleeding may soon be necessary after the first, it

will

will be proper to delay the blister till after the second bleeding, when it may be supposed that the irritation occasioned by the blister will be over before a third bleeding becomes necessary. It may frequently be of use in this disease to repeat the blistering; and in that case the plasters should always be applied somewhere on the thorax, for when applied to more distant parts they have little effect. The keeping the blistered parts open, and making what is called a perpetual blister, has much less effect than a repeated blistering. When this disease terminates unfavourably, it often ends in an empyema, which is occasioned by the effusion of a quantity of purulent matter into the cavity of the thorax, producing a lingering and painful disorder, very often incurable. The first sign of an empyema is a cessation of the pain in the breast, which before was continual: this is followed by a sensation of weight on the diaphragm; and a fluctuation of matter, sometimes making a noise that may be heard by the by-standers: the acute fever is changed into a hectic, with an exacerbation at night: a continual and troublesome dry cough remains. The respiration is exceedingly difficult, because the lungs are prevented by the matter from fully expanding themselves. The patient can lie easily on that side where the matter is effused, but not on the other, because then the weight of the matter on the mediastinum produces uneasiness. The more the hectic heat is augmented, the more is the body emaciated, and its strength decayed. In some there is danger of suffocation when they stoop down, which goes off when they alter that posture of the body; and in some there is a purulent spitting.—These symptoms are accompanied with great anxiety, palpitation of the heart, and faintings. Very few recover after an empyema has been once formed, especially if the operation paracentesis be neglected. After this operation is performed, if a great quantity of bloody fetid pus be discharged, if the fever continue, and if the patient spit up a purulent, pale, frothy, livid, or green, matter, with a decay of strength, there is no hope; but, when a small quantity of pus, of a white colour, not very fetid, is discharged; when the fever and thirst presently cease, the appetite returns, and faces of a good consistence are discharged, the strength also returning in some degree; there is then hope of a perfect recovery. If the matter be not dried up in seven weeks time, the disease readily changes to a fistulous ulcer, which is very difficult to cure. An empyema affecting both sides of the thorax is more dangerous than that which affects only one.

The *inflammation of the heart* is attended with all the symptoms before mentioned, but in a higher degree; it is besides sometimes accompanied with hydrophobic symptoms, fainting, palpitation of the heart, a seeming madness, a sunk and irregular pulse, watery eyes, and a dejected countenance, with a dry black tongue.

The signs of an *inflammation of the stomach* are, great heat and pain in the epigastric region, extreme anxiety, an almost continual and painful hiccough, with a most painful vomiting of every thing taken into the stomach. This disease is always very dangerous, and the prognosis doubtful, which also must always be in proportion to the severity of the symptoms. A cessation of pain, coldness about the præcordia, great debility, with a languid and intermitting pulse, and an abatement of the hiccough, denote a gangrene and speedy death. From the sensibility of the stomach also, and its great connection with the rest of the system, it must be obvious that an inflammation of it, by whatever causes produced, may be attended with fatal consequences; particularly by the great debility it produces, it may prove suddenly fatal, without running through the usual course of inflammations.—Its tendency to admit of resolution may be known by its having arisen from no violent cause, by the moderate state of the symptoms, and by a gradual remission of these in the course of the first or at most of the second week of the disease. The tendency to gangrene may be suspected from the symptoms continuing with unremitting violence, notwithstanding the use of proper remedies; and a gangrene already begun may be known by the symptoms above-mentioned, particularly great debility and sudden cessation of pain. The tendency to suppuration may be known by the symptoms continuing but in a moderate degree for more than one or two weeks, and by a considerable remission of the pain, while a sense of weight and anxiety still remains. When an abscess has been formed, the frequency of the pulse is first abated, but soon after it increases, with frequent cold shivering, and an exacerbation in the afternoon and evening; followed by night-sweats, and other symptoms of hectic fever. These at length prove fatal, unless the abscess open into the cavity of the stomach, the pus be evacuated by vomiting, and the ulcer soon healed.

An *inflammation of the intestines* shows itself by a fixed pain in the abdomen, attended with fever, vomiting, and costiveness. The pain is often felt in different parts of the abdomen, but more frequently spreads over the whole, and is particularly violent about the navel. Inflammations of the intestines may arise from the same cause as those from the stomach; though commonly the former will more readily occur from cold applied to the lower extremities, or to the belly itself. It is also found supervening on the spasmodic cholera, incarcerated hernia, and volvulus. The inflammations of the intestines have the same termination with those of the stomach; and the prognosis in both cases is much the same.

Inflammation of the liver is attended with considerable fever; a frequent, strong, and hard, pulse; high-coloured urine; an acute pain in the right hypochondrium, increased by pressing upon the part. The pain is very often in such a part of the side as to make it appear like a pleurisy: and frequently, like that, is increased on inspiration.

ration. The disease is also commonly attended with a cough, which is generally dry, but sometimes moist; and, when the pain thus resembles a pleurisy, the patient cannot lie easily except upon the side affected. The pain is frequently extended to the clavicle, and to the top of the shoulder; and is attended sometimes with hic-cough, and sometimes with vomiting. The inflammation of the liver, like others, may end by resolution, suppuration, or gangrene; and the tendency to the one or to the other of those events may be known from what has been already mentioned.

Inflammation of the spleen, comes on with a remarkable shivering, succeeded by a most intense heat and very great thirst; a pain and tumour are perceived in the left hypochondrium, and the paroxysms for the most part assume a quartan form. When the patients expose themselves for a little to the free air, their extremities immediately grow very cold. If an hæmorrhage happens, the blood flows out of the left nostril.

It is often a very difficult matter to distinguish rheumatism from gout: but in *rheumatism* there in general occurs much less affection of the stomach; it affects chiefly the large joints, and often several of them at the same time: it occurs at an earlier period of life than gout; it is not observed to be hereditary; and it can in general be traced to some obvious exciting cause, particularly to the action of cold. To distinguish the chronic rheumatism from the acute: When the pains are still ready to shift their place; when they are especially severe in the night-time; when, at the same time, they are attended with some degree of pyrexia, and with some swelling, and especially some redness, of the joints; the disease is to be considered as partaking of the nature of the acute rheumatism. But when there is no longer any degree of pyrexia remaining; when the pained joints are without redness; when they are cold and stiff; when they cannot easily be made to sweat; or when, while a free and warm sweat is brought out on the rest of the body, it is only clammy and cold on the pained joints; and when, farther, the pains of these are increased by cold, and relieved by heat, applied to them, the case is to be considered as that of a purely chronic rheumatism: or perhaps more properly the first of the conditions now described may be termed the state of irritability, and the second the state of atony. The chronic rheumatism, or rather the atonic, may affect different joints; but is especially apt to affect those which are surrounded with many muscles, and those of which the muscles are employed in the most constant and vigorous exertions. Such is the case of the vertebræ of the loins, the affection of which is named *lumbago*; or of the hip-joint, when the disease is named *ischias* or *sciatica*. Violent strains and spasms, occurring on sudden and somewhat violent exertions, bring on rheumatic affections, which at first partake of the chronic rheumatism. Such are frequently the *lumbago*, and other affections which seem to be more seated in the muscles than in the joints. The distinction of the rheumatic pains from those resembling them which occur in the syphilis and scurvy

must be obvious, either from the feat of the pains or from the concomitant symptoms peculiar to those diseases.

What we call a paroxysm of the *gout* is principally constituted by an inflammatory affection of some of the joints. This sometimes comes on suddenly, without any warning, but is generally preceded by several symptoms; such as the ceasing of a sweating which the feet had been commonly affected with before; an unusual coldness of the feet and legs; a frequent numbness, alternating with a sense of pricking along the whole of the lower extremities; frequent cramps of the muscles of the legs; and an unusual turgescence of the veins. While these symptoms take place in the lower extremities, the body is affected with some degree of torpor and languor, and the functions of the stomach in particular are more or less disturbed. The appetite is diminished; and flatulency, or other symptoms of indigestion, are felt. These symptoms take place for several days, sometimes for a week or two, before a paroxysm comes on; but commonly, upon the day immediately preceding it, the appetite becomes keener than usual. It is generally supposed, that there are some cases of rheumatism which are scarcely to be distinguished from the gout: these, however, Dr. Cullen thinks, are but few; and that the two diseases may be for the most part distinguished with great certainty, by observing the pre-disposition, the antecedent circumstances, the part affected, the recurrences of the disease, and its connection with the system; which circumstances, for the most part, appear very differently in the two diseases.

Prognostics that a person is affected with the *plague*: 1. Great loss of strength. 2. Stupor, giddiness, and consequent staggering, which resembles drunkenness; or the head-ach and various delirium. 3. Anxiety, palpitation, syncope, and especially the weakness and irregularity of the pulse, denoting a considerable disturbance in the action of the heart. 4. Nausea and vomiting, particularly the vomiting of bile, which show an accumulation of vitiated bile in the gall-bladder and biliary ducts, and from thence derived into the intestines and stomach; which also denote a considerable spasm, and loss of tone in the extreme vessels on the surface of the body.

The *small-pox* begins with a synocha, or inflammatory fever. It generally comes on about mid-day, with some symptoms of a cold stage, and commonly with a considerable languor and drowsiness. A hot stage is soon formed, and becomes more considerable on the second and third day. During this course children are liable to frequent startings from their slumbers; and adults, if they are kept in bed, are disposed to much sweating. On the third day, children are sometimes affected with one or two epileptic fits; and towards the end of the third day the eruption commonly appears. The principal marks by which the *chicken-pox* may be distinguished from the small-pox are, 1. The appearance, on the second or third day of the eruption, of that vesicle full of serum upon the top of the pock. 2. The crust, which covers

the pocks on the fifth day; at which time those of the small-pox are not at the height of their suppuration. Foreign medical writers hardly ever mention the name of the chicken-pox; and the writers of our own country scarcely mention any thing more of it than its name. Morton speaks of it as if he supposed it to be a very mild genuine small-pox. But these two distempers are surely totally different from one another, not only on account of their different appearances above-mentioned, but because those who have had the small-pox are capable of being infected with the chicken-pox; but those who have once had the chicken-pox are not capable of having it again, though to such as have never had this distemper it seems as infectious as the small-pox. Dr. Heberden wetted a thread in the most concocted pus-like liquor of the chicken-pox which he could find; and, after making a slight incision, it was confined upon the arm of one who had formerly had it; the little wound healed up immediately, and showed no signs of any infection. From the great similitude between the two distempers, it is probable, that, instead of the small-pox, some persons have been inoculated from the chicken-pox; and that the distemper which has succeeded has been mistaken for the small-pox by hasty or inexperienced observers.

It is a promising sign, in the *palsy*, when the patient feels a slight degree of painful itching in the affected parts; and, if a fever should arise, it bids fair to cure the palsy. When the sense of feeling remains, there is much more room to hope for a cure than when it is gone, as well as the power of motion. But, when we observe the flesh to waste, and the skin to appear withered and dry, we may look upon the disease to be incurable. Convulsions supervening on a palsy are a fatal sign.

When *fainting* happens in the beginning of any acute distemper, it is not a good omen; but, when it takes place in the increase or at the height of the disease, the danger is somewhat less; but in general, when fainting comes on without any evident cause, it is to be dreaded. In violent hæmorrhages it is favourable; as the bleeding vessels gain time to contract and recover themselves, and thus the patient may escape. When persons of a full habit faint through excess of passion, they ought to be bled without delay, and should drink vinegar or lemon-juice diluted with water; and, after the bowels are emptied by a clyster, take a paregoric draught, and go to bed.

Prognostics from convulsions. Except in some few cases, convulsive disorders are always to be dreaded; but less in young people than in such as are advanced in life. Those which attack girls under the age of puberty will generally cease on the appearance of the menses; and boys have likewise a chance of being relieved as they advance in life: but in grown-up people, unless the cause be very evident, a cure is hardly to be expected, especially after the disease has been of long continuance. The treatment is much the same with that of epilepsy.

The

The *epilepsy* frequently is preceded by a pain in the head, lassitude, some disturbance of the senses, unquiet sleep, unusual dread, dimness of sight, a noise in the ears, palpitation of the heart, coldness of the joints; and in some there is a sensation of formication, or a cold-air, &c. ascending from the lower extremities toward the head. If the epilepsy comes on before the time of puberty, there are some hopes of its going off at that time. But it is a bad sign when it attacks about the twenty-first year, and still worse if the fits grow more frequent; for then the animal functions are often destroyed, as well as those of the mind, and the patient becomes stupid and foolish. Sometimes it will terminate in melancholy or madness, and sometimes in a mortal apoplexy or palsy. It has sometimes, however, been observed that epilepsies have been removed by the appearance of cutaneous diseases, as the itch, small-pox, measles, &c. therefore, if any of these appear, it may be reckoned a favourable prognostic.

Signs of a *diabetes*.—The diabetes first shows itself by a dryness of the mouth and thirst, white frothy spittle, and the urine in somewhat larger quantity than usual. A heat begins to be perceived in the bowels, which at first is a little pungent, and gradually increases. The thirst continues to augment by degrees, and the patient by degrees loses the power of retaining his urine for any length of time. The most singular phenomenon in this disease is, that the urine seems to be entirely or very much divested of an animal nature, and to be largely impregnated with a saccharine salt, scarcely distinguishable from that obtained from the sugar-cane. For this discovery we are indebted to Dr. Dobson of Liverpool, who made some experiments on the urine of a person labouring under a diabetes, who discharged 28 pints of urine every day, taking during the same time from 12 to 14 pounds only of solid and liquid food. When a person perceives any of the before-mentioned symptoms upon him, (particularly the quantity and insipidity of the urine,) he should lose no time in taking the proper precautions; for the diabetes is rarely cured unless when taken at the very beginning, which is seldom done. Bristol water is reckoned a specific in this disorder.

Hydrophobia.—This disease commonly does not make its attacks till a considerable time after the bite. In some few instances it has commenced in seven or eight days from the accident; but generally the patient continues in health for twenty, thirty, or forty, days, or even much longer. The wound, if not prevented, will in general be healed long before that time, frequently with the greatest ease; though sometimes it resists all kinds of healing applications, and forms a running ulcer, which discharges a quantity of matter for many days. It has been said, that the nearer the wounded place is to the salivary glands, the sooner the symptoms of hydrophobia appear. The approach of the disease is known by the cicatrix of the

wound becoming hard and elevated, and by a peculiar sense of pricking at the part; pains shoot from it towards the throat; sometimes it is surrounded with livid or red streaks, and seems to be in a state of inflammation; though frequently there is nothing remarkable to be observed about it. The patient becomes melancholy, loves solitude, and has sickness at stomach. Sometimes the peculiar symptom of the disease, the dread of water, comes on all at once. We have an instance of one who, having taken a vomit of ipecacuanha for the sickness he felt at his stomach, was seized with the hydrophobia at the time he was drinking the warm water. Sometimes the disease begins like a common sore throat; and, the soreness daily increasing, the hydrophobic symptoms show themselves like a convulsive spasm of the muscles of the fauces. In others, the mind seems to be primarily affected, and they have a real dread of water or any liquid before they try whether they can swallow it or not. Dr. James, in his Treatise on Canine Madness, mentions a boy sent out to fill two bottles with water, who was so terrified by the noise of the liquid running into them, that he fled into the house crying out that he was bewitched. He mentions also the case of a farmer, who, going to draw some ale from a cask, was terrified to such a degree at its running into the vessel, that he ran out in great haste with the spigot in his hand. But, in whatever manner this symptom comes on, it is certain that the most painful sensations accompany every attempt to swallow liquids. Nay, the bare sight of water, of a looking-glass, or of any thing clear or pellucid, will give the utmost uneasiness, and even throw the patient into convulsions. With regard to the affection of the mind itself in this disease, it does not appear that the patients are deprived of reason. Some have, merely by the dint of resolution, conquered the dread of water, though they never could conquer the convulsive motions which the contact of liquids occasioned; yet even this resolution has been of no avail; for the convulsions and other symptoms, increasing, have almost always destroyed the unhappy patients. However, in this distemper the symptoms are so various, that they cannot be enumerated; for we seldom read two cases of hydrophobia which do not differ very remarkably in this respect. When a person is bitten, the prognosis with regard to the ensuing hydrophobia is very uncertain. All those who are bit do not fall into the disease; nay, Dr. Vaughan relates that, out of thirty bitten by a mad dog, only one was seized with the hydrophobia. During the interval betwixt the bite and the time of the disease comes on, there are no symptoms by which we can certainly judge whether it will appear or not.

Prognostics of a *dropsy of the breast*.—This affection, particularly with respect to its causes, is in many circumstances similar to other kinds of dropsy, particularly to ascites. But from the situation of the water, which is here deposited in the cavity

of the thorax, it may naturally be supposed that some peculiar symptoms will occur. Besides the common symptoms of dropsy, (paleness of the countenance, scarcity of urine, and the like,) this disease is, in some instances, attended with a fluctuation of water within the breast; which, when it does occur, may be considered as a certain distinguishing mark of this affection. But, besides this, it is also distinguished by the remarkable affections of circulation and respiration with which it is attended. The breathing is peculiarly difficult, especially in a recumbent posture; and in many instances patients cannot breathe with tolerable ease unless when sitting erect, or even stooping somewhat forward. The pulse is very irregular, and has often remarkable intermissions. But the disease has been thought to be principally characterized by a sudden starting from sleep, in consequence of an almost inexpressible uneasy sensation referred to the breast, and attended with strong palpitation, which may probably arise from an affection either of circulation or of respiration. That these symptoms are common attendants of this disease is undeniable; and they are certainly the best characteristics of it with which we are yet acquainted: but it must be allowed that they are present in some cases where there is no water in the breast; and that in other instances, where the disease exists, they are either altogether wanting, or occur only in a very slight degree. Certain diagnostics, therefore, of this disease still remain to be discovered. When hydrothorax is present, from the affection of the vital functions with which it is attended, it may readily be concluded that it is a dangerous disease; and in many instances it proves fatal. The cure, as far as it can be accomplished, is obtained very much on the same principles as in other dropsies. Benefit is often obtained from an artificial discharge of water by the application of blisters to the breast; but in this, as well as other dropsies, a discharge is chiefly effected by the natural outlets, particularly from the use of cathartics and diuretics. In this species of dropsy, more perhaps than in any other, recourse has been had to the use of the digitalis purpurea, or fox-glove, so strongly recommended as a diuretic by Dr. Withering in his Treatise respecting the use of it. There can be no doubt that this, though sometimes productive of inconvenience, from the distressing sickness and severe vomiting which it not unfrequently excites, even in small doses, often operates as a powerful diuretic, and produces a complete evacuation of water, after other remedies have failed. From the effects mentioned above, however, as well as from its influence on the pulse, which it renders much slower, it is necessary that it should be employed with great caution and in small doses. A dram of the dried leaves of the digitalis, macerated for four hours in half a pint of warm water, forms an infusion which may be given in doses of an ounce, and the dried powder of the leaves in doses of one or two grains: these doses may be gradually increased, and repeated twice or oftener in the day;

but

but this requires to be done with great caution, lest severe vomiting or other distressing symptoms should take place.

Scurvy.—The first indication of the scorbutic diathesis is generally a change of colour in the face, from the natural and healthy look to a pale and bloated complexion, with a listlessness, and aversion from every sort of exercise; the gums soon after become itchy, swell, and are apt to bleed on the slightest touch; the breath grows offensive; and the gums, swelling daily more and more, turn livid, and at length become extremely fungous and putrid, as being continually in contact with the external air; which in every case favours the putrefaction of substances disposed to run into that state, and is indeed absolutely requisite for the production of actual rottenness. The symptoms of the scurvy, like those of every other disease, are somewhat different in different subjects, according to the various circumstances of constitution; and they do not always proceed in the same regular course in every patient. But what is very remarkable in this disease, notwithstanding the various and immense load of distress under which the patients labour, there is no sickness at the stomach, the appetite keeps up, and the senses remain entire almost to the very last: when lying at rest, they make no complaints, and feel little distress or pain: but, the moment they attempt to rise or stir themselves, then the breathing becomes difficult, with a kind of straitness or catching, and great oppression, and sometimes they have been known to fall into a syncope. This catching of the breath upon motion, with the loss of strength, dejection of spirits, and rotten gums, are held as the essential or distinguishing symptoms of the disease.

The *jaundice* first shows itself by a listlessness and want of appetite: the patient becomes dull, oppressed, and generally costive. These symptoms have continued but a very short time, when a yellow colour begins to diffuse itself over the *tunica albuginea*, or white part of the eye, and the nails of the fingers; the urine becomes high coloured, with a yellowish sediment capable of giving a yellow tint to linen; the stools are whitish or grey. In some there is a most violent pain in the epigastric region, which is considerably increased after meals. In some the disease degenerates into an incurable dropsy; and there have been many instances of people who have died of the dropsy after the jaundice itself had been totally removed. The coming on of a gentle diarrhoea, attended with bilious stools, together with the cessation of pain, are signs of the disease being cured. We are not, however, always to conclude, because the disease is not attended with acute pain, that it is therefore incurable; for frequently the passage of a concretion through the biliary ducts is accompanied only with a sensation of slight uneasiness. If the disease goes off, its return must be prevented by a course of tonic medicines, particularly the Peruvian bark and antiseptics: but we can by no means be certain that the jaundice will not return,

and that at any interval; for there may be a number of concretions in the gall-bladder, and, though one hath passed, another may very quickly follow, and produce a new fit of jaundice; and thus some people have continued to be affected with the distemper, at short intervals, during life.

Stone in the bladder.—The signs of a stone in the bladder are, pain, especially about the sphincter; and bloody urine, in consequence of riding or being jolted in a carriage: a sense of weight in the perinæum; an itching of the glans penis; slimy sediment in the urine; and frequent stoppages in making water; a tenesmus also comes on while the urine is discharged.

Imaginary vision of objects which do not exist.—This often takes place when the body is diseased, and then the patient is said to be delirious. Sometimes however, in these cases, it does not amount to delirium; but the person imagines he sees gnats or other insects flying before his eyes; or sometimes, that every thing he looks at has black spots in it, which last is a very dangerous sign. Sometimes also sparks of fire appear before his eyes; which appearances are not to be disregarded, as they frequently precede apoplexy or epilepsy: on the other hand, it is feared that little benefit can be derived from an attention to this prognostic, as the fits commonly follow so suddenly.

I shall now proceed to describe two disorders not noted by Culpeper, or any old writer. And first of the

ANGINA PECTORIS.

Dr. Heberden was the first who described this disease, though it is extremely dangerous, and, by his account, not very rare. It seizes those who are subject to it when they are walking, and particularly when they walk soon after eating, with a most disagreeable and painful sensation in the breast, which seems to threaten immediate destruction: but, the moment they stand still, all the uneasiness vanishes. In all other respects the patients at the beginning of this disorder are well, and have no shortness of breath. After it has continued some months, the fits will not cease instantaneously on standing still; and it will come on not only when the patients are walking, but when they are lying down, and oblige them to rise up out of their beds every night for many months together. In one or two very inveterate cases, it has been brought on by the motion of a horse or carriage, and even by swallowing, coughing, going to stool, speaking, or by any disturbance of mind. The persons affected were all men, almost all of whom were above fifty years of age, and most of them with a short neck

and inclining to be fat. Something like it, however, was observed in one woman, who was paralytic; and one or two young men complained of it in a slight degree. Other practitioners have observed it in very young persons. When a fit of this sort comes on by walking, its duration is very short, as it goes off almost immediately upon stopping. If it comes on in the night, it will last an hour or two. Dr. Heberden met with one in whom it once continued for several days; during all which time the patient seemed to be in imminent danger of death. Most of those attacked with the distemper died suddenly: though this rule was not without exceptions; and Dr. Heberden observed one who sunk under a lingering illness of a different nature. The os sterni is usually pointed to as the seat of this malady; but it seems as if it was under the lower part of that bone, and at other times under the middle or upper part, but always inclining more to the left side; and in many cases there is joined with it a pain about the middle of the left arm, which appears to be seated in the biceps muscle.

The appearance of Dr. Heberden's paper in the Medical Transactions very soon raised the attention of the faculty, and produced other observations from physicians of eminence; namely, Dr. Fothergill, Dr. Wall of Worcester, Dr. Haygarth of Chester, and Dr. Percival of Manchester. It also induced an unknown sufferer to write Dr. Heberden a very sensible letter, describing his feelings in the most natural manner; which unfortunately, in three weeks after the date of this anonymous epistle, terminated in a sudden death, as the writer himself had apprehended. The youngest subject that Dr. Fothergill ever saw afflicted with this disorder was about thirty years of age; and this person was cured. The method that succeeded him was a course of pills, composed of the mass of gum-pill, soap, and native cinnabar, with a light chalybeate bitter: this was continued for some months, after which he went to Bath several successive seasons, and acquired his usual health: he was ordered to be very sparing in his diet; to keep the bowels open; and to use moderate exercise on horseback, but not to take long or fatiguing walks. The only symptom in this patient that is mentioned, was a stricture about the chest, which came on if he was walking up hill or a little faster than ordinary, or if he was riding a very brisk trot; for moderate exercise of any kind did not affect him; and this uneasy sensation always obliged him to stop, as he felt himself threatened with immediate death if he had continued to go forwards. It is the sharp constrictive pain across the chest, that (according to Dr. Fothergill's observation) particularly marks this singular disease; and which is apt to supervene upon a certain degree of muscular motion, or whatever agitates the nervous system. In such cases as fell under the inspection of Dr. Fothergill, he very seldom met with one that was not attended with an irregular and intermitting pulse; and this, not only during the exacerbations,

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but often when the patient was free from pain and at rest; but Dr. Heberden observes, that the pulse is, at least sometimes, not disturbed; and mentions his having once had an opportunity of being convinced of this circumstance, by feeling the pulse during the paroxysm. But no doubt these varieties, as well as many other little circumstances, will occur in this disease, as they do in every other, on account of the diversity of the human frame; and, if those which in general are found to predominate and give the distinguishing character be present, they will always authorise us in giving the name to the disease: thus, when we find the constrictory pain across the chest, accompanied with a sense of strangling or suffocation; and still more, if this pain should strike across the breast into one or both arms; we should not hesitate to pronounce the case an angina pectoris.

As to the nature of this disease, it appears to be purely spasmodic: and this opinion will readily present itself to any one who considers the sudden manner of its coming on and going off; the long intervals of perfect ease; the relief afforded by wine and spirituous cordials; the influence which passionate affections of the mind have over it; the ease which comes from varying the posture of the head and shoulders, or from remaining quite motionless; the number of years for which it will continue, without otherwise disordering health; its bearing so well the motion of a horse or carriage, which circumstance often distinguishes spasmodic pains from those which arise from ulcers; and lastly, its coming on for the most part after a full meal, and in certain patients at night, just after the first sleep, at which time the incubus, convulsive asthma, and other ills justly attributed to the disordered functions of the nerves, are peculiarly apt to return or to be aggravated. From all these circumstances taken together, there can be little doubt that this affection is of a spasmodic nature: but, though this should be admitted, it may not be so easy to ascertain the particular muscles which are thus affected. The violent sense of strangling or choaking which shows the circulation through the lungs to be interrupted during the height of the paroxysm; and the peculiar constrictive pain under the sternum, always inclining (according to Dr. Heberden's observation) to the left side; together with that most distressing and alarming sensation, which, if it were to increase or continue, threatens an immediate extinction of life; might authorise us to conclude that the heart itself is the muscle affected: the only objection to this idea (and, if it had been constantly observed, it would be insurmountable) is, that the pulse is not always interrupted during the paroxysm. The appearances in two of the dissections favour the opinion that the spasm affects the heart; as in one subject the left ventricle (and, though it be not mentioned, we may presume the right one also) was found as empty of blood as if it had been washed; and in another, the substance of the heart appeared whitish, not unlike a ligament; as it should seem, in both cases, from the force

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of the spasm squeezing the blood out from the vessels and cavities. If this hypothesis be allowed, we must conclude that the spasm can only take place in an inferior degree, as long as the patient continues to survive the paroxysm; since an affection of this sort, and in this part, of any considerable duration or violence, must inevitably prove fatal: and accordingly, as far as could be traced, the persons who have been known to labour under this disease have in general died suddenly. The dissections also show, that, whatever may be the true seat of the spasm, it is not necessary for the bringing of it on, that the heart, or its immediate appendages, should be in a morbid state; for in three out of the six that have as yet been made public, these parts were found in a sound state. On opening the body of the gentleman who wrote the letter to Dr. Heberden, "upon the most careful examination, no manifest cause of his death could be discovered; the heart, in particular, with its vessels and valves, were all found in a natural condition." In the case communicated by Dr. Percival to the publishers of the Edinburgh Medical Commentaries, "the heart and aorta descendens were found in a sound state." And in Dr. Haygarth's patient, on opening the thorax, the lungs, pericardium, and heart, appeared perfectly sound. Not to mention Dr. Fothergill's patient (R. M.), in whose body the only morbid appearance about the heart was a small white spot near the apex. So that the cause, whatever its nature might have been, was at too great a distance, or of too subtle a nature, to come under the inspection of the anatomist. But there was a circumstance in two of the subjects that is worthy of remembrance; and which shows that the crasis of the blood, while they were living, must have been greatly injured; namely, its not coagulating, but remaining of a cream-like consistence, without any separation into serum and crassamentum.

From all that we have seen hitherto published, it does not appear that any considerable advances have been made towards the actual cure of this anomalous spasm. The very judicious and attentive Dr. Heberden (to whom the public are highly indebted for first making the disorder known) confesses, that bleeding, vomits, and other evacuations, have not appeared to do any good: wine and cordials, taken at bed-time, will sometimes prevent or weaken the fits; but nothing does this so effectually as opiates: in short, the medicines usually called nervous or cordial, such as relieve and quiet convulsive motions, and invigorate the languishing principle of life, are what he recommends. Dr. Wall mentions one patient, out of the twelve or thirteen that he had seen, who applied to him early in the disease, and was relieved considerably by the use of antimonial medicines joined with the fetid gums: he was still living at the time the doctor wrote his paper, (Nov. 1772.) and going about with tolerable ease. Two were carried off by other disorders; all the rest died suddenly. Dr. Fothergill's directions are chiefly calculated with the view to prevent the

disorder from gaining ground, and to alleviate present distress. Accordingly he enjoins such a kind of diet as may be most likely to prevent irritability: in particular not to eat voraciously: to be strictly abstemious in respect to every thing heating; spices, spirits, wines, and all fermented liquors: to guard most scrupulously against passion, or any vehement emotions; and to make use of all the usual means of establishing and preserving general health; to mitigate excesses of irritability by anodynes; or pains, if they quicken the circulation: to disperse flatulencies, when they distend the stomach, by moderate doses of carminatives; amongst which, perhaps, simple peppermint-water may be reckoned one of the safest. But, since obesity is justly considered as a principal predisposing cause, he insists strongly on the necessity of preventing an increase of fat by a vegetable diet, and using every other practicable method of augmenting the thinner secretions. These were the only means which occurred to the English physicians of opposing this formidable disease.—In my own practice I have never known the Solar Tincture to fail in removing by degrees this dangerous disorder. The cases indeed that have occurred to me have been very few; and my uniform practice has been to order a wine-glass of the Tincture, diluted with water, to be taken at going to bed; and, in those where the disorder had gained great ascendancy, I prescribed a like quantity to be taken at getting up in the morning, at least an hour before breakfast. This has always rendered the attacks less violent, and at last totally removed them. Two table-spoonfuls of the Tincture undiluted should be administered, if possible, during the height of the paroxysm, which will generally give immediate ease.

Dr. Smyth of Ireland has, we are told, discovered that the angina pectoris may be certainly cured by issues, of which Dr. Macbride gives the following instance:

“A. B. a tall well-made man; rather large than otherwise: of healthy parents, except that there had been a little gout in the family; temperate; being very attentive to the business of his trade, (that of a watch-maker,) led a life uncommonly sedentary; had, from his boyhood upwards, been remarkably subject to alarming inflammations of his throat, which seized him at least once in the course of the year; in all other respects well. In 1767, (then forty-eight years of age,) he was taken, without any evident cause, with a sudden and very dispiriting throbbing under the sternum. It soon afterwards increased, and returned upon him every third or fourth week, accompanied with great anxiety, very laborious breathing, choaking, a sensation of fulness and distension in the head, bloated and flushed countenance, turgid and watery eyes, and a very irregular and unequal pulse. The paroxysm invaded him almost constantly while he was sitting after dinner; now and then he was seized with it in the morning, when walking a little faster than usual; and was then obliged to rest on any object at hand. Once or twice it came on in bed; but did not oblige

him to sit up, as it was then attended with no great difficulty in breathing. In the afternoon-fits, his greatest ease was from the supine posture; in which he used to continue motionless for some hours, until, quite spent and worn out with anguish, he dropt into a slumber. In the intervals between these attacks, which at length grew so frequent as to return every fourth or fifth day, he was, to appearance, in perfect health. Thus matters continued for more than two years; and various antispasmodic were ineffectually tried for his relief. In 1769, there supervened a very sharp constrictory pain at the upper part of the sternum, stretching equally on each side, attended with the former symptoms of anxiety, dyspnœa, choaking, &c. and with an excruciating cramp, as he called it, that could be covered with a crown-piece, in each of his arms, between the elbow and the wrist, exactly at the insertion of the pronator teres; the rest of the limb was quite free. The fits were sometimes brought on, and always exasperated, by any agitation of mind or body. He once attempted to ride on horseback during the paroxysm: but the experiment was near proving fatal to him. The difference of season or weather made no impression upon him. Still, in the intervals, his health was perfectly good; except that his eyes, which before his illness were remarkably strong and clear, were now grown extremely tender; and that his sight was much impaired. He had no flatulency of stomach, and his bowels were regular. In this situation, Feb. 22, 1770, he applied to me for assistance. I had seen, I believe, eight or ten of these frightful cases before. Two of the patients dropped dead suddenly. They were men between forty and fifty years of age, and of a make somewhat fleshy. The fate of the others I was not informed of; or, at least, cannot now recollect. Having found the total inefficacy of blisters and the whole class of nervous medicines in the treatment of this anomalous spasm, I thought it right to attempt correcting or draining off the irritating fluid in the case now before us. To this purpose, I ordered a mixture of lime-water with a little of the compound juniper-water, and an alterative proportion of Huxham's antimonial wine: I put the patient on a plain, light, perspirable, diet; and restrained him from all viscid, flatulent, and acrimonious, articles. By pursuing this course, he was soon apparently mended; but, after he had persisted regularly in it for at least two months, he kept for some time at a stand. I then ordered a large issue to be opened on each of his thighs. Only one was made. However, as soon as it began to discharge, he amended. The frequency and severity of the fits abated considerably; and he continued improving gradually, until, at the end of eighteen months, he was restored to perfect health; which he has enjoyed, without the least interruption, till now, except when he has been tempted (perhaps once in a twelvemonth) to transgress rules, by making a large meal on salted meat, or indulging himself in ale or rum-punch, each of which never failed to disorder him from

the beginning of his illness : but on even these occasions, he has felt no more than the slightest motion of his former sufferings ; inasmuch that he would despise the attack, if it did not appear to be of the same stock with his old complaint. No other cause has had the least ill effect on him. Though rum was constantly hurtful, yet punch, made with a maceration of black currants in our vulgar corn-spirit, is a liquor that agrees remarkably well with him. He never took any medicine after the issue began to discharge ; and I have directed that it shall be kept open as long as he lives. The inflammations of his throat have disappeared for five years past ; he has recovered the strength and clearness of his sight ; and his health seems now to be entirely re-established."

Dr. Macbride, in a letter to Dr. Duncan, published in the Edinburgh Medical Commentaries, gives the following additional observations on this disease :

"Within these few weeks I have, at the desire of Dr. Smyth, visited, three or four times, a very ingenious man who keeps an academy in this city, of about thirty-four years of age, who applied to the doctor for his advice in January last. I shall give you his symptoms as I had them from his own mouth, which appear to me to mark his case to be an angina pectoris, and as deplorable as any that I have read of. It was strongly distinguished by the exquisite constrictory pain of the sternum, extending to each of his arms as far as the insertion of the deltoid muscle, extreme anxiety, laborious breathing, strangling, and violent palpitation of the heart, with a most irregular pulse. The paroxysms were so frequent, that he scarcely ever escaped a day, for six or seven years, without one. They were usually excited by any agitation of mind or body, though slight. He had clear intervals of health between the fits. The distemper seems hereditary in him, as he says his father was affected in the same manner some years previous to his death. He has a strong gouty taint, which never showed itself in his limbs ; and he has led a life of uncommon sedentaryness, from intense application to mathematical studies, attention of mind, and passion, even from his boyish years. These circumstances may, perhaps, account for his having been taken with this disease at so early an age as seventeen. A large issue was immediately opened on each of his thighs. In a month afterwards he began to mend, and has gone on improving gradually. He can now run up stairs briskly, as I saw him do no later than yesterday, without hurt ; can bear agitation of mind ; and has no complaint, excepting a slight oppression of the breast, under the sternum, which he feels sometimes in a morning, immediately after dressing himself, and which he thinks is brought on by the motion used in putting on his clothes ; though, for a complete week preceding the day on which I saw him last, he told me that he had been entirely free from all uneasiness, and was exulting that he had not had such an interval of ease for these last seven years. Dr. Smyth also showed me, in his *adversaria*, or note-book, the case of a gentleman who had been under his care

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in 1760, which he had forgotten when my book went to the prefs, but which he was reminded of the other day by a visit from his patient. It was a genuine angina pectoris, brought on by a sedentary life, and great vexation of mind, clearly marked by the exquisite pain under the sternum, that extended acutely to the upper extremities, particularly along the left arm, together with the other symptoms of dyspnœa, anxiety, palpitation of the heart, &c. recited in the case above. The disorder went off in 1762, by large spontaneous discharges from the piles, but returned upon him severely in 1765. Issues in his thighs were then recommended to him, but not made. But, whether it was by the persuasion of some friend, or of his own accord, he went into a course of James's powder, in small alterative doses, combined with a little castor and asafoetida. This he persisted in for about six weeks; in the mean while, he had large acrimonious gleetings from the scrotum, and a plentiful discharge of ichor from the anus. From this time he began to find his complaints grow less and less distressing, and he has now been totally free from them for six years past."

Of this shocking disorder died that eminent surgeon, Mr. John Hunter. See *Encyclopædia Londinensis*, vol. x. p. 482.

STRAITNESS OF THE ŒSOPHAGUS.

This distemper has been treated of only by Dr. Munckley, who reckons it one of the most deplorable diseases of the human body. Its beginning is in general so slight as to be scarcely worth notice, the patients perceiving only a small impediment to the swallowing of solid food: they usually continue in this state for many months; during which, all liquid foods, and even solids themselves when cut small and swallowed leisurely, are got down without much difficulty; by degrees the evil increases, and the passage through the œsophagus becomes so narrow, that not the smallest solid whatever can pass through it; but, after having been detained for some time at the part where the obstacle is formed, is returned again with a hollow noise of a very peculiar kind, and with the appearance of convulsion. The seat of this malady is sometimes near the top of the œsophagus, and at other times farther down, nearer the superior orifice of the stomach. In this last case, the part of the alimentary tube which is above the obstruction is frequently so dilated by the food which is detained in it as to be capable of containing a large quantity; and the kind of vomiting, by which it is again returned through the mouth, comes on sooner or later after the attempt to swallow, in proportion to the nearness or remoteness of the part affected. In the last stage of this disease, not even liquids themselves can be swallowed so as to pass into the stomach, and the patient dies literally starved to death. On the dissection of such as have died in this manner, the œsophagus is found to be considerably thickened; and in some so contracted within at the diseased part, as scarcely to admit the passing of a common probe; in others, to adhere together in such a manner

manner as entirely to close up the passage, and not to be separated without great difficulty. He comes next to show what he has found to be the most efficacious method of treating this disease, which, though not uncommon, yet in general has been considered as incurable. He claims not the merit of having discovered the method of cure, but hopes that some service may arise from publishing what his experience has confirmed to him; having first received the hint from another eminent physician. The only medicine, then, from the use of which he has ever found any service, is mercury; and in cases which are recent, and where the symptoms have not risen to any great height, small doses of mercury given every night, and prevented, by purgative medicines, from affecting the mouth, have accomplished the cure. But where the complaint has been of long standing, and the symptom has come on of the food's being returned through the mouth, a more powerful method of treatment becomes necessary. In this case he has never found any thing of the least avail in removing the symptoms but mercury, used in such a manner as to raise a gentle but constant spitting, and this method he has pursued with the happiest success. If this method be commenced before the complaint has gained too much ground upon the constitution, the case is not to be despaired of; and, of those who have come under his care in this state, by much the greater part have received considerable benefit from it, and many have been entirely cured. The complaint itself, he observes, is not very uncommon; but there is no instance, to his knowledge, recorded, of success from any other manner of treating it than that he has recommended.

OBSERVATIONS ON THE MEANS OF PRESERVING HEALTH.

I. RULES for the Management of VALETUDINARIANS.

That part of the medical system which lays down rules for the preservation of health and prevention of diseases, termed Hygiene, is not to be strictly understood as if it respected only those people who enjoy perfect health, and who are under no apprehensions of disease, for such seldom either desire or attend to medical advice; but should rather be considered as relating to valetudinarians, or to such as, though not actually sick, may yet have sufficient reason to fear that they will soon become so: hence it is that the rules must be applied to correct morbid dispositions, and to obviate the various things that are known to be the remote or possible causes of diseases. From the way in which the several temperaments are usually mentioned by systematic writers, it should seem as if they meant that every particular constitution must be referred to one or other of the four; but this is far from being reducible to practice, since by much the greater number of people have constitutions so indistinctly

tinctly marked, that it is hard to say to which of the temperaments they belong. When we actually meet with particular persons who have evidently either, 1. Too much strength and rigidity of fibre, and too much sensibility; 2. Too little strength, and yet too much sensibility; 3. Too much strength, and but little sensibility; or, 4. But little sensibility joined to weakness;—we should look on such persons as more or less in the valetudinary state, who require that these morbid dispositions be particularly watched, lest they fall into those diseases which are allied to the different temperaments.

People of the first-mentioned temperament being liable to suffer from continued fevers, especially of the inflammatory species, their scheme of preserving health should consist in temperate living, with respect both to diet and exercise; they should studiously avoid immoderate drinking, and be remarkably cautious lest any of the natural discharges be checked. People of this habit bear evacuations well, especially bleeding: they ought not, however, to lose blood but when they really require to have the quantity lessened; because too much of this evacuation would be apt to reduce the constitution to the second-mentioned temperament, wherein strength is deficient, but sensibility redundant.

Persons of the second temperament are remarkably prone to suffer from painful and spasmodic diseases, and are easily ruffled; and those of the softer sex who have this delicacy of habit are very much disposed to hysterical complaints. The scheme here should be, to strengthen the solids by moderate exercise, cold bathing, the Peruvian bark, and chalybeate waters; particular attention should constantly be had to the state of the digestive organs, to prevent them from being overloaded with any species of saburra which might engender flatus, or irritate the sensible membranes of the stomach and intestines, from whence the disorder would soon be communicated to the whole nervous system. Persons of this constitution should never take any of the drastic purges, nor strong emetics; neither should they lose blood but in cases of urgent necessity. But a principal share of management, in these extremely-irritable constitutions, consists in avoiding all sudden changes of every sort, especially those with respect to diet and clothing, and in keeping the mind as much as possible in a state of tranquillity. Hence the great advantages which people of this frame derive from the use of medicinal waters drunk on the spot, because of that freedom from care and serious business of every kind which generally obtains in all the places laid out for the reception of valetudinarians.

The third-mentioned temperament, where there is an excess of strength and but little sensibility, does not seem remarkably prone to any distressing or dangerous species of disease; and therefore it can hardly be supposed that persons so circumstanced will either of themselves think of any particular scheme of management, or

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have recourse to the faculty for their instructions : such constitutions, however, we may observe, bear all kinds of evacuations well, and sometimes require them to prevent an over-fulness, which might end in an oppression of the brain or some other organ of importance.

But the fourth temperament, where we have weakness joined to want of sensibility, is exceedingly apt to fall into tedious and dangerous disease, arising from a defect of absorbent power in the proper sets of vessels, and from remissness of the circulation in general ; whence corpulency, dropsy, jaundice, and different degrees of scorbutic affection. In order to prevent these, or any other species of accumulation and depravation of the animal fluids, the people of this constitution should use a generous course of diet with brisk exercise, and be careful that none of the secretions be interrupted, nor any of the natural discharges suppressed. These constitutions bear purging well, and often require it ; as also the use of emetics, which are frequently found necessary to supply the place of exercise, by agitating the abdominal viscera ; and are of service to prevent the stagnation of bile, or the accumulation of mucous humours, which hinder digestion, and clog the first passages. The free use of mustard, horse-radish, and the like sort of stimulating dietetics, is serviceable in these torpid habits.

When the general mass of fluids is accumulated beyond what is conducive to the perfection of health, there arises what the writers term a *plethora*, which may prove the source of different diseases ; and therefore, when this over-fulness begins to produce languor and oppression, care should be taken in time to reduce the body to a proper standard, by abridging the food and increasing the natural discharges, using more exercise, and indulging less in sleep. But in opposite circumstances, where the fluids have been exhausted, we are to attempt the prevention of further waste by the use of strengthening stomachics, a nourishing diet, and indulgence from fatigue of body or mind. Vitiated fluids are to be considered as affected either with the different kinds of general acrimony, or as betraying signs of some of the species of morbid matter which give rise to particular diseases, such as gout, rheumatism, calculus, scurvy, &c.

During the state of infancy, we may sometimes observe a remarkable acidity, which not only shows itself in the first passages, but also seems to contaminate the general mass of fluids. As it takes its rise, however, from weak bowels, our views, when we mean to prevent the ill consequences, must be chiefly directed to strengthen the digestive organs, as on their soundness the preparation of good chyle depends ; and hence small doses of rhubarb and chalybeates (either the natural chalybeate waters mixed with milk, or the flores martiales in doses of a few grains, according to the

the age of the child) are to be administered; and the diet is to be so regulated as not to add to this acid tendency: brisk exercise is likewise to be enjoined, with frictions on the stomach, belly, and lower extremities.

Where the fluids tend to the putrescent state, which shows itself by fetid breath, sponginess and bleeding of the gums, a bloated look and livid countenance, the diet then should be chiefly of fresh vegetables and ripe fruits, with wine in moderation, brisk exercise, and strengthening bitters.

Where acrimony shows itself by itching eruptions, uncommon thirst, and flushing heats, nothing will answer better than such sulphureous waters as the Harrogate and Moffat in Britain, or the Lucan Swadlinbar in Ireland; at the same time using a course of diet that shall be neither acrid nor heating.

So far with respect to those kinds of morbid matter which do not invariably produce a particular species of disease: but there are others of a specific nature, some of which are generated in the body spontaneously, and seem to arise from error in diet, or other circumstances of ill management with respect to the animal economy: and hence it is sometimes possible, in some degree if not altogether, to prevent the ill consequences. Thus, there are instances where returns of the gout have been prevented by adhering strictly to a milk diet.

The rheumatism has also been sometimes warded off by wearing a flannel shirt, or by using the cold bath without interruption.

Calculus may be retarded in its progress, and prevented from creating much distress, by the internal use of soap and lime-water, by soap-lees taken in milk or in veal-broth, or by the use of aerated alkaline water, which may perhaps be considered as being both more safe and more efficacious, and at the same time more pleasant, than any of the other practices.

The scurvy may be prevented by warm clothing and perseverance in brisk exercise, by drinking wine or cider; and eating freely of such vegetable substances as can be had in those situations where this disease is most apt to show itself.

In constitutions where there is an hereditary disposition to the scrofula, if early precautions be taken to strengthen the solids by cold bathing, a nourishing course of diet, and moderate use of wine, the acrimony which rises to the disease will probably be prevented from producing any very bad effects.

The other kinds of morbid matter, which are of a specific nature, are received into the body by infection or contagion.

The infection of a putrid fever or dysentery is best prevented by immediately taking an emetic on the first attacks of the sickness or shivering; and, if that do not completely answer, let a large blister be applied between the shoulders: by this

method the nurses and other attendants on the sick in the naval hospitals have often been preserved. As to other infectious morbid matter, we must refer to what has already been said when treating of hydrophobia, poisons, &c.

The ill effects which may arise from the different species of saburra, are to be obviated, in general, by the prudent administration of emetics, and carefully abstaining from such kinds of food as are known to cause the accumulation of noxious matters in the first passages.

Crude vegetables, milk, butter, and other oily substances, are to be avoided by persons troubled with a sourness in the stomach; brisk exercise, especially riding, is to be used, and they are to refrain from fermented liquors: the common drink should be pure water; or water with a very little of some ardent spirit, such as rum or brandy. Seltzer and Vahl's water are to be drunk medicinally; and aromatic bitters, infusions, or tinctures, with the acid elixir of vitriol, from 10 to 20 drops, will be found serviceable, in order to strengthen the fibres of the stomach, and promote the expulsion of its contents, thereby preventing the too-hasty fermentation of the alimentary mixture. In order to procure immediate relief, magnesia alba, or creta præparata, will seldom fail; the magnesia, as well as the chalk, may be made into lozenges, with a little sugar and mucilage; and in that form may be carried about and taken occasionally by people afflicted with the acid saburra.

In constitutions where there is an exuberance of stagnation of bile, and a troublesome bitterness in the mouth, it is necessary to keep the bowels always free by taking occasionally small doses of pure aloes, oleum ricini, cream of tartar, some of the common purging salts, or the natural purging waters.

When there is a tendency to the empyreumatic and rancid saburra, people should carefully avoid all the various kinds of those oily and high-seasoned things generally termed *made dishes*, and eat plain meat, without rich sauces or much gravy; and in these cases the most proper drink is pure water.

II. RULES for those who enjoy perfect HEALTH.

There can be no doubt that, in general, temperance is the true foundation of health; and yet the ancient physicians, as we may see in the rules laid down by Celsus, did not scruple to recommend indulgence now and then, and allowed people to exceed both in eating and drinking: but it is safer to proceed to excess in drink than in meat; and, if the debauch should create any extraordinary or distressing degree of pain or sickness, and a temporary fever should ensue, there are two ways of shaking it off, either to lie in bed and encourage perspiration, or to get on horseback, and by brisk exercise restore the body to its natural state. The choice of these

two methods must always be determined by the peculiar circumstances of the parties concerned, and from the experience which they may before have had, which agrees best with them.

If a person should commit excess in eating, especially of high-seasoned things, with rich sauces, a draught of cold water, acidulated with vitriolic acid, will take off the sense of weight at the stomach, and assist digestion, by moderating and keeping within bounds the alimentary fermentation, and thus preventing the generation of too much flatus. The luxury of ices may be here of real service at the tables of the great, as producing similar effects with the cold water acidulated. Persons in these circumstances ought not to lay themselves down to sleep, but should keep up and exercise until they are sensible that the stomach is unloaded, and that they no longer feel any oppressive weight about the præcordia.

If a man be obliged to fast, he ought, if possible, during that time, to avoid laborious work: after suffering severe hunger, people ought not at once to gorge and fill themselves; nor is it proper, after being over-filled, to enjoin an absolute fast: neither is it safe to rest totally immediately after excessive labour, nor suddenly fall hard to work after having been long without motion: in a word, *all changes should be made by gentle degrees*; for, though the constitution of the human body be such that it can bear many alterations and irregularities without much danger, yet, when the transitions are extremely sudden, they cannot fail of producing some kind or degree of disorder.

It is also the advice of Celsus to vary the scenes of life, and not confine ourselves to any settled rules: but as inaction renders the body weak and listless, and exercise gives vigour and strength, people should never long omit riding, walking, or going abroad in a carriage; fencing, playing at tennis, dancing, or other similar engagements, which afford both exercise and amusement, as each shall be found most agreeable or convenient, are to be used in their turns, according to the circumstances and tendency to any particular species of disease. But, when the weakness of old age shall have rendered the body incapable of all these, then dry frictions with the flesh-brush will be extremely requisite to preserve health, by accelerating the flow of humours through the smallest orders of vessels, and preventing the fluids from stagnating too long in the cellular interstices of the fleshy parts.

Sleep is the great restorer of strength; for, during this time, the nutritious particles appear to be chiefly applied to repair the waste, and replace those that have been abraded and washed off by the labour and exercise of the day. But too much indulgence in sleep has many inconveniences, both with respect to body and mind, as it blunts the senses, and encourages the fluids to stagnate in the cellular membrane;

brane; whence corpulency, and its necessary consequences, languor and weakness. The proper time for sleep is the night season, when darkness and silence naturally bring it on: therefore day-sleep, in general, is not so refreshing; and to some people is really distressful, as creating an unusual giddiness and languor, especially in persons addicted to literary pursuits. Custom, however, frequently renders sleep in the day necessary; and in those constitutions where it is found to give real refreshment it ought to be indulged.

With regard to the general regimen of diet, it has always been held as a rule, that the softer and milder kinds of aliment are most proper for children and younger subjects; that grown persons should eat what is more substantial; and old people lessen their quantity of solid food, and increase that of their drink.

OF FIXED AIR as a MEDICINE.

THE antiseptic qualities of fixed air, or as it is now more generally called of the aerial or carbonic acid gas, have introduced it as a medicine in cases of putrid disorders, and various other complaints.—Dr. Percival observes, that, though fatal if inspired in a very large quantity, it may in smaller quantities be breathed without danger or uneasiness. And it is a confirmation of this conclusion, that at Bath, where the waters copiously exhale this mineral spirit, the bathers inspire it with impunity. At Buxton also, where the bath is in a close vault, the effects of such effluvia, if noxious, must certainly be perceived.

Encouraged by these and some other considerations, he administered fixed air in more than 50 cases of the phthisis pulmonalis, by directing his patients to inspire the steams of an effervescing mixture of chalk and vinegar through the spout of a coffee-pot. The hectic fever has in several instances been considerably abated, and the matter expectorated has become less offensive and better digested. He was not, however, so fortunate in any one case, as to effect a cure; although the use of this air was accompanied with proper internal medicines. But Dr. Withering was more successful. One phthisical patient under his care, by such a course, entirely recovered; another was rendered much better; and a third, whose case was truly deplorable, seemed to be kept alive by it more than two months. It may be proper to observe, that fixed air can only be employed with any prospect of success in the latter stages of the phthisis pulmonalis, when a purulent expectoration takes place. After the rupture and discharge of vomica also, such a remedy promises to be a powerful palliative. Antiseptic fumigations and vapours have been long employed, and much extolled, in cases of this kind. The following experiment

ment was made to determine whether their efficacy in any degree depends on the separation of fixed air from their substance.

One end of the bent tube was fixed in a phial full of lime-water; the other end in a bottle of the tincture of myrrh. The junctures were carefully luted; and the phial containing the tincture of myrrh was placed in water heated almost to the boiling point by the lamp of a tea-kettle. A number of air-bubbles were separated, but probably not of the mephitic kind; for no precipitation ensued in the lime-water. This experiment was repeated with the *tinct. toluanae Ph. Ed.* and with *sp. vinos. camph.* and the result was entirely the same. The medicinal action therefore of the vapours raised from such tinctures cannot be ascribed to the extrication of fixed air, of which it is probable bodies are deprived by chemical solution as well as by mixture.

If mephitic air be thus capable of correcting purulent matter in the lungs, we may reasonably infer it will be equally useful when applied externally to foul ulcers; and experience confirms the conclusion. Even the sanies of a cancer, when the carrot-poultice failed, has been sweetened by it, the pain mitigated, and a better digestion produced. But, though the progress of the cancer seems to be checked by the fixed air, it is to be feared a cure will not be effected. A palliative remedy, however, in a disease so desperate and loathsome, may be considered a very valuable acquisition. Perhaps nitrous air might be still more efficacious. This species of factitious air is obtained from all the metals, except zinc, by means of the nitrous acid; as a sweetener and antiseptic, it far surpasses fixed air.

In the ulcerous fore throat, much advantage has been experienced from the vapours of effervescent mixtures drawn into the fauces. But this remedy should not supersede the use of other antiseptic applications.

In malignant fevers, wines abounding with fixed air may be administered to check the septic ferment, and sweeten the putrid colluvies in the primæ viæ. If the laxative quality of such liquors be thought an objection to the use of them, wines of a greater age may be given, impregnated with aerial acid. The patient's common drink might also be medicated in the same way. A putrid diarrhœa frequently occurs in the latter stage of such disorders, and it is a most alarming and dangerous symptom. If the discharge be stopped by astringents, a putrid fomes is retained in the body, which aggravates the delirium, and increases the fever. On the contrary, if it be suffered to take its course, the strength of the patient must soon be exhausted, and death unavoidably ensue. The injection of mephitic air into the intestines, under these circumstances, bids fair to be highly serviceable. And in some cases of this kind, the gas emitted from a mixture of chalk and oil of vitriol, conveyed into the body by the machine employed for tobacco-clysters, quickly restrained the diarrhœa,

diarrhœa, corrected the heat and fœtor of the stools, and in a short time removed every symptom of danger.

As a solvent of the calculus, its virtues have been already mentioned; but the experiments made on that subject do not determine the matter with sufficient accuracy.

OF MEDICAL ELECTRICITY.

THE application of this subtile fluid to medicinal purposes was thought of soon after the discovery of the electric shock; and, after various turns of reputation, its medical virtues seem now to be pretty well established. Mr. Cavallo, who has published the latest and the best treatise on Medical Electricity, entirely disapproves of giving violent shocks, and finds it most efficacious to expose the patient to the *electrical aura*, a gentle air, discharged from an iron or wooden point; or, if shocks are given, they should be very slight, and not exceed twelve or fourteen at a time. In this way he recommends it as effectual in a great number of disorders. The patient may be electrified from three to ten minutes: but, if sparks are drawn, they should not exceed the number of shocks above mentioned.

Rheumatic disorders, even of long standing, are relieved, and sometimes quite cured, by only drawing the electric fluid with a wooden point from the part, or by drawing sparks through flannel. The operation should be continued for about four or five minutes, repeating it once or twice every day.

The gout, extraordinary as it may appear, has certainly been cured by means of electricity, in various instances. The pain has been generally mitigated, and sometimes the disease has been removed so well as not to return again. In those cases, the electric fluid has been thrown by means of a wooden point; although sometimes, when the pain was too great, a metal point only has been used.

Deafness, except when it is occasioned by obliteration or other improper configuration of the parts, is either entirely or partly cured by drawing the sparks from the ear with the glass-tube director, or by drawing the fluid with a wooden point. Sometimes it is not improper to send exceedingly-small shocks (for instance, of one thirtieth of an inch) from one ear to the other.—It has been constantly observed, that, whenever the ear is electrified, the discharge of the wax is considerably promoted.

The tooth-ach, occasioned by cold, rheumatism, or inflammation, is generally relieved by drawing the electric fluid with a point, immediately from the part, and also externally from the face. But, when the body of the tooth is affected, electrification is of no use; for it seldom or never relieves the disorder, and sometimes increases the pain to a prodigious degree.

Inflammations of every fort are generally relieved by a very gentle electrization. In inflammations of the eyes, the throwing of the electric fluid by means of a wooden point is often attended with great benefit; the pain being quickly abated, and the inflammation being generally diffipated in a few days. In these cafes, the eye of the patient must be kept open; and care should be taken not to bring the wooden point very near it, for fear of causing any spark. Sometimes it is sufficient to throw the fluid with a metal point; for in these cafes, too great irritation should be always avoided. It is not necessary to continue this operation for three or four minutes without intermission; but, after throwing the fluid for about half a minute, a short time may be allowed to the patient to rest and to wipe his tears, which generally flow very copiously: then the operation may be continued again for another half minute, and so on for four or five times every day. The gutta serena has been sometimes cured by electrization; but at the same time it must be confessed, it has proved ineffectual in many such cafes, in which it was administered for a long time and with all possible attention. However, it has never been known that any body was made worse by it. The best method of administering electricity in such cafes, is first to draw the electric fluid with a wooden point for a short time, and then to send about half a dozen shocks of one twentieth of an inch, from the back and lower part of the head to the forehead, very little above the eye. A remarkable disease of the eye was some time ago perfectly cured by electrization; it was an opacity of the vitreous humour. All the cafes of fistula lacrymalis, which Mr. Cavallo had known to have been electrified by persons of ability for a sufficient time, had been entirely cured. The method generally practised has been that of drawing the fluid with a wooden point, and to take very small sparks from the part. The operation may be continued for about three or four minutes every day. It is remarkable, that in those cafes, after curing the fistula lacrymalis, no other disease was occasioned by it, as blindness, inflammation, &c. by suppressing that discharge.

Palfies are seldom perfectly cured by means of electricity, especially when they are of long standing; but they are generally relieved to a certain degree. The method of electrifying in those cafes is to draw the fluid with the wooden point, and to bring sparks through flannel, or through the usual coverings of the part if they are not too thick. The operation may be continued for about five minutes per day.

Ulcers, or open fores of every kind, even of a long standing, are generally disposed to heal by electrization. The general effects are a diminution of the inflammation, and at first a promotion of the discharge of properly-formed matter, which discharge gradually lessens, according as the limits of the sore contract, till it be quite cured. In these cafes the gentlest electrization must be used, in order to avoid too great an irritation, which is generally hurtful. To draw or throw the fluid with
a wooden

a wooden or even with a metal point, for three or four minutes per-day, is fully sufficient.

Cutaneous eruptions have been successfully treated with electrization: but in these cases it must be observed, that, if the wooden point be kept too near the skin, so as to cause any considerable irritation, the eruption will be caused to spread more; but, if the point be kept at about six inches distance, or farther if the electrical machine be very powerful, the eruptions will be gradually diminished, till they are quite cured. In this kind of disease, the immediate and general effect of the wooden point is to occasion a warmth about the electrified part, which is always a sign that the electrization is rightly administered.

The application of electricity has perfectly cured various cases of St. Vitus's dance, or of that disease which is commonly called so; for it is the opinion of some very learned physicians, that the real disease called St. Vitus's dance, which formerly was more frequent than it is at present, is different from that which now goes under that name. In this disease, shocks of about one-tenth of an inch may be sent through the body in various directions, and also sparks may be taken. But, if this treatment prove very disagreeable to the patient, then the shocks must be lessened, and even omitted; instead of which, some other more gentle applications must be substituted.

Scrophulous tumours, when they are just beginning, are generally cured by drawing the electric fluid with a wooden or metal point from the part. This is one of those kinds of diseases in which the action of electricity requires particularly the aid of other medicines in order to effect a cure more easily; the scrophulous affections commonly accompany a great laxity of the habit, and a general cachexy, which must be obviated by proper remedies.

In cancers, the pains only are commonly alleviated by drawing the electric fluid with a wooden or metal point. Mr. Cavallo, however, mentions one case in which a most confirmed cancer of very long standing, on the breast of a woman, had been much reduced in size. It is remarkable, that this patient was so far relieved by drawing the fluid with a metal point from the part, that the excruciating pains she had suffered for many years did almost entirely disappear; but, when the electric fluid was drawn by means of a wooden point, the pains rather increased.

Abscesses, when they are in their beginning, and in general whenever there is any tendency to form matter, are dispersed by electrization. Lately, in a case in which matter was formed upon the hip, called the lumbar abscess, the disease was perfectly cured by means of electricity. The sciatica has also been often cured by it. In all such cases, the electric fluid must be sent through the part by means of two directors applied to opposite parts, and in immediate contact either with the skin, or with the coverings when these are very thin. It is very remarkable, that the mere
passage

passage of electric fluid in this manner is generally felt by the patients afflicted with those disorders nearly as much as a small shock is felt by a person in good health. Sometimes a few shocks have been also given, but it seems more proper to omit them; because it has been found, that, instead of dispersing, they rather accelerate the formation of matter.

In cases of pulmonary inflammations, when they are in the beginning, electrization has been sometimes beneficial; but in confirmed diseases of the lungs it does not seem to have ever afforded any unquestionable benefit; however it seems that in such cases the power of electricity has been but seldom tried.

Nervous head-achs, even of a long standing, are generally cured by electrization. For this disease, the electric fluid must be thrown with a wooden and sometimes even with a metal point, all round the head successively. Sometimes exceedingly small shocks have been administered; but these can seldom be used, because the nerves of persons subject to this disease are so very irritable, that the shocks the sparks, and sometimes even the throwing the electric fluid with a wooden point kept very near the head, will bring on convulsions.

The application of electricity has often been found beneficial in the dropsy when just beginning, or rather in the tendency to a dropsy; but it has never been of any use in advanced dropsies. In such cases, the electric fluid is sent through the part, in various directions, by means of two directors; and sparks are also drawn across the flannel or the clothes; keeping the metal rod in contact with them, and shifting it continually from place to place. This operation should be continued at least ten minutes, and should be repeated once or twice a day.—Perhaps in those cases, a simple electrization, (viz. to insulate the patient, and to connect him with the prime conductor whilst the machine is in action,) continued for a considerable time, as an hour or two, would be more beneficial.

Swellings in general, which do not contain any matter, are frequently cured by drawing the electric fluid with a wooden point. The operation should be continued for three or four minutes every day.—It is very remarkable, that, in some cases of white swellings quite cured by means of electricity, the bones and cartilages became disfigured.

Agues have not unfrequently been cured by electricity, so that sometimes one electrization or two have been sufficient. The most effectual and sure method has been that of drawing sparks through flannel, or the clothes, for about ten minutes or a quarter of an hour. The patients may be electrified either at the time of the fit, or a short time before it is expected.

The suppression of the menses, which is a disease of the female sex that often occasions the most disagreeable and alarming symptoms, is often successfully and speedily

dily cured by means of electricity, even when the disease is of long standing, and after the most powerful medicines have proved ineffectual. The cases of this sort in which electrization has proved useless are so few, and the successful ones so numerous, that the application of electricity for this disease may be justly considered as an efficacious and certain remedy. Great attention and knowledge is required, in order to distinguish the arrest of the menses from a state of pregnancy. In the former, the application of electricity, as we observed above, is very beneficial; whereas, in the latter, it may be attended with very disagreeable effects; it is therefore a matter of great importance to ascertain the real cause of the disease, before the electricity be applied in those cases. Pregnant women may be electrified for other diseases, but always using very gentle means, and directing the electric fluid through other parts of the body distant from those subservient to generation. In the real suppression of the menses, small shocks, i. e. about one twentieth of an inch, may be sent through the pelvis; sparks may be taken through the clothes from the parts adjacent to the seat of the disease; and also the electric fluid may be transmitted by applying the metallic or wooden extremities of two directors to the hips, in contact with the clothes; part of which may be removed in case they are too thick. These various applications of electricity should be regulated according to the constitution of the patient. The number of shocks may be about twelve or fourteen. The other applications may be continued for two or three minutes; repeating the operation every day. But either strong shocks, or a stronger application of electricity than the patient can conveniently bear, should be avoided; for by those means sometimes more than a sufficient discharge is occasioned, which is not easily cured. In cases of uterine hæmorrhage, it is not known that the application of electricity was ever beneficial. Perhaps a very gentle electrization, so as to keep the patient insulated and connected with the prime conductor whilst the electrical machine is in action, might be of some benefit.

In respect to unnatural discharges and fluxes in general, it may be observed, that some discharges are quite unnatural or adventitious, as the fistula lacrymalis, and some species of the venereal disease; but others are only increased natural discharges, such as the menses, perspiration, &c. Now the power of electricity in general has been found more beneficial for the first than for the second sort of discharges, which are mostly increased by it.

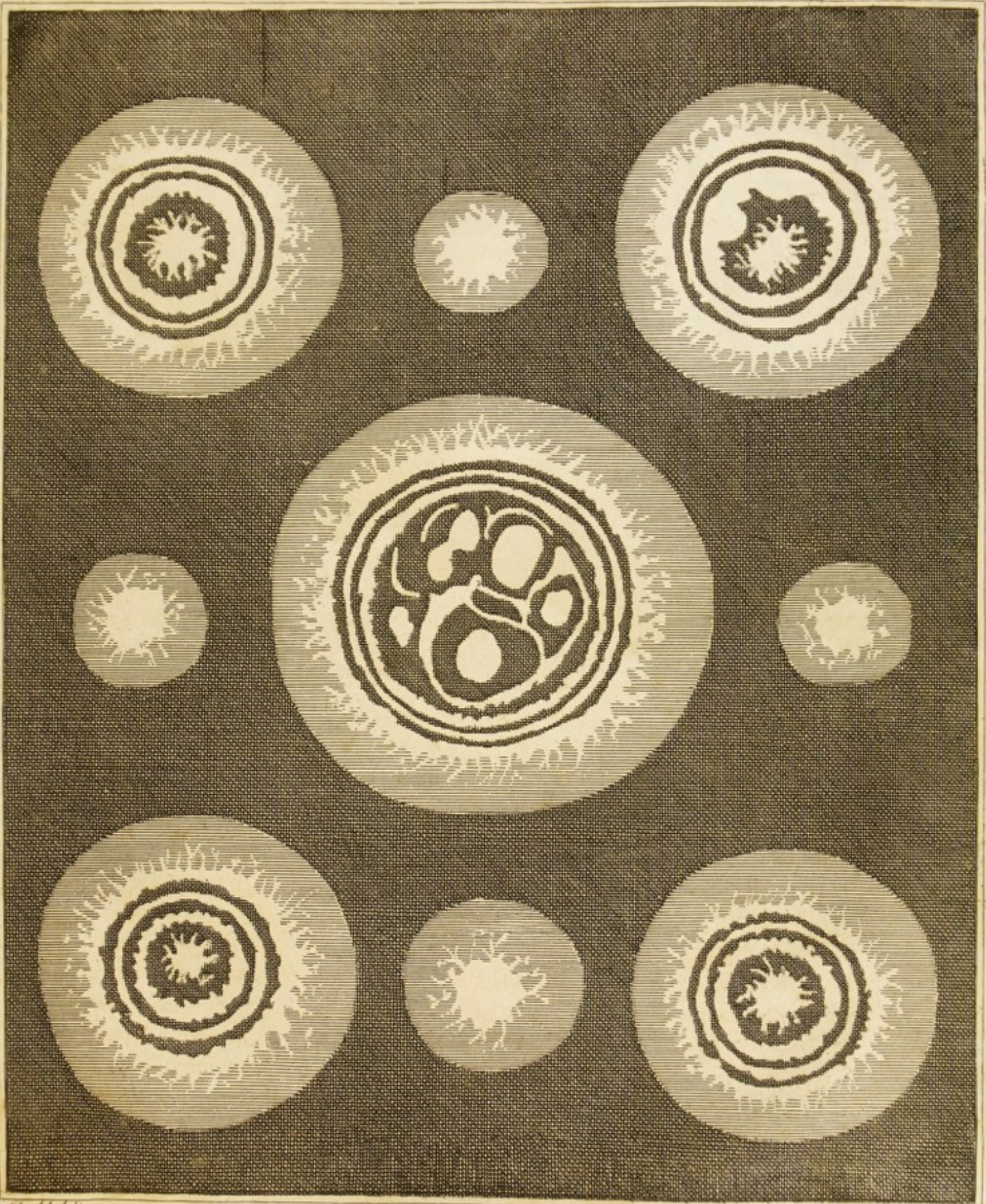
In the venereal disease, electrization has been generally forbidden; having commonly increased the pains, and other symptoms, rather than diminished them. Indeed, considering that any sort of stimulus has been found hurtful to persons afflicted with that disorder, it is no wonder that electricity has produced some bad effects, especially in the manner it was administered some time ago, viz. by giving strong

shocks. However, it has been lately observed, that a very gentle application of electricity, as drawing the fluid by means of a wooden or metal point, is peculiarly beneficial in various cases of this kind, even when the disease has been of long standing. Having remarked above, that tumours, when just beginning, are dispersed, and that unnatural discharges are gradually suppressed, by a judicious electrization, it is superfluous to describe particularly those states of the venereal disease in which electricity may be applied; it is only necessary to remind the operator to avoid any considerable stimulus in cases of this sort.

The application of electricity has been found also beneficial in other diseases besides those mentioned above; but, as the facts are not sufficiently numerous to afford the deduction of any general rules, we have not thought proper to take any particular notice of them.

We may lastly observe, that, in many cases, the help of other remedies to be prescribed by the medical practitioner will be required to assist the action of electricity, which by itself would perhaps be useless; and, on the other hand, electrization may be often applied to assist the action of other remedies, as of sudorifics, strengthening medicines, &c.

Mr. Lichtenberg with a large electrophorus made some very curious experiments; in which, the knob of an electrified phial being drawn over the surface of the electric plate, finely-powdered rosin, afterwards sifted upon the place, assumed the figure of stars and other beautiful ramifications, indicating not only an inclination to arrange itself in the same regular order with the crystals of salts, but to run out into branches like those of vegetables. These experiments have been repeated to great advantage by the Rev. Mr. Bennet, according to whose method the figures represented in the annexed Plate were made. The apparatus used for making them consisted only of a common Leyden phial, and a plate of glass 15 inches square covered on one side with a varnish of gum-lac dissolved in spirit of wine, and several times laid over. Two ounces of shell-lac powdered and mixed with six ounces of spirit of wine answers very well for this purpose. The glass must be warm, and the varnish spread upon it with a camel's-hair pencil. Care must be taken, however, not to lay it on too thick, otherwise the effect will not follow.—The other side is covered with tin-foil laid on with common paste. When it is to be used, the glass plate is put upon a metallic stand with the tin-foil side laid undermost; the phial is to be charged, and the knob drawn over the varnished side. Thus any kind of figure may be drawn, or letters made, as represented in the plate; and from every figure beautiful ramifications will proceed, longer or shorter according to the strength of the charge. On some occasions, however, the charge may be too strong, particularly where we wish to



Dodd delin.

Electrical Stars.

W. J. Sculp.

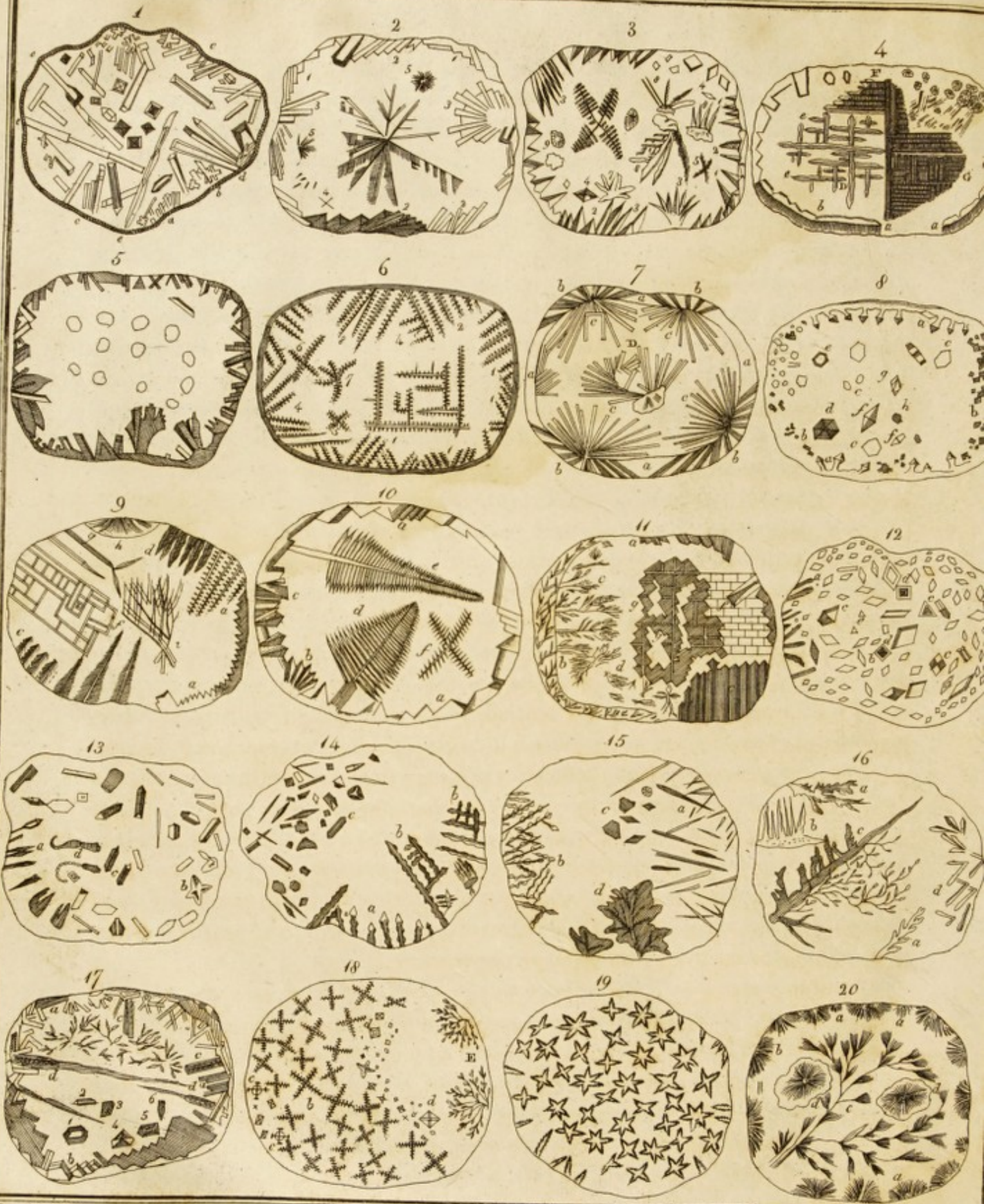


to represent letters, so that the whole will be blended into one confused mass. The round figures are formed by placing metallic rings or plates upon the electrical plate, and then giving them a spark from the electrified bottle, or sending a shock through them. The figures may be rendered permanent by blowing off the loose chalk, and clapping a piece of black sized paper upon them; or, if they are wanted of another colour, that may easily be obtained by means of lake, vermilion, rose-pink, or any of the ordinary colours ground very fine.

Electricity seems also to be the cause of crystallization; which probably is only an incipient or imperfect vegetation. Different salts assume different figures in crystallization, and are thus most easily distinguished from one another. Each salt is capable of assuming a very different appearance of the crystalline kind, when only a single drop of the saline solution is made use of, and the crystallization viewed through a microscope. For our knowledge of this species of crystallization we are indebted to Mr. Henry Baker, who was presented with a gold medal for the discovery, in the year 1744. These microscopical crystals he distinguishes from the large ones by the name of *configurations*; but this term seems inaccurate, and the distinction may well enough be preserved by calling the large ones the common, and the small ones the microscopical, crystals of the salt. His method of making these observations he gives in the following words:

“ I dissolve the subject to be examined in no larger a quantity of rain or river water than I am certain it is sufficient to saturate. If it is a body easily dissolvable, I make use of cold water; otherwise I make the water warm, hot, or even boiling, according as I find it necessary. After it is perfectly dissolved, I let it rest for some hours, till, if overcharged, the redundant saline particles may be precipitated and settle to the bottom, or shoot into crystals; by which means I am most likely to have a solution of the same strength at one time as at another; that is, a solution fully charged with as much as it can hold up, and no more; and by these precautions the configurations appear alike, how often soever tried: whereas, if the water be less saturated, the proportions at different times will be subject to more uncertainty; and, if examined before such separation and precipitation of the redundant salts, little more will be seen than a confused mass of crystals. The solution being thus prepared, I take up a drop of it with a goose-quill cut in fashion of a scoop, and place it on a flat slip of glass of about three quarters of an inch in width, and between three and four inches long, spreading it on the glass with the quill, in either a round or an oval figure, till it appears a quarter of an inch, or more, in diameter, and so shallow as to rise very little above the surface of the glass. When it is so disposed, I hold it as level as I can over the clear part of a fire that is not too fierce, or over the flame of a candle, at a distance proportionable to the heat it requires (which experience only

only can direct), and watch it very carefully till I discover the saline particles beginning to gather and look white, or of some other colour, at the extremities of the edges. Then (having adjusted the microscope before-hand for its reception, armed with the fourth glass, which is the fittest for most of those experiments) I place it under my eye, and bring it exactly to the focus of the magnifier; and, after running over the whole drop, I fix my attention on that side where I observe any increase or pushing-forwards of crystalline matter from the circumference towards the centre. This motion is extremely slow at the beginning, unless the drop has been overheated, but quickens as the water evaporates; and in many kinds, towards the conclusion, produces configurations with a swiftness inconceivable, composed of an infinity of parts, which are adjusted to each other with an elegance, regularity, and order, beyond what the exactest pencil in the world, guided by the ruler and compasses, can ever equal, or most luxuriant imagination fancy. When this action once begins, the eye cannot be taken off, even for a moment, without losing something worth observation: for the figures alter every instant till the whole process is over; and, in many sorts, after all seems at an end, new forms arise, differing entirely from any that appeared before, and which probably are owing to some small quantity of salt of another kind, which the other separates from, and leaves to act after itself has done: and, in some subjects, three or four different sorts are observable, few or none of them being simple and homogeneous. When the configurations are fully formed, and all the water evaporated, most kinds of them are soon destroyed again by the moisture or action of the air upon them; their points and angles lose their sharpness, become uneven and defaced, and moulder, as it were, away. But some few are permanent, and, being inclosed between glasses, may be preserved many months, or even years, entertaining objects for the microscope. It happens oftentimes that a drop of saline solution can hardly be spread on the slip of glass, by reason of the glass's smoothness, but breaks into little globules, as it would do if the surface were greasy: this was very troublesome, till I found a way of preventing it, by rubbing the broken drop with my finger over the glass, so as to leave the surface smeared with it; on which smeared place, when dry, another drop of the solution may be spread very easily in what form one pleases. It likewise sometimes happens, that, when a heated drop is placed properly enough for examination, the observer finds he can distinguish nothing: which is owing to saline steams that, rising from the drop, cover and obscure the object-glass, and therefore must immediately be wiped away with a soft cloth or leather. In all examinations by the microscope of saline solutions, even though made in the day-time, I always employ the light of a candle, and advise every observer to do so likewise; for the configurations, being exceedingly transparent, are rendered much more distinguishable



Dodd del.

Crystals formed from Salts.

Cupps. sculp.

ble by the brown light a candle affords than by the more white and transparent day-light; and besides, either by moving the candle or turning microscope, such light may be varied or directed just as the object requires."

In this manner were produced the beautiful crystallizations represented in the annexed Plate. They are vastly different from such crystals of the same salts as are obtained by the common processes; but Mr. Baker assures us they are no less constant and invariable than they, and that he has repeated the experiments a great number of times with the same success.

Fig. 1. shows the microscopical crystals of nitre or saltpetre. These shoot from the edges, with very little heat, into flattish figures of various lengths, exceedingly transparent, and with straight and parallel sides. They are shown in their different degrees of progression at the letters *a, b, c, d, e*; where *a* represents how they first begin. After numbers of these are formed, they will often dissolve under the eye, and disappear entirely; but, if you wait a little, new shoots will push out, and the process go on afresh. These first figures sometimes enlarge only with altering their shapes, and sometimes form in such sort as the drop represents; but, if the heat has been too great, they shoot hastily into ramifications very numerous and beautiful, but very difficult to be drawn; and which Mr. Baker therefore did not attempt. There seems all the while a violent agitation in the fluid; and most commonly, towards the conclusion, a few octahedra (composed of eight triangular planes, or two quadrangular pyramids, joined base to base) make their appearance.

2. Blue vitriol, the sulphat of copper of the new chemistry, produces crystals round the edges, very short at the beginning, but increasing gradually, as represented at the figures 1, 2, 3, which denote their difference of form, and the progress of their growth. These crystalline shoots are solid, regular, transparent, and reflect the light very beautifully from their polished sides and angles. As the watery part evaporates, numbers of long slender bodies like hairs are seen here and there, some lying side by side, or crossing each other as at 4; others forming star-like figures with many radiations (5, 5). This salt shoots but slowly, and therefore requires patience. At last, the true crystals begin to appear commonly in the middle of the drop, and very prettily branched.

3. Distilled verdigrease, or green oxyd of copper, dissolved as above directed, and immediately applied to the microscope, shows abundance of the regular figures, 1, 2, 3, 4, 5, 6, 7. If the solution is suffered to stand for a few hours, and a drop of it is then heated over the fire on a slip of a glass, till it begins to concrete about the sides, and then examined, sharp pointed solid figures, bisected by a line cut through the middle, from which they are cut away towards the edges, begin to appear, and shooting forwards (1, 1, 1). These figures are often striated very

prettily from the middle line to the edges obliquely (2, 2); and frequently they arise in clusters, and shooting from a centre (3, 3). These figures are a long time in growing; and, whilst they are doing so, regular crystals appear forming in several parts of the drop, of the most lively emerald-colour, and reflecting the light from their sides and angles, which are most exactly disposed, and finely polished. No crystals are formed in the middle till the water is nearly evaporated; and then they begin to form hastily, for which reason they must be carefully attended. Their common figure resembles two long *f f* crossing each other in an angle of about 60°, and shooting branches every way; each of which again protrudes other branches from one, and sometimes from both, its sides; making together an appearance like four leaves of fern conjoined by their stalks (5, 5). Separate clusters of the same sharp-pointed figures as those at the edges of the drop are also formed in the middle of it. Sometimes also they put on another form, like the leaves of dandelion (7). Very beautiful figures are likewise produced by a kind of combination of sharp-points and branches (8, 8). All the crystals are of a most beautiful green colour, but deeper or lighter according to the time of their production. The deepest are constantly produced first, and the paler ones afterwards. Towards the end of the process some circular figures are formed, extremely thin, and so slightly tinged, with green lines radiating from a centre, as to be almost colourless (9). When all seems in a manner over, bundles of hair-like bodies appear frequently scattered here and there throughout the drop, like those of blue vitriol already described.

4. Alum. The microscopical crystals of this salt prove more or less perfect according to the strength of the solution and the degree of heat employed in making the experiment. The solution of alum, however saturated with the salt, will not be found over-strong after standing some days: for in that time many crystals will have formed in it. This separation will often leave the remainder too weak for the purpose; but, by holding the vial over or near the fire, the crystals will again dissolve. After it has stood about half an hour, it may then be used. The drop put on the glass, and properly heated, exhibits commonly at first a dark cloud which appears in motion somewhere near the edge, and runs pretty swiftly both to the right and left until it is either stopped by the intervention of regular crystals, or else it proceeds both ways at once, till, having surrounded the whole drop, the two ends rush together, and join into one (*a, a*). This cloudy part, which seems to be violently agitated while it is running round, appears on a strict examination to consist of salts, shot into long and very slender lines, much finer than the smallest hair, crossing each other at right angles. As they go along, rows of solid crystals are produced from their internal edges. These are composed of many oblique plain sides (*b, b*), and which have all a tendency towards the figures of the regular crystals to be described

scribed presently. But it frequently happens, that, in some parts of the drop, many minute and circular figures are seen rising at some little distances from the edge, which, enlarging themselves continually, appear at last of a star-like form. The crystals in the middle seldom appear till the fluid seems almost wholly evaporated; when, on a sudden, many straight lines appear pushing forwards, whose sides or edges are jagged, and from which other similar straight and jagged lines shoot out at right angles with the first. These again have other small ones of the same kind shooting out likewise from themselves; and compose all together a most beautiful and elegant configuration (D). Each of these lines, increasing in breadth towards its end, appears as if it were somewhat club-headed (*e, e, e*). Sometimes, instead of sending branches from their sides, many of these lines rise parallel to each other, resembling a kind of palisado, and having numberless minute transverse lines running between them (F). But the most wonderful part of all, though not producible without an exact degree of heat and right management, is the dark ground-work (G). It consists of an infinity of parallel lines having others crossing them at right angles, and producing a variety scarcely conceivable from lines disposed in no other manner; the direction of the line, (which are exquisitely straight and delicate) being so frequently and differently changed, that one would think it the result of long study and contrivance. During the time this ground-work is framing, certain lucid points present themselves to view, most commonly on one side. These grow continually larger, with radiations from a centre, and become star-like figures as before mentioned. Some of them send out long tails, which give them the appearance of comets: and, at the end of all, a dark lineation in various directions darts frequently through, and occupies all or most of the spaces between them, making thereby no ill representation, when viewed by candle-light, of a dark sky illuminated with stars and comets. The regular crystals are often formed in the same drop with the others.

5. Borax. If a drop of solution of borax is held too long over the fire, it hardens on the slip of glass in such a manner that no crystals can appear. The best method is to give it a brisk heat for about a second, and then, applying it to the microscope, the crystals will quickly form themselves as represented in the figure.

6. Sal ammoniac, or muriat of ammoniac, begins with shooting from the edges great numbers of sharp, but at the same time thick and broad, spiculæ; from whose sides are protruded, as they rise, many others of the same shape, but very short, parallel to each other, but perpendicular to their main stem (1). These spiculæ arrange themselves in all directions, but for the most part obliquely to the plane from whence they rise, and many are frequently seen parallel to one another (1, 1). As they continue to push forwards, which they do without increasing much in breadth, some shoot

from them the small spiculæ only (2); others divide in a singular manner by the splitting of the stem; others branch into smaller ramifications (4). Before the middle of the drop begins to shoot, several exceedingly-minute bodies may be discernable at the bottom of the fluid. These in a little while rise to the top, and soon distinguish their shape as at (5). Their growth is very quick, and for some time pretty equal; but at last some branch gets the better of the rest, and forms the figure (6). The other branches enlarge but little after this, all the attraction seeming to be lodged in that one that first began to lengthen; and from this more branches being protruded, and they again protruding others, the whole appears as at (8). It is not uncommon to see in the middle of the drop some crystals, where, instead of the straight stems above described, there is formed a kind of zig-zag, with spiculæ like those in the other figures (7).

7. Salt of lead, or saccharum saturni. A little of this salt dissolved in hot water, which it immediately renders milky, after standing a quarter of an hour to subside, is in a fit condition for an examination by the microscope. A drop of it then applied on a slip of glass, and held over the fire to put the particles in action, will be seen forming round the edge a pretty even and regular border of a clear and transparent film or gluy substance (aaaa); which, if too sudden and violent a heat be given, runs over the whole area of the drop, and hardens so on the glass as not to be got off without great difficulty. But, if a moderate warmth be made use of, which likewise must not be too long continued, this border proceeds only a little way into the drop, with a kind of radiated figure composed of fine lines, or rather bundles of lines, beginning from the centres to the interior edge of the border, and spreading out at nearly equal distances from each other every way, towards the exterior (bbbb). From the same centres are produced afterwards a radiation inwards, composed of parallelograms of different lengths and breadths; from one and sometimes both the angles of these, are frequently seen shootings so exceedingly slender, that they are perhaps the best possible representations of a mathematical line. The extremities of the parallelograms are generally cast off at right angles, but they are sometimes also seen oblique (cccc). Centres with the like radii issuing from them, and some of the glutinous matter for their root, are sometimes formed in the drop, entirely detached from the edges; and in these it is very frequent to find a kind of secondary radii proceeding from some of the primary ones; and others from them to a great number of gradations, forming thereby a very pretty figure (D).

8. Salt of tin produces at the edges of the drop a number of octahedra, partly transparent, standing on long necks, at small distances from each other, with angular shoots between them (aa). At the same time solid and regular opaque cubes will be seen forming themselves in other parts of the drop (bb). In the middle of the

same

same drop, and in several other parts of it, very different figures will also be formed; particularly great numbers of flat, thin, transparent, hexangular, bodies (*ccc*): some among which are thicker (*e*); and a few appear more solid, and with six sloping sides arising to a point, as if cut and polished (*d*). The figure (*f*) is composed of two high pyramids united at their base. Some in this kind of form are found truncated at one of their ends, and others at both. Several of the hexagonal bodies may be observed with sloping sides, forming a smooth triangular rising plane, whose angles point to three intermediate sides of the hexagon (*g*).

9. Epfom salt (sulphat of magnesia) begins to shoot from the edge in jagged figures (*a*). From other parts differently-figured crystals extend themselves towards the middle, some of which have fine lines proceeding from both sides of a main stem, in an oblique direction; those on one side shooting upwards in an angle of about 60° , and those on the other downwards in the same obliquity (*f*). Others produce jags from either side nearly perpendicular to the main stem, thereby forming figures that resemble some species of the polypody (*c*); but in others the jags are shorter (*d*). Now and then one of the main stems continues shooting to a considerable length, without any branchings from the sides: but at last sends out two branches from its extremity (*g*). Sometimes a figure is produced having many fine and minute lines radiating from a centre (*h*). The last shootings in the middle of the drop (*h*) are not unlike the frame-work for the flooring or roofing of a house, but with the angles oblique: and sometimes a form of another kind presents itself (*i*).

10. Scarborough salt begins to shoot from the edges: first of all in portions of quadrilateral figures, much resembling those of common salt; but two of their angles, instead of 90° , are about 100° . They shoot in great numbers round the borders of the drop, having their sides as nearly parallel to one another as the figure of the drop will allow: some proceed but a little way, others farther, before they renew the shoot (*aa*). In some places they appear more pointed and longer (*b*); and sometimes, instead of the diagonal, one of the sides is seen towards the edge, and the other shooting into the middle (*c*). The middle crystals (*def*) seem to be of the vitriolic kind.

11. Glauber's salt, or sulphat of soda, produces ramifications from the side of the drop, like the growth of minute plants, but extremely transparent and elegant (*c*). Some of them, however, begin to shoot from a centre at some distance from the edge, and protrude branches from that centre in a contrary direction (*b*). Sometimes they shoot from one and sometimes from more sides of the central point in different varieties (*d*). Other figures are produced from different parts of the edge of the drop (*a, f, e*); but the most remarkable and beautiful crystallization forms last of all near the middle of the drop. It is composed of a number of lines proceeding from

one another at right angles, with transparent spaces and divisions running between them, appearing altogether like streets, alleys, and squares (*g g*). When this crystallization begins, it forms with great rapidity, affording the observer a very agreeable entertainment: but its beauty is of very short duration; in a few moments it dissolves and vanishes like melted ice, which renders drawing it very difficult.

12. Salt of Jesuits bark. The few shootings which this salt produces at the edge of the drop are of no regular figure (*a*). The whole area becomes quickly filled with great numbers of rhombi, of different sizes, extremely thin and transparent (*b*). Some of these enlarge greatly, and acquire a considerable thickness, forming themselves into solids of many sides (*c c*). Near the conclusion some crystals of sea-salt are formed (*d d*), and likewise a few odd triangular figures (*e*).

13. Salt of liquorice begins shooting from the edge with a sort of rhombic spiculæ (*a*). Some four-branched figures like those of vitriol commonly appear, but moulder away before their ramifications are completed, leaving only their stamina behind (*b b*). The middle of the drop is usually overspread with great numbers of parallelograms, some exceedingly transparent, being mere planes; having sometimes one, sometimes more, of the angles canted in such a manner as to produce pentagonal, hexagonal, and other, figures. Others have much thickness, and form parallelepipeds or prisms (*c*). Some of the plane figures now and then protrude an irregular kind of shooting which appears very pretty (*d*).

14. Salt of wormwood, or carbonat of potash. The first shootings of this salt from the edges of the drop appear of a considerable thickness in proportion to their length: their sides are deeply and sharply jagged or indented, being made up of many somewhat-obtuse angles, and their ends point with angles of the same kind (*a*). But other shoots frequently branch out from these original ones, and they again send forth others, making all together a very pretty appearance (*b b*). The crystals of this salt are very different from each other, consisting of squares, rhombi, parallelograms, &c. (*c*).

15. Salt of tobacco. If a moderate degree of heat be given to a solution of this salt, its first shootings will be from the edges of the drop, in slender tapering figures, ending with very sharp points, but at considerable distances from one another. Along with these are formed other crystals, nearly of the same kind, but entirely detached, and farther within the drop, having the thicker ends towards the centre of the drop, and the sharp points turned towards its edge (*a*). When a little more heat has been given, other spiculæ are produced from the edge, whose ends spread on either side, and then terminate in a point, and which have all along their sides triangular pointed crystals, placed alternately, so as to represent a zig-zag with a line drawn through its middle (*b*). The regular crystals are produced in the middle of the drop, and are either hexagons or rhombi (*c*). When the moisture is nearly ex-

led, there are sometimes seen to shoot from, or rather under, the spiculæ, upon the plane of the glass, a representation of leaves, very small at their first appearance, but gradually increasing (*d*). A violent agitation may be discovered in the fluid by the first magnifier during the whole process, but especially at the beginning, and extremely minute crystals arising from the bottom.

16. Salt of hartshorn. On the application of a very small degree of heat, salt of hartshorn shoots near the edges of the drop into solid figures somewhat resembling razors or lancets, where the blade turns into the handle by a clasp (*d*). The crystals of this salt are produced with great velocity, and are somewhat opaque, shooting from the edges of the drop, on both sides of a main stem, and with a kind of regularity, rugged branches like those of some sorts of coral (*aa*). But sometimes, instead of these branches, sharp spiculæ, some plain, and others jagged, are protruded to a considerable depth on one side only (*b*). As the fluid exhales, some one of the branching figures generally extends to a great length, producing on one side shoots that are rugged and irregular, and on the other curious regular branches resembling those of some plant (*c*).

17. Salt of urine shoots from the edges of the drop in long parallelograms like nitre (*aa*). But in other places, along the sides of the drop solid angles are formed, that seem to be the rudiments of common salt (*b*). Some of the parallelograms increase much in size, and spread themselves in the middle, so as to change their first figure, and become three or four times bigger than the rest; and these have a dividing line that runs through their whole length from end to end, whence issue other short lines at small distances, opposite to one another, all pointing with the same degree of obliquity towards the base (*cc*). Among these enlarged figures some few shoot still forward and tapering towards a point, but, before they form one, swell again, and begin as it were anew; and thus they proceed several times before their figure is quite finished (*aa*). The figures 1, 2, 3, 4, 5, 6, are the regular crystals of this salt when it is allowed to dissolve in the air, and no heat at all is given.

18. Rheum, or the clear liquor which distils from the nostrils when people catch cold, is strongly saturated with salt. A drop of it on a slip of glass will soon crystallize in a beautiful manner, either with or without heat; but if heated to about the warmth of the blood, and then viewed through the microscope, many lucid points will be seen rising and increasing gradually, till their form is shown to be quadrangular, with two transparent diagonals crossing each other (*dd*). These diagonals shoot soon after far beyond the square, protruding other lines at right angles from their sides; and thus they go on to form the most elegant and beautiful crystals (*bb*, *cc*). When a drop of rheum is set to crystallize without any heat, instead of branched crystals over the whole area, such are formed only in the middle; but,

about

about the edges, plant-like figures are produced, shooting several stems from one point, and resembling a kind of moss (E).

19. Camphor, though insoluble in water, dissolves very readily in spirit of wine. A drop of this solution spread upon a slip of glass crystallizes instantly in the beautiful manner represented in the figure.

20. Manna easily dissolves in water, and a drop of the solution is a very pretty object. Its first shootings are radiations from points at the very edge of the drop: the radiating lines seem opaque, but are very slender (*aaa*). Amongst these arise many minute transparent columns, whose ends grow wider gradually as they extend in length, and terminate at last with some degree of obliquity (*b*). Some few figures, radiating from a centre every way, and circumscribed by an outline, are produced within the drop (*dd*). But the most surprising and elegant configuration is composed of many clusters of radiations shooting one from another over great part of the drop, and making all together a figure not unlike a beautiful sea-plant.

OF ANIMAL MAGNETISM

ANIMAL MAGNETISM is a sympathy which exists between the magnet and the insensible perspiration of the human body, whereby an æther, or universal effluvia, is made to pass and repass through the pores of the cuticle, in the same manner as the electrical fluid passes through bodies; and by which many cures are performed.

The system originated, in 1774, from a German philosopher named Father Hehl, who greatly recommended the use of the magnet in medicine. M. Mesmer, a physician of the same country, by adopting the principles of Hehl, became the direct founder of the system. He had already distinguished himself by a Dissertation on the Influence of the Stars upon the human Body, which he publicly defended in a thesis before the university of Vienna. He afterwards made a tour through Germany, publishing every-where the great cures he performed by means of animal magnetism; and arrived at Paris in the beginning of the year 1778. Here he was first patronised by the author of the *Dictionnaire des Merveilles de la Nature*; in which work a great number of his cures were published, Mesmer himself receiving likewise an ample testimony of his candour and solid reasoning. Our physician soon collected some patients; and in the month of April 1778 retired to Creteil, from whence he in a short time returned with them perfectly cured. His success was now great; and patients increased so rapidly, that the doctor was soon obliged to take pupils to assist him in his operations. These pupils succeeded equally well as Mesmer himself; and so great was their emolument, that one of them, named Deslon, realized upwards of 100,000*l.* sterling. In 1779 Mesmer published a memoir

memoir on the subject of Animal Magnetism, promising afterwards a complete work upon the same, which should make as great a revolution in philosophy as it had already done in medicine.

The new system gained ground daily; and soon became so fashionable, that the jealousy of the faculty was thoroughly awakened, and an application concerning it was made to the French government. In consequence of this, a committee was appointed to inquire into the matter, consisting partly of physicians and partly of members of the Royal Academy of Sciences at Paris, with Dr. Franklin at their head. Mesmer himself refused to have any communication with the committee: but his most celebrated pupil Deslon was less scrupulous, and explained the principles of his art in the following manner.

1. Animal magnetism is an universal fluid, constituting an absolute plenum in nature, and the medium of all mutual influence between the celestial bodies, and between the earth and animal bodies.
2. It is the most subtile fluid in nature; capable of a flux and reflux, and of receiving, propagating, and continuing, all kinds of motion.
3. The animal body is subjected to the influences of this fluid by means of the nerves, which are immediately affected by it.
4. The human body has poles and other properties analogous to the magnet.
5. The action and virtue of animal magnetism may be communicated from one body to another, whether animate or inanimate.
6. It operates at a great distance, without the intervention of any body.
7. It is increased and reflected by mirrors; communicated, and propagated, and increased, by sound; and may be accumulated, concentrated, and transported.
8. Notwithstanding the universality of this fluid, all animal bodies are not equally affected by it; on the other hand, there are some, though but few in number, the presence of which destroys all the effects of animal magnetism.
9. By means of this fluid, nervous disorders are cured immediately, and others mediately; and its virtues, in short, extend to the universal preservation of mankind.

From this theory, M. Deslon engaged, 1. To prove to the commissioners, that such a thing as animal magnetism existed; 2. To prove the utility of it in the cure of diseases; and to communicate to them all that he knew upon the subject. The commissioners accordingly attended in the room where the patients underwent the magnetical operations. The apparatus consisted of a circular platform made of oak, and raised about a foot and a half from the ground. At the top of it were a number of holes, in which were iron rods with moveable joints for the purpose of applying them to any part of the body. The patients were placed in a circle round it, each touching an iron rod, which he could apply to any part of the body at pleasure; they were joined to one another by a cord passing round their bodies, the design being to increase the effect by communication. In one corner of the room was a piano-

forte, on which some airs are played, occasionally accompanied with a song. Each of the patients held in his hand an iron rod ten or twelve feet long; the intention of which was to concentrate the magnetism in its point, and thus to render its effects more sensible. Sound is another conductor of this magnetism; and, in order to communicate the magnetism to the piano-forte, nothing more is necessary than to bring the iron rod near it. Some magnetism is also furnished by the person who plays it; and this magnetism is transmitted to the patients by the sounds. The internal part of the platform was so contrived as to concentrate the magnetism, and was the reservoir whence the virtue diffused itself among the patients.

Besides the different ways of receiving the magnetism already mentioned, viz. by the iron, cord, and piano-forte, the patients also had it directly from the doctor's finger, and a rod which he held in his hand, and which he carried about the face, head, or such parts of the patient as were diseased; observing always the direction of the poles. His principal application of magnetism, however, was by pressure of the hands or fingers on the hypochondria, or lower region of the stomach.

The effects of these operations upon Deslon's patients were very amazing. Some spit, coughed, and sweat, and felt extraordinary heats in different parts of the body. Many had convulsions, which is what is called their crisis, &c.—The commissioners after this determined to try the experiments themselves; for the fluid was totally imperceptible by any of the senses, and they could only ascertain its existence by its ultimately curing diseases, or by its observable effects upon the human body.

The practice having been since pursued in England with great success by the ingenious Dr. Bell, I shall give the process and effects of this discovery in his own words.

“There is an universal fluid which fills all space. Every body is endowed with a certain quantity of electric fluid. There exists an attraction and repulsion, or sympathy and antipathy, between animated bodies. The universal currents of the universal fluid, are the cause and existence of bodies. One may accelerate those currents in a body, and produce crisis and somnambulism, which is done by acting reciprocally upon one another, by increasing the currents going across their interstices or pores, in consequence of the absolute will of the operator. As there exists a general and reciprocal gravitation of all celestial bodies towards each other, so there exists a particular and reciprocal gravitation of the constitutive parts of the earth towards the whole, and of that whole towards each of its parts.

“The reciprocal action of all these bodies is operated upon by the insensible perspiration, or vapour, flowing in and out, as you see in a real loadstone or in an artificial magnet, forming an outside atmosphere; it also produces currents in a more or less direct manner, according to the analogy of bodies. That which

can act most effectually on a sickly man, is one who is in a good state of health, and is of a similar constitution—the power of man in a good state of health will be then more powerful in consequence of the latter's weakness, who receives more than he gives; it will increase the circulation, and produce beneficial effects.

“The respective position of two beings acting on one another is not indifferent. To judge what that position should be, we ought to consider each being as a whole compounded of different parts, of which each possesses a form, or particular tonical movement. It is of course by that means easily understood, that two beings have over each other the greatest influence possible, when they are so placed that their analogous parts act on one another in the most harmonical manner. It is necessary that the person who submits to be treated is willing, as well as that the operator's mind must be absolute, and think of nothing but of the different sensations he then feels. *Credite & volete.* (This is the secret.)

“Therefore, in order that two persons may act on each other in the strongest manner possible, they must be placed opposite each other; from North to South is the best; you turn your patient's face towards the South; you may treat in other directions, according to your ideas and circumstances. In that opposite position your atmospheres are joining; and you may be considered as forming but one whole, acting in an harmonic manner. When a man suffers, all the action of life is directed towards him in order to destroy the cause of suffering; likewise, when two persons are acting on each other, the whole action of that union acts on the disordered parts with a force proportioned to the increase of the mass. It may therefore be in general asserted, that the action of animal electricity and Magnetism, &c. increases in proportion to the masses.

“It is possible to direct the action of Animal Electricity and Magnetism more particularly on any individual part, by fixing your idea and directing the fluid upon the part affected. Our arms may be considered as conductors to the animal fluid, and serve to attract or repel according to our will, and establish a kind of continuity between bodies. It follows, from what has been said on the most advantageous position of two beings acting on each other in order to maintain the harmony of the whole, one ought to touch the right part with the left arm, and the right foot in contact with the left. In that position you are in affinity with your patient, your two atmospheres are joined; it shows the opposition of poles in the human body, and is nearly the same as those which may be observed in the loadstone, or artificial magnet.

“Paracelsus, as well as many other anatomists, have admitted poles in man. Mr. George Adams, in his Treatise on Magnetism, justly says, ‘In some future period it may be discovered that most bodies are possessed of a polarity, as well as one direction :

direction relative to the various affinity of the elements of which they are compounded. The better to conceive the poles of the human body, we ought to consider man divided into two parts, by a line drawn from the top to the pubis; all the joints of the left part may be considered as poles opposite to those corresponding herewith; the fluid passes out more sensibly, and in a greater abundance, from the extremities, as those extremities are considered as poles opposite to the right, and are the best conductors of the animal fluid.

“ You may give polarity to animate and inanimate bodies; that is to say, to increase an action to a degree which they had not before, only by a friction very nearly resembling that which you give to a piece of steel before it becomes a magnet, except that it will not be so palpable. You may also change the poles in the human body pretty nearly the same as you change those of a magnet. You may also strengthen or increase the action of Animal Electricity and Magnetism by animate and inanimate bodies, as you may increase the action of an artificial magnet by adding more magnets, provided the poles are contrary: therefore every thing is filled in the universe by means of an universal fluid in which all bodies are immersed, and therefore all beings touch one another in consequence of the continual circulation by which the currents of the magnetic fluid flow out and pass in; and in consequence of this you may affect a person at a distance, provided he is of a weak habit of body, and has been in a crisis before you put the column of air into vibration which exists between the person you treat and yourself; that will affect him, as is seen or felt by the force of sounds at a concert.

“ In order to be in affinity or harmony with your patient, you must touch him by the hand; as there is a circulation which forms itself between you and him, and tends to an equilibrium, it is generally by that means easier to take your patients out of their crisis. You next hold up both your hands parallel to the head, and bring them gently down as far as the pubis; you may follow the direction of the nerves; then fix your hands upon the diaphragm or stomach, where lies the greatest abundance of nerves; you may put your thumbs upon the plexus, and put the nerves in motion; you may also fix one hand upon the stomach, and draw the other towards you; by that mean you attract or repel at pleasure.—There are various ways of manipulation, which the operator makes use of, according to circumstances. If you wish to procure sleep soon, change your position; get either to the right side of your patient or left; in that position you fix one of your hands before the head, and the other behind; keep them there with all your might, till you feel some heat in the palm of the hand. If the person is not inclined to sleep, you must charge the head in different directions, by shutting your hands as if you were boxing—then you open them quick, and this you repeat often; the person feels then a drowsiness.—You must



Ed. del.

ANIMAL MAGNETISM—The Operator putting his Patient into a crisis.



must keep your hands in opposition as before; by these means the animal fluid gets into the absorbent vessels—acts also upon the nerves, which stimulates the body and produces a crisis. If you see the patient too much agitated, get opposite to him, and bring both your hands downwards from head to foot, or as if you were to fan a person, and, getting backwards, it will compose him.—Then you seek for the cause and place of the illness; or you hold the person's hand, and you ask him where he feels pain, as it is increased by treating: if he does not answer your questions properly, it is a sign he is not in a perfect state of somnambulism; you must keep him asleep longer without speaking to him.—You then seek for the seat of the disease, by extending your hand at a little distance from his body, beginning from head to foot; if your sensations are good, you may feel, with a little attention, within yourself, pains in the same part as where the person is affected—or you may feel at the end of your fingers a heat, if it is an inflammation or obstruction; if you feel a coldness, it is in the lymphatic vessels; if bilious, you feel a numbness; and many other ways which different constitutions feel;—either of these circumstances will inform you where the disease lies.—But by touching, which is the surest way, you soon become certain of the seat and cause of the disease, which sometimes lies in the opposite side to the pain, particularly in nervous affections, &c. You may touch, if you like, the cause of the disease, or charge it as you do the head; by that means you keep up the symptomatical pain, till you have rendered it critical—you second the effort of nature against the cause of the disease, and act like a stimulus, which will produce a salutary crisis, by putting the whole frame in action, which will remove any disease proceeding from obstructions, &c. after the patient finds himself composed, and the cause of the disorder diminished. When the patient is asleep, you ask him if it is time to take him out of it; if he answers Yes, draw your hands towards his head down to the feet, and rub your eyes with your thumbs several times, and wave your hand as if you were to fan a person who is too hot—you get by degrees backwards till he is recovered.

“The cause of most part of diseases is an irritability or fever, debility or obstruction; by the slowness or abolition of motion, it is an obstruction or debility, and by its acceleration produces an irritability, inflammation, and fever.

“The seat of those diseases is generally in the viscera, as the intestines, the spleen, the liver, the epiploon, the mesentery, the loins, &c. in women, the stomach, the womb, &c. These aberrations or obstructions are an impediment in the circulation of one part, which presses on the blood or lymphatic vessels, and on the nerves, which produce those spasms, on account that the fluid circulates slowly. For that reason, those persons are the soonest affected, and put into a crisis, when they are labouring under those maladies; if those vessels press upon the root of a nerve, the

motion and fenfibility of the correfponding parts are quite fuppreffed, as in an apoplexy, palfy, &c. There is not a better conductor for the animal fluid than the nerves, as they are fpread all over the body; they abound more particularly in the diaphragm, ftomachical and umbilical plexus, where lies the root of the nerves, which extend their branches (as a tree does its branches and roots in the earth) all over the body.

“ Many philofophers have thought it is in them that the foul lies: it is through them that the fomnambules fee in the dark when their eyes are fhut.—When you treat a perfon, you muft follow as much as poffible the direktion of the nerves; you may treat at a fmall diftance, and fix your hand upon the part affected, and by motion you put the column of air (which exifts between you and your patient) into vibration, which will caufe an irritation and produce a crifis.

“ Many profefors make ufe of conductors, either glafs, fteel, filver, or gold; about eight inches long; they have a good effect in fome cafes: all this proceeds from the idea of the operator. Mr. Mefmer tells us, ‘ When you make ufe of conductors, you muft magnetife from right to right:’ that is, the poles are changed.—I have repeatedly produced the fame effect by treating from left to left, except when I have put a perfon into a fleep without a conductor; if while afleep I magnetifed them from right to right, fome have gone into a crifis, others have awaked. If you touch the forehead with your right hand, you muft put your left in oppofition behind; and in the fame manner to any other part of the body, becaufe there is a re-acton of fluid from one pole to the other, like a magnet; for Dr. Mefmer represents the human body as a magnet. If you eftablifh the North to the right, the left becomes the South, and the middle like the equator, which is without predominant acton. I repeat it; it is moft advantageous to be oppofite the perfon you want to treat, in order to cure him effectually. Curing confifts in re-eftablifhing the difturbed harmony—the general remedy is the application of animal fluid, which ferves to re-eftablifh the equilibrium which is loft in fome part of the body. As there is but one difeafe, there is but one remedy; if motion is diminished, it ought to be increafed: if there is too great irritability, it ought to be decreafed; as it is on folid bodies that this fluid operates, particularly on our viscera, in order to rectify them, as they are deftined by Nature to prepare, to difsolve, and affimilate our humours, they fhould be brought to their equilibrium by any means whatever, by employing either internal or external remedies; but we ought to be very cautious how we adminifter them, except fuch as the patients will order for themfelves or prefcribe for others, which are generally very fimple. There are few remedies taken internally which are good, becaufe, when received into the ftomach and the firft paffages, they experience the fame elaboration as our aliments, the parts
of

of which analogous to our humours are assimilated there by chyfication, and the heterogeneous particles are expelled by the means of excretions. Those remedies which may be given will often prove to have effects contrary to the intentions of the prescriber, because most of them are very aqueous, stimulate too much, and will increase irritation, spasms, &c. and produce effects discordant to the harmony of the parts, which ought to be established and restored to their proper equilibrium. If treating is not sufficient to produce vomiting in the case of a person who has too much putridity, or abundance of bile which has been too long standing, then a gentle emetic is to be given, or magnesia if there is too much acid; if alkali is predominant, order a solution of tartar, or of any other acid which you think will agree with your patient. In case of a violent cholic or costiveness, or sore throat, injections are the best. These are the general remedies which ought to be administered to the patients, as I am sure that all those preparations of minerals, &c. which we see in an apothecary's shop, were never intended by Nature for the human body. Modern physicians have, from an interested view, neglected the knowledge of the vegetable kingdom, more adapted by Providence for the human body. The diet of the patient is whatever Nature points out to him: it is she who dictates what every man ought to follow, because she seldom deceives us in our manner of living. It is not what we eat, nor the quantity, which does good—It is what we digest. Animals by instinct will never touch any thing but what Nature has dictated to them. In this their instinct is far superior to our reason. Spirituous liquors are forbidden, strong green tea without milk, coffee, hot aliments, and the use of snuff, because it irritates the pituitary membranes in the throat, the stomach, and the head, and will produce crispation and irritation. The usual drink may be water with a bit of toast in it; wine and water, or good rich wine, old small beer, good porter, lemonade, or different syrups, all these may be ordered according to the case of the patient. The food may be good broth, either of beef, mutton, or veal, chicken boiled, and roasted meat. Avoid salt or fat meat; make use of fallads, good ripe fruits, &c. Gentle exercise in the open air, either riding or walking. Cold or warm baths are most excellent; the drinking of some mineral waters is good:—in fact, a good observer (though not a physician) may cure more people than a man of the faculty—because a doctor never goes without an apothecary—they all go together hand in hand, and do more harm than good.

“If you have but one patient, and cannot move him out of bed, gather round him as many healthy persons as you can; make them rub their hands well—then make them hold one another, and communicate to the patient: this is what I call forming a chain,—by that you communicate to him the animal fluid, which will vivify him if he is not too much debilitated. You may set him upon an insulated stool,

as when you electrify a person; you may set him upon a chair, and make a healthy person sit upon the same chair back to back. You may magnetise a tree in a garden; you may have one in your room, or a small reservoir.—There are various ways, which depend upon the idea of the magnetiser.

“There are several ways of treating and curing; in which, however, much attention and prudence are required. But a prudent man, willing to do good to his fellow-creatures who labour under any infirmities, will never treat his patient in public, and make them walk in their sleep, or do many other things: it is very well to convince incredulous people of the effects, but cannot do good to the patient. I will say also, that a person cannot treat more than two or three patients in a day to do them justice, and those who do treat more seldom cure by magnetising alone; the patients may fancy they have been cured;—but, if they had not been so treated, they might also have been well; as their treatments are long, Nature operates, and is a better doctor. There are some who will firmly assure you they have cured people at the distance of two or three hundred miles off, without ever having seen the patients, and have put them into crises.—I will answer them, they are either fools or madmen; their imagination being heated with this idea, they are like visionaries. I knew an ingenious physician who saw every body with the yellow jaundice, and another who thought that every body had a virus in their blood, and all the patients who applied to him he treated as having a *gallicus morbus*; and another who pretended to cure every body only by looking at them: all these are some degrees of insanity. I knew several persons who supposed I had been treating them after I had left their houses; they fall asleep some twenty miles off, and they have related this as a fact to several of their friends, while I never thought of them; and nevertheless, suppose I had been treating them, and they might by chance fall asleep, I could not with propriety relate the story as a fact, because it must be repeated often to hold good. I never rest my judgment upon a single experiment; in experimental philosophy facts are stubborn, and no one can contradict them when repeated. Now I shall explain the manner of treating and curing effectually, on reasonable principles, each complaint particularly.

“Suppose your patient has a head-ach. You seat him in a chair, the back towards the North, or otherwise; you sit opposite to him; you put yourself in affinity with him, as I have observed before; you draw the general current, following the direction of the nerves; you hold your hands the same as if you were to hold a pen; you seek for the cause of the pain, which may lie in different parts—perhaps the patient will tell you, if you cannot find it out. If it is a hemisphera, which is owing to the foulness of the stomach, you fix your eyes upon your left hand, which you direct towards the stomach with your right hand—you do the same

as if you were to turn a pancake; this you repeat several times; by that means you stir the atmosphere and relax the stomach, and may make him vomit; you may give a little warm water to promote your operation; you may also treat the head by drawing the fluid downwards, if the pain has been of long standing; you may order a vomit or a gentle purge, and treat them every day, and then order bitters to strengthen the stomach. There are different head-achs: as the *cephalalgia*, when the head is affected slightly in one particular part; *cephalæa* is when the whole head is affected; one side only is called *hemicrania*, and a small spot affected is called *clavis hysterica*. These various head-achs arise from different causes: if it proceeds from obstructions, crises are very salutary, as they put the whole body into motion, and will remove the cause. Treating the part which you think affected is very necessary; you do the same with one hand or both, by drawing your hands towards you several times as before. To treat the head, you may apply your hands upon the temples, and put your thumb upon the frontal sinus, which will often remove it.

“**DEAFNESS.**—If the want of hearing proceeds from a fault in the structure of the ear, there is no cure. If it proceeds from cold, fever, hard wax, or dryness, you may magnetise according to my principles. You keep yourself within a yard or two, according as you feel a re-action: you then fix your left hand towards the ear, and you move your right open, and bring it towards the left hand, and do the same as if you were to clap your hands; by that means you put the air into vibration, and, guided by your left hand as a conductor, you apply the palm of the hand upon the ears; you may put your thumb in the ear, and with your finger, as you hold a pinch of snuff, press the thumb towards the ear—you accelerate the fluid into it. You may make use of a conductor, either glass or artificial magnet, and put it into the ear, and press with two fingers from the basis towards the ear; you may magnetise the head, by drawing the fluid towards you: all these means you are to make use of according to your sensations and judgment; sometimes an injection made of Castile soap—warm brandy and water will assist you in your operation.

“**Of the TOOTH-ACH**—This violent, though not dangerous, disease, proceeds from rheumatism, obstructed perspiration, inflammation, &c. This being the case, you treat according to my rules. If there is inflammation, you draw the fluid from the head; you touch the temples, the frontal sinus, the top of the head, the articulation of the jaws, and under the chin; you may touch the tooth with your index and thumb; but a sure way is to get an artificial magnet, and, as your patient's face is towards the South, apply the South pole upon the tooth, and touch the next teeth, and afterwards draw the fluid downwards, and you will perform a cure.

“ **DISEASES** of the **EYES**.—There is nothing so difficult to cure as these diseases; and none of our organs is more subject to be affected than the sight, or from so many causes. When they proceed from obstructions in the customary evacuations, you must magnetise according to my rules. You treat the cause, also the eyes, by fixing your thumbs opposite; you press with the index the fluid into the eyes, you move your thumb opposite you; and may rub the eyes gently; you drop magnetised water into them with a quill: this you do three or four times a-day, and you order a little lemonade or syrup to your patient.

“ The gutta serena, ophthalmia, cataract, specks on the eyes, and fistula lacrymalis, are very difficult and almost incurable. I have heard many magnetisers boasting of the cures they had made of these diseases. I have had more practice in that way than many of them; I confess candidly I have made but few. I shall explain the best manner of treating.—You must know first the cause, which you treat; afterwards you apply your thumbs gently on the eyes; you rub them often—you fix your thumb with the next finger at a distance from the eye; but I have had success in some cases of this kind by making use of an artificial magnet, by fixing it at the distance of half an inch from them; it has by that means removed spots and gutta serena, proceeding from the compression of the nerves by superfluous humours. I have dropped magnetised water three or four times a-day with success; a proper regimen is necessary, and some internal and external application.

“ Of the **EPILEPSY** and **HYSTERIC AFFECTIONS**.—These diseases are the opprobrium of the faculty, with many others, as they cannot be cured by internal medicines, except when proceeding from obstructions, worms, or affection of the mind, &c. In those cases you treat according to the rules. First, touch the head on the top; by applying your thumb on the root of the nose, you endeavour to dissolve the obstruction which may be the cause; apply your hand upon the diaphragm, and endeavour to put the nerves in motion. You may treat at a distance also; but try to produce a crisis.—Dr. Andry, and Tourit, at Paris, have cured several epileptics by applying artificial magnets round the head, or like a horse-shoe applied upon the top of the head; when they are in a fit, apply a magnet in each hand, it will soon recover them. I have brought some to, by applying a key in their hands; they are very good in spasms, fainting, and cramps—by applying the magnet under the foot, it ceases instantly.

“ Of the **SCROPHULA**, called the **KING'S EVIL**.—This disease is a disgrace to physic. Some persons have had the gift of curing by touching. I have seen in London two persons who had been touched by a man after he was hanged; they were relieved; but I really believe it was the force of imagination; being frightened by the dead man made such a revolution in the blood, that it removed the obstruction

tion in the glands. You may touch your patient in those parts, and draw the effluvia in order to soften the glands. If there is an ulcer, order the person to bathe the part with magnetised water, and keep a bit of rag always upon the part. Seabathing, decoction of celery, and hemlock-juice, may be tried, besides treating.

“**SORE THROAT.**—Sore throat, or any inflammation in the head, is to be treated by drawing the fluid out of the part, either by putting yourself in opposition, or by standing on one side, and putting one hand behind the neck and the other before.

“**Of the PALSY.**—The palsy, when it happens to an old person, or has been of long standing, is seldom cured; but if it happens to a middling age, and one side only is struck, called an *hemiplegia*, a cure will be effected by being treated soon after. You may magnetise your patient opposite, as usual. After you turn the side affected towards the North, you treat the opposite side, which is supposed to be where lies the cause: you may touch with one hand along the back-bone, or within an inch from it, along the great intercostal, by applying your right hand upon the stomach; you treat him about two hours; if you can put him into a crisis, which is very easy, you may expect to cure him. You make him lift up his bad arm, or have somebody to support it; you put a conductor to his hand to attract the universal fluid; you may insulate him, and turn the part affected towards the North; tie a silk string to the ceiling, at the end of it have strong compounded magnet, the North pole parallel to the hand; to the other hand tie likewise another string, at the end of which there is a large piece of iron whose surface is larger than the magnet. Have an electrical machine, and connect the chain to the patient, then make him stretch his arm; then touch the magnet and the piece of iron together, or one after another, to the extremities of the hands, it will cure him; I have cured several that way: but this does not belong to Animal Magnetism, say many. But has not a magnetiser a right to cure his patients as soon as possible, and employ every means his mind suggests to him? It is not so among the faculty; they must cure or kill them *secundem artem*, according to art. A general vomit or purge is often necessary; the diet must be good. If the tongue is affected, put a conductor upon it, or an artificial magnet, such as you make use of for the teeth, by pressing the fluid from the basis towards the point on the tongue: sometimes a little gargarism is useful. Electricity and the cold bath are very good.

“**RHEUMATISM.**—Nothing is more common in this country than this disease, on account of the dampness and change of the weather, which will absorb the electric and magnetic fluid from flying off certain parts, particularly from the feet, whence there flies out a greater abundance of fluid than from any other part of the body. It is for that reason dogs will follow our tracks. There are very obstinate rheumatisms which proceed from different causes, and are difficult to cure. The method

of curing this disease is to magnetise the patient in opposition; try to promote perspiration, by putting him into a crisis. If the rheumatism is in a particular part of the body, you must treat the part affected either by touching or rubbing, which is the best. You may make use of an artificial magnet in the form of a horse-shoe. If the rheumatism is in the head, you apply it upon the top of it; if it is on the face and teeth, apply it on the temples; if it is in the hip, you apply it above the knee, with the poles up; if in the knees, apply it on the tarsus, with the poles up; if it is on the shoulders, you place it on the humerus, clavicle, &c. Electricity, hot and cold bath, earth-bathing, according to Dr. Graham's principles, &c. &c. Some internal and external applications will assist the operation.

“**CONSUMPTION, or DECAY.**—This disease, so common in England, is difficult to cure; it proceeds from want of the animal fluid in the body, which wastes it to nothing; therefore it is necessary that the person who treats be very strong and healthy. His patient is like a child at the breast, pumping his animal juice; and he may be much hurt by it, like a child who sleeps with an old or unhealthy person; therefore I would advise you to treat as few as possible. Riding a young horse without a saddle, a cow, a bullock, or to be among cattle, is very good; or to sleep in a stable, and communicate a rope from the bed to the cattle, which serves as a conductor to the animal fluid.

“Diseases in the stomach are common in this country among women, owing to that pernicious custom of wearing stays; not only so, but they must have a piece of iron or steel two or three inches broad, and proportionally thick, in it, called a busk, which occasions so many diseases. They should be loose round the body. You treat the stomach by throwing fluid into it. Crises are not good for it.

“Flatulency, or wind in the stomach and bowels, arise from want of tone in those parts. It is to be treated upwards, which will make the patient break wind and produce a crisis, which is the best. After the crisis, you must treat the stomach downwards, in order to settle it; you may order carminatives. Bile on the stomach is treated upwards; also to make the patient vomit, and crises, are good for it; a glass of magnetised water afterwards will settle the stomach. In all sorts of inflammation of the lungs, liver, &c. you treat towards you, and avoid the crisis as well as when those parts are ulcerated. In the stone and gravel you treat; throw a quantity of fluid, and produce crisis; it will promote evacuation, which may do service to the patient. In external swellings, or ulcers, draw towards you, and bathe with magnetised water.

“Pregnant women, and in labour, may be treated without a crisis. I have magnetised women in labour, and put them asleep while the accoucheur was performing his duty; the woman did not recollect it, and was surprised afterwards. I have

put

put a man asleep who had an hydrocele; the surgeon performed the operation, but the patient never recollected any thing of it. Relaxation, and the blood flowing from a cut, may be stopped by fixing your thumb and pressing the fore-finger over the part.

“ Fevers of every kind may be cured by crises; it is during that time that nature endeavours to get rid of what disturbs her, either by perspiration, vomiting, &c. Those people are the best somnambulists, as I shall explain hereafter. It is very easily understood, by the method I have taken to explain the treating of the foregoing disorders, that an ingenious magnetiser may treat all others, as it would require a whole volume to explain them.

“ **OF NERVOUS DISEASES.** It is in those diseases that magnetism acts most forcibly, by putting the whole nervous system in motion; it operates crises as well as somnambulism, and offers to the attentive eye a vast field of observation. There is as great a variety in those diseases as there are combinations between all possible numbers. Different organs may be affected, and distinctly from others. In some persons the extension of sight is so great, that it seems as if they made use of a microscope. Some of them can see, in the dark, the animal fluid flying in all directions, and appearing luminous; others will see the skin appear to them like a sieve, and see the gross humours or perspiration as big as small shot; and by rubbing the hands they see sparks of fire coming out. Mr. Boyle mentions a person who, after getting half-fuddled with claret, (which I suppose relaxed the stomach and his nervous system,) when he waked in the night, could see to read moderate print. Another who could in the night distinguish colours. Grimaldi tells us, that some women can, by their eyes alone, distinguish between eggs laid by black hens and those by white ones. This single effect will lead to many things which I shall relate about somnambules. We must not attribute to whim all the singularities which we observe among people affected in the nerves; it is a real cause, as that which determines the most reasonable man. I knew a gentleman in London, who shook his head and arm every instant like a perpetual motion; a lady, I treated when in his company, had the same involuntary affection. There are different methods of treating those diseases, either by treating without crises, or with them; such people are the best somnambules. If a person is irritable, you treat gently, in opposition, by drawing a certain quantity of fluid from him; if, on the contrary, you throw the fluid towards him, you may put him into a gentle crisis; if the patient has a trembling of the limbs like the head, you treat that part: if you cannot succeed by treating, apply a magnetic bandeau round the head, it will stop it instantly. For trembling of the hands, you apply magnetic bracelets.

“ To magnetise, or treat a person at a distance, is not impossible. The manner which several professors make use of, is different. There are quacks in that art who pretend to have found it out before Dr. Mesmer; but that none of them understood it is well known. The faculty of our soul, thought, or idea, can perceive, contemplate, and unite itself to, any object, present or distant, visible or invisible. That it has action upon matter is well demonstrated; it acts directly upon the vivifying electric and magnetic fluid, and by its will determines it to be directed upon such part. We know that our soul acts upon our body, and forces any part of it to move in any direction, according to its will. This being the case, we may reasonably believe that it may act as well upon merely organical matter as upon animal bodies. The thought, or soul, goes to any distance. No obstacles can resist it. It arrives and unites itself, by a sympathetic power, to any object it wishes, without a master of ceremonies; neither the size of the body, its strength, or figure, impede; all give way; the union is made in an instant; the will, and the will only, is the cause of it, because it directs the fluid towards the diseased and affected viscera, by fixing them in your imagination, as much as it is possible; and by that means it will force the magnetic fluid to touch and to penetrate to a great distance any bodies to which the soul is willing to unite herself, and to re-establish the animal œconomy, of which she is the indestructible principle. These reflections show the possibility, and the mean made use of, to treat a person at a distance; of which experience will show the reality, and an ingenious mind may make many curious experiments: repeated trials will convince us.

“ To treat a person at a distance, from one house to another, is possible, provided you have seen the person before, and put him in a crisis. The manner you do this, is to know where the person is, and fix the hour by your watch, and have some friends with the patient to divert him: you must be alone in a room, to avoid any noise, or any thing to distract the attention of your mind. In that position you paint the person in your imagination; you represent in your idea the part which you suppose affected, and you treat in the same manner as if the person were before you. That sympathy of body and mind which exists between you and him will produce a crisis and somnambulism; that phænomenon is very interesting. You may also from the same principles treat a person in the same room, without his or her knowledge, by fixing your mind and your eyes upon the part affected, or upon the heart, stomach, &c. and produce crises and somnambulism.

“ **DROPSY.** There are different sorts of this disease, according to the parts which are affected. I shall treat of the manner of curing the ascite, which is, when there is a collection of water in the belly, proceeding from obstructions, living too low,
and

and sometimes from drinking spirits or cold water when the body is hot. You treat the patient in opposition; you fix your hands upon the part, either at a distance, or by applying the hands on the belly; you try to produce a crisis, which is the quickest way. You may apply a magnetised bell-glass on the belly when the patient is in bed, the same on the legs if they are swelled, and various accessaries, according to the operator's fancy. Dropsy of the brain, of the breast, and of the legs, are treated by extracting the fluid, and promoting circulation and perspiration.

“Of the **ASTHMA**. This disease of the lungs is very seldom cured when it proceeds from a bad formation of the breast, or is hereditary. If it comes from obstructions, treat the lungs, and put the patient into crises to promote circulation; but if the asthma proceeds from another cause, as violent passions of mind, humoral or nervous, and the patient spits a great deal, treat the stomach upwards to promote expectoration. If the patient coughs much at night, give him a glass of magnetised water going to bed, and another in the morning. Moderate exercise in a gentle air is very useful.

“**APOPLEXY**. This sudden loss of the senses may be cured by applying immediately, and with proper care. The cause is an effusion of the blood, or a collection of watery humours. There are two sorts, a sanguine and a serous apoplexy; it is generally towards the brain that the cause lies, because the blood does not return from the head. That being the case, you magnetise the patient either in bed or up: if he is in bed, you stay at his feet; you magnetise the head downward; you may get at his right side, and magnetise as before; you touch his head, one hand behind and the other before, and bring your hands downwards; you must raise the head of the patient high. If it is a sanguine apoplexy, and you see there is no change, you may order a bleeding, or put the feet in warm flannel. Let the patient have free air. You must treat him four hours a-day.

“**NIGHT-MARE**. This disagreeable disease puts the patient into the greatest torture during his sleep; he feels often a weight upon his stomach, as a fiend, a cat, a dog, &c. He endeavours to cry out, and fancies himself going to be drowned, or to be killed. It proceeds from a weak stomach, nervous affections, &c. I attended a patient who used to be bled every year in May. During March and April he was always so; but, as soon as he was bled, the pain was over. They are a kind of somnambules. You may treat the stomach, by throwing a quantity of fluid, in order to strengthen it; also treat the head downwards. A glass of magnetised water, going to bed, is very good.

“Of **SENSATIONS**, looked upon as a sixth sense. There are as many sensations as there are possible differences between proportions. In all sensations we must consider

consider three things; the cause producing the impression, the nature and disposition of the organs receiving it, and the sensations which have preceded it. It is by the combination of those affinities that the organs of our senses may be magnified or increased to such a degree, as to become, for every object which they present to us, what telescopes and microscopes are to the sight; consequently our sensations are the result of all the effects which objects make on our organs. Our senses can only draw us more or less near to the knowledge of objects and their nature, by a constant use and a serious application, in order to attain to their reality. We have a great number of small organs proper to receive sensations; but the habit we are in of making use of some particular organs only, absorbs the rest. Blind people have different sensations from us; they will perceive a wall, or other body, before they touch it. There is no doubt but we are endowed with an internal sense, which is in affinity with the universe, and is considered as an extension of sight; it is by these means one may comprehend the possibility of finding the disease of another: of foresights, predictions, and the phenomena of somnambules and sybils, &c.

“It is possible to be affected in such a manner, as to have the idea of a body at an immense distance, in the same manner as we see the stars, the impression of which is transmitted to us in a right line, the succession and continuity of a co-existing matter between them and our organs, bounded by the nature of their form: why should it not be possible, by the means of an inward organ, by which we are in contact with the whole universe, for us to be affected by beings, the successive motion of which is propagated to us in curve or oblique lines, in any direction? and why should we not be affected by the connection of beings which succeed one another?”

“I was acquainted with Monsieur de Botinau, who had a place under government in the island of St. Helena. During twenty years he made a particular study of a sense unknown to us: he could perceive a fleet or a single ship two or three hundred miles off; last war he described M. de Suffrein's fleet, the number of ships, and those which had passed by and did not touch at the island. He could do more: at sea he could tell the distance he was off land, as has been proved by repeated experiments in the Channel. In confirmation of this, I have seen the certificates granted him from the governor and principal people of the island, and the petition and recommendation to the minister, who granted him 1800 livres per annum.

“The famous Bleton, called the *fourcier*, or spring-finder, whenever he walked upon ground where there was a vein of water, felt within himself a certain sensation which gave him notice there was water. Another countryman shook wherever there was water; the elementary, electric, or magnetic, fluid, passing through the pores of the earth, gave him that sensation.

“Of **CRISES**. The crises are an effort of nature against the disorder, endeavouring to dissipate the obstacles that are in the circulation, and to restore harmony or equilibrium in all the parts of the body. Few diseases can be cured without a crisis, particularly when it proceeds from obstructions, &c. There are two sorts of crises. The natural one, which is attributed to nature alone, gets rid of what offends her by an increase of movement, producing vomiting, motion, perspiration, &c. These are the most salutary, as nature acts silently, without violence, and expels the obstacles that impede circulation, by moving gently the molecules which form those impediments, and go off by perspiration, &c. The forced one is sometimes salutary in obstructions, or windy and bilious complaints. These are produced when nature is insufficient to expel what offends her. The use of Animal Electricity and Magnetism puts in action the whole body, and, in conjunction with her, acts efficaciously on the patient, and he discovers benefit and ease, particularly if it has produced evacuations, &c. There are various means of producing them, according to the subject, and the cause of his disease. Some say there are six degrees of crises; I say there are as many as there are different constitutions to treat. Some will also call it the luminous crisis, from that new sect called the illuminati. All these are imaginary. Suppose you have a patient on whom you would wish to produce a gentle crisis; you must put yourself first in affinity; then put your hand behind the head, and the other before, till the person is asleep. If the person is agitated, calm him, by drawing the fluid downwards from the head; if you treat the cause by touching, it will increase the pain; if you put your thumb upon the frontal sinus, they will fall into a crisis. You may magnetise your watch, and to show what o'clock it is; they will go in. You may magnetise a flower, and give them a smell: they will fall in. Magnetise a harpichord: as soon as you play on it, they will go in. Put a person between you and the patient, and magnetise him; you will put him in. To magnetise a pond, make the patient stay on the other side of it; you must stand opposite; make the patient hold a stick in his hand to touch the water; you must touch also the water with your magnetised conductor; the person will go into a crisis immediately. Have somebody behind him, to prevent his falling into the water: it is the best conductor of animal fluid. To make a person read, be behind him; you magnetise the lines as he reads: he will go in. To make a person stay behind you opposite the looking-glass, magnetise with a conductor the person in a looking-glass, that you may see him; the re-action of the fluid will produce a crisis. Magnetise a tree in a walk; make the person walk; as soon as he comes near the magnetised tree, he will fall into a crisis. One may put a person in a crisis from one room to another; and, in fact, an ingenious observer may, by what I have related, make a great many curious experiments, provided he has proper subjects.

“Of **SOMNAMBULISM**. Somnambulism is a state between sleeping and waking, partaking of both; the patient is a somnambule when he can do the same as if he were awake. These natural somnambules, who get up at night, and do many wonderful things, are well demonstrated. They are diseased, and may be cured by treating. The magnetic somnambules are those whom art has found out a mean of absorbing or suspending some of their external senses for a while, and the patient eats and drinks, goes up and down, plays upon the harpsichord, and does many things which you desire him, provided he be willing. The first I saw was at the Marquis de Puységur's, in the year 1784; and all those who had pretended to it in this country before were impostors; for all this we are indebted to Dr. Mesmer. Whenever any person has a real somnambule, which is very easy, by care they have a treasure. They are called by us *malades medecins*, or sick physicians. These beings see in the dark, and go through an external atmosphere, the same as a glow-worm; they have besides an internal atmosphere, which they make use of to perceive objects present or distant, visible or invisible. I have had several who related to me what they could perceive. They differ in many respects according to their constitution. One must not depend always upon what they say, on account of their differing sometimes. You may make them move in any direction, by your will alone; or, by moving your conductor any way upon the floor, they will follow its directions. You may make them play on any instrument they can play upon; they will read, write, and work; all this they will do better than if awake. Being deprived of their other faculties, these become stronger. No physician can tell the disease of a person better than a real somnambule. They seldom fail to tell unknown persons their diseases, and prescribe for them. At a future time, when the science is better established, I shall publish a full account of the theory of somnambulism.

“Some will accuse me of having said too much; but those who know me personally will never accuse me of relating any thing which I cannot demonstrate; and those who repeat these marvellous narrations hurt themselves and the science in the eyes of really learned men. Those stories, like tradition, which are handed down from generation to generation, and become improbable, like antiquity, lose their former lustre. I would advise my pupils to try those experiments I have shown them first, and try others afterward.

“To make an **ELECTRIC OR MAGNETICAL APPARATUS**. I shall not give you a full account of the apparatus of our society in Paris. It is almost like a grove. Mine, which I had in London and Dublin, is a large oak tub, eight feet in diameter, well pitched in the inside, about an inch thick, insulated upon four glass-foot bottles of water well corked; you magnetise the bottles, and lay them down, the

neck of one in the bottom of the other all around, so that the last comes to the centre. You may fill up the space with broken bottles, or any vitrifiable matter, brimstone, or resinous matter, minerals, &c. fill it up all but six inches; put some loadstones and artificial magnets in different directions: then cover the whole to the edge with fine dry river-sand, put the lid over; place in the middle a polished iron bar about eight feet high, with sprigs to it, to attract the universal fluid which concentrates itself in the reservoir. At the far corner place an arbor vitæ in a box, and place under it a strong magnet, the north pole upwards; the south pole is fixed in a hole upon the cover, by that means you increase the motion of the tree, and, becoming vegetalised, it will grow without water. You make holes all round, about eighteen inches distant; put iron or brass conductors behind, so as to touch the patient who comes next to it. Connect a chain of an electric machine; insulate your patients, and make them hold hands; it will increase the action in them. You may treat them in that manner; you will the sooner put them into crises. I have had all my patients round my reservoir in a crisis at a time. I could not attend them. You may have a tree in a box, upon insulated feet; have a small box with vitrifiable matter, and fill it with water: you may make use of a large bottle filled with water only, and connect a chain to it. All this apparatus may be made differently, according to the idea. Some take every morning brimstone or lozenges; and have brimstone in their sleeves, and rub themselves with different ingredients; but I never made use of any, and produced a great many effects.

“To magnetise a tree, you must stand facing the north; you must have a conductor which you have magnetised; you must then point it from the top of the highest branches to the roots; do the same from the other branches: if the tree is so large that you cannot see the branches on the other side, change your position from south to north, and do the same; then approach the tree; clap your hands round it, and stay in that position five minutes, your tree becomes magnetised. Any patient who has been in a crisis, or somnambulism, will distinguish it. Some will go in a crisis as soon as they come near it; others, if they are in somnambulism, will discover it among the rest.

“You may magnetise a myrtle, or any other shrub; it will appear luminous in the dark. You may magnetise a flower, by putting your thumbs in the middle, and establish an equator; then drawing your thumbs to the extremities, you press your thumb with the next finger, and you throw the fluid upon the flower; it will appear luminous in the dark; by giving it to a person to smell, who has been in a crisis before, he will go into one again.

“To magnetise a conductor or a cane, put your hands in the middle of it; slide your hands to the extremities, your thumbs at the top, and rub the extremities with them.

them; by these means you will impregnate it with an electrical fluid, that seems luminous in the dark, and as sulphurous as the electric rubbing.

“To magnetise a shilling, or a guinea, put your thumbs in the middle, and draw them to the extremities, it will appear as a ball of fire. A watch is magnetised in the same manner, by drawing your two thumbs at the top, and your index under it; establish an equator, and draw your fingers to the two poles: by showing it to a person who has been already in a crisis, he will fall in one again. They can tell you what o'clock it is in the dark; if asleep they can tell you the same, by showing a watch.

“To magnetise a harpsichord, fix your hands spread in the middle, and draw them towards the extremities; then rub the end you touch the strings with one after another, in the same manner, and thus you will impregnate it with an electric fluid. As soon as a person plays upon the harpsichord, make your patient touch it with his hand or finger; he will fall in a crisis immediately.

“To magnetise a room, or a bed, is the same. Set it to the north, facing the south; point your conductor up to the ceiling; bring it down towards you; point it to the west and east, and bring it also to your feet; the room will appear all luminous, and the bed also.

“A pond may be magnetised in the same manner, by pointing your conductor over the surface of the water, from the cardinal points; touch the water with it, and make your patient do the same; he will have a shock in falling in, and it may be of service to him. From these few experiments it is easy to conceive, that any inanimate body may be electrified or magnetised by another animal body, just as easily as by an electrifying machine, or by the force of magnets.”

ARGUMENTS to PROVE, that ANIMAL MAGNETISM is the CAUSE of SYMPATHY in MAN and other ANIMALS, and in PLANTS, &c.

THAT constant flux and reflux of the vital principles and corporeal humours in man (without which both motion and life are stopped) produce those effects of sympathy and antipathy which become more natural and less miraculous; the atmospheric particle to each individual receives from the general fluid the proper attraction and repulsion. In the divers crossings of those individual atmospheres, some emanations are more attractive between two beings, and others more repulsive; so again, when one body possesses more fluid than another, it will repel; and that body which is less will make an effort to restore itself into equilibrium or sympathy with the other body. Robin Abraham Benhannes says, iron or ferruginous particles are every-where, not only in the mineral world, but in our blood and bones;

now,

now, as the magnet attracts ferruginous particles, every thing of course is subservient to magnetism by the power of attraction or sympathy.

I could relate a variety of examples to prove that sympathetic affection which prevails with people of the same family, views, sect, or any other cause that binds them harmoniously together; but, as it is a subject which every one must have experienced, I shall not touch further on it.

The magnetic fluid often occasions some contractions in other parts of the body, when a muscle has been wounded, which produces different motions in the organs of the same body. Whether they have a secret affinity or not is a question not yet determined; however, I am inclined to think they have. These motions have astonished many physicians who have reflected upon this art, particularly Barthe, who has well explained them by a subtile motion which he calls *vital fluid*, and which he might as well have called animal electricity and magnetism.

OF ANTIPATHY.

WE do not all resemble the Trojan shepherd, who awarded the apple to the fairest; it is not always the handsomest woman that wins our affections; our interior emotions are involuntary seizures independent of the influence of beauty, and are the forerunners of love. So again, when two atmospheres are in equilibrium, that is to say, when those corpuscular emanations are in affinity with each other, it produceth sympathy, or attraction; but, when those atmospheres are crossing each other, it produceth antipathy, or repulsion.

The discordance of tempers, religious disputations, politics, &c. have frequently been the cause of inveterate hatred; how can we otherwise account for that sudden aversion we feel for certain objects or persons, if it be not in the disagreeable impressions communicated to the nerves, and then to the brain, from the emission of those persons or objects? This can be called by no other name than antipathy.

By antipathy many people find out the diseases of others; they feel within themselves, in the opposite side, the same pain the other persons have. If I put a diseased person in contact with another person in somnambulism, they instantly feel the same pain; only, however, during the time they are in contact. It may be called sympathy; but, as they suffer in some proportion during that time, it is properly antipathy. It is well known there are many people who entertain an antipathy to different animals, &c.

EFFECTS of ANTIPATHY and SYMPATHY in BRUTE ANIMALS.

ANIMALS in general, like ourselves, move at the aspect of pleasure, and fly from that of distress; in some respects they are sensible beings that seem to enjoy a

will adequate to determine their different motions, nay, sometimes to be possessed of the sentiments, vices, and passions, of mankind, and experience likewise inclination and hatred, which seldom vary in their objects; whence proceeds that constant love that some animals show for certain species, whilst they bear the strongest antipathy and aversion to others. They are differently affected according to their different species by corpuscular emissions, but are nearly the same when they flow from the same species. Hence the one constantly becomes the object of the other's aversions. Thus one animal only lives to destroy and devour; and in his turn contributes, by his own destruction, to the preservation of a stronger animal. Thus nature is supported by these successive destructions; new combinations arise from the compositions operated in her bosom; like the phoenix, she only dies to revive, and return brighter out of her own ashes. Without thinking (as the ancients did) that a string made out of the bowels of a wolf and another from a sheep cannot agree, or, if two drums made out of their skins, the sound proceeding from that of the wolf-skin would deprive the other of all sound, antipathy between certain species is evidently a means allotted them by instinct to discover their prey or avoid their enemy. Thus the wolf pursues the lamb, the dove dreads the falcon, the wren the eagle, the goldfinch the toad, the hen the fox, the water-fowl the stork, the grasshopper the swallow, the blackbird the hawk, the nightingale the butcher-bird, the frog the eel, the snail the partridge, the oyster the crab, the tench the pike, the fly the spider, and the spider the scorpion. The lion dislikes the cock, the ape the tortoise, the horse the camel, the lizard the serpent, the boar the sea-calf, the martin the vulture, the owl the crow, the tunny the dolphin, the conger the lamprey, with an infinite number of others too tedious to be mentioned. The smell of lobsters drives bees away; the owl destroys the eggs of the crow, the stork those of the bat; the weasel those of the hen; the heron and the lark are continually at war, by destroying each other's young. If the eagle devours the serpent, the latter climbs up the rocks and revenges itself by sucking its enemy's eggs; the toad and the rattlesnake, under the grass, by darting through their pores the magnetic fluid, fascinate their prey; the weasel in vain endeavours to avoid them; she leaps from one place to another, and her strength is at last exhausted to no purpose; obliged to draw near the enemy, she issues a dismal cry, and, being violently attracted towards the reptile's mouth, precipitates herself into it, and there finds her grave. To revenge this victim, the field-spider spins her web suspended over the toad: her influence troubles and at last lulls him to sleep. In like manner the stag's breath attracts the serpent, and occasions in him a giddiness. The viper, with fiery eyes and contracted muscles, darts venomous corpuscles on the branch of the tree where the nightingale finds an asylum; soon after, the wood-singer loses his voice, is thrown into convulsions, falls down,

and is devoured by the viper. It is owing to the effects of emission that the hound finds out the game, and pursues it to its den, where it seeks for a refuge. It is by this same sensation that the partridge stops in the middle of a fallow ground, and forgets she has the power of flying.

Animals are as susceptible of sympathetic as of an antipathetical attachments: according to some naturalists, the fox is fond of the serpent's company, and the duck of that of the toad; the bear avoids treading on the ant, the nightingale loves the peacock, the kite protects the cuckoo, partridges and pheasants doat on the stag, and doves on teal. We are told that a lizard, elephant, and dolphin, are fond of a man; but this is nothing to the attachment of a dog to its master: he follows him to all places; and, should he happen to lose sight of him, he still finds out where he passed only by the emanation he has left in his way, (which escapes more abundantly through the toes, as being more porous;) and, if he meets him, by a thousand transports testifies his joy.

Of ATTRACTION and REPULSION, otherwise called SYMPATHY and ANTIPATHY, in PLANTS.

PLANTS, like men, have their transpiration and emission produced by a pressure of a magnetic fluid which penetrates them; and they carry in all their fibres that vivifying fluid, and have also their particular spheres of attraction and repulsion. Hence that inclination that some vegetables seem to have to come nearer to each other, to grow and die together; hence that hatred that has been observed amongst others, and the efforts seemingly made use of to repel each other.

The vine seems to improve under the elm, the olive-tree with the aloe-tree, the plantain with the fig-tree, the agaric with the cedrus, asparagus with penny-royal, and the cocoa grows powerfully under the shade of ebony; the resinous-tree is favourable to the femla, and the cotyledon and the fir-tree to the different species of aconitum and solanum. By a like sympathy the poppy adorns the harvest, the water-lily likes the ranunculus, and rue likes the water-lily; the lily springs delightfully by the rose, near garlic, where it appears more shining, and smells more perfumed, notwithstanding the smell of the latter is so offensive; the rose is unfavourable to onions, basilicum dries up near rice, and cabbages die away near the cyclamen and origanum; the oak does not like the olive, the vines dislike laurel and hemlock, and hemlock dies away near the vines. The latter brings to our recollection the doctrine of old Robin Abraham Benhannes, who in the 14th century attributed the colour of wine and its fermentation to the ferruginous particles of the grape, and to their union by magnetism. The effluvia from the hands or any part of man's body is the cause why flowers or herbs droop when touched; the sensitive plant

plant is a striking instance of the force of this observation. The muscicapa, or catch-fly, mimosa, and oxalis, the flower martima, annona, dandelion, pimpnel, flower of cistus, helianthimum, epine venette, and castus opuntia, acquire a very remarkable motion by irritability.

We could take notice of numberless others; in fact there are none insensible to the emanation of surrounding bodies; all move in a reciprocal sphere of attraction and repulsion. The sun, whose heat attracts the magnetic fluid, dilates or contracts plants in general according to the ordinary course of nature, the granadille, (which in fine weather shows the time of the day,) the tragopogon, or goat's beard, heliotropus, the cameliorus, and chrysanthemum (or daisy of the field), the tulip, the lily of Persia, and a few more, show by their motion the course of the sun, whose influence attracts in their different ramifications the principles that vivify them.

When the sun darts his ray, the enamelled flowers rectify and acacia open their leaves to receive the influence; but, if he withdraws from the horizon, you see their leaves clasp and their flowers decay, till the all-enlivening beam again vivifies them. There is a kind of clover put in action, by the solar heat, according to the different degrees of the efficient fluid. This clover will appear whitish in the morning, of a purple colour in the middle of the day, and towards the evening it looks yellow and pale. It is the abundance of that fluid in some plants which renders them so apt to inspire men and other animals with desire of love; and it is the want of it in others that appeases the heat of blood, and stops the progress of rising passion.

CONSIDERATIONS on the INDISPOSITIONS and DISEASES of MAN.

MAN, with regard to his preservation, ought to be considered,

1. In a State of Sleeping.
2. In a State of Waking.
3. In a State of Health.
4. In a State of Indisposition.

If we survey all nature, we find in men, animals, plants, &c. but two principles, matter and motion. The whole of the matter which constitutes him may be either increased or diminished. The diminution ought to be repaired from the general mass by the means of aliment, as food, drink, and other stimuli.

Motion in like manner be either increased or diminished. The diminution occasioned by motion, as walking or any other bodily exercise, is repaired by sleep. Man sustaining two kinds of losses, it necessarily follows that there must be two kinds of reparation in the state of sleep. Man acts like a machine whose principles of motion are applied inwardly, and independently of the organs of sense. The
sleeping

fleeping ftate of man is when the ufe and functions of a confiderable part of his individual faculties are fufpended for a while, during which the quantity of motion loft while awake is repaired by the general currents in which he is placed. There are two forts of currents with regard to man—gravity, and the *magnetic current* from one pole to the other; that is to fay, from head to foot, man receives and collects a certain quantity of the univerfal current as if in a refervoir; the overplus of motion (or the overflowing of this refervoir) determines the ftate of waking. This exiftence of man begins in a ftate of fleep; the degree of motion he receives in that ftate, proportionate to the mafs, is employed in the formation and unfolding of his organs. As foon as his formation is completed, he awakes, and makes efforts on his mother powerful enough to bring him into the world. If his conftitution is debilitated, his motion being too flow owing to his weaknefs, he will prefent a wrong pofition, and will not come into the world without affiftance, from not having fufficient ftrength to turn himfelf the proper way.

Man is in a ftate of health, when all the parts of which he is compofed have the power of exercifing the functions they were defigned for with pleafure and eafe. If there is perfect order in all the functions, it conftitutes a ftate of harmony or equilibrium. Illnefs is the oppofite ftate, wherein harmony is difturbed, and is either extended over the whole fyftem or confined to one part.

Health may be reprefented by a right line. Illnefs is a deviation from that right line: that deviation is more or lefs confiderable, according to the ftrength of the difeafe; the remedy adjusts the order or harmony which was difturbed; the quantity of the univerfal motion that man receives in his origin becomes tonical by being modified in the womb, and helps the unfolding of the vifcera, and all the other organical parts of his conftitution.

This power of motion is the principle of life; this principle maintains and rectifies the functions of the vifcera. Vifcera are the conftituent and organical parts, which prepare, rectify, and affimulate, all humours, determine their motion, fecretions, and excretions. The vital principle, being a part of the univerfal motion, and obeying the common laws of the univerfal fluid, is confequently fubjected to the impreffions of the influences of celeftial, earthly, and particular, bodies with which it is furrounded. That faculty or property of man, which renders him fufceptible of all thefe impreffions, is animal magnetifm or animal electricity.

Man, being constantly in the univerfal and particular currents, is penetrated by them; the motion of the modified fluid by the different organizations of its conftituent parts becomes tonical; it follows in that ftate the continuity of the body to the extreme parts. From thefe extremities of the body either flow out or pafs in

currents the univerfal fluid, when another body capable of receiving or returning them is placed in an oppofite point.

1. There is a circulation formed between the currents paffing in and out. 2. Thefe currents are ftraitened and almoft re-united in the fame point ; and thefe two caufes concur together to increafe fucceffively the celerity of motion.

Thefe points of emanation or introduction to or from the tonical current are poles, bearing analogy to thofe we fee in loadftones or artificial magnets ; confequently there are fome currents coming or iffuing out of the poles which deftroy or ftrengthen each other ; their communications being the fame, it fuffices to determine one for the oppofite to be formed at the fame time. Upon a fupposed line between two poles there is a centre or point of equilibrium, the acting of which is fuch that no direktion is predominant. Thefe currents may be propagated and communicated at any diftance whatever, either by continuities, connection of bodies and minds, as fymphony, or that of a fluid, fuch as air, water, found, &c. It is a constant law, that in each variety of an intermediate body, the poles are either overturned or changed.

All bodies whofe form ends in a point or angle ferve to receive the currents, and become their conductors. We may confider the currents as openings or channels to convey other currents. Currents can penetrate all folid and liquid bodies, preferring always the direktion they have received. Thefe currents may be communicated and propagated by any means, whenever there exifts a continuity, either folid or fluid, in the rays of light, and by a fucceffion of the vibrations of found. Thefe currents may be reinforced, 1. by caufes of common motion, fuch as the intefines, and local motion, found, noife, wind, &c. the electrical frition, and every other body which is a loadftone, is already endowed with a determinate motion, by animate bodies, by trees, and all vegetables : 2. by their communication with hard bodies in which they may happen to be centered and affembled, as in a refervoir, to be afterwards at pleafure diftributed in every direktion : 3. by the multiplication of bodies to which they are communicated, that principle being not a fubftance ; by a modification its effect increafes like that of fire, in proportion to its communication. If the current of animal electricity and magnetifm concurs in its direktion with the general magnetic current of the world, the increafing of all thefe currents is the general effect which results from it. Thefe currents may again be reflected by looking-glaffes, after the laws of light.

OF INDISPOSITION and DISEASE.

IT has been observed, that man's life is a quantity of univerfal motion, which in its original becomes tonical, applied to matter, deftined to form the organs and vifcera, and afterwards to maintain and rectify their functions. Man's life begins in motion, and ends in reft. The entire abolition of tonical motion is death. As in all nature motion is the fource of every combination, as well as reft is of matter, fo, in man, the principle of life becomes the caufe of death.

Every unfolding and formation of an organical body depends on the various and fucceffive relations between motion and reft; their equality being determined, the number of poffible relations between the one and the other ought alfo to be determined. The diftance between two terms or given points may be confidered as representing the duration of life; one of thefe terms or points is motion, the other reft. The fucceffive progrefion of the various proportions of the one and the other conftitutes the progrefs and revolution of life. Proceeding thus from motion to reft, we arrive at the point of their equilibrium; after that point we begin by degrees to die.

That progrefion of divers modifications between motion and reft, may have an exact proportion, or that proportion may be difturbed. If man runs through that progrefion without the proportion being difturbed, he lives in a good ftate of health, and arrives at his term without illnefs: on the contrary, as foon as the proportions are troubled, difeafe begins. Illnefs is nothing elfe but a perturbation in the progrefion of motion and life, which may be confidered as exifting either in folid or fluid bodies. If it exifts in folids, it difturbs the harmony of the properties of organical bodies by diminifhing the one and increafing the other. If it exifts in fluids, it difturbs their local and internal motion.

The aberration from motion in folids, by altering their properties, difturbs the functions of the vifcera and the various elaborations which ought to take place. The aberration from the intefine motions of humours produces their degeneration. The aberration from local motions produces obftruction or debility, fever or irritation.

The flownefs or abolition of motion produces obftruction, or debility; the acceleration of motion produces fever, or irritability. The perfection of folids or vifcera confifts in the harmony of all their properties and functions; and the refult of the functions of the vifcera is the quality of fluids with their intefine and local motion. To be able to rectify the general harmony of the body, we muft rectify the functions of the vifcera; becaufe, their functions being once re-eftablifhed, they rectify every thing that can be fo, and divide every thing that cannot be rectified.

That

That effort of nature or viscera upon the humour is called *crisis*, or paroxysm; and no disease can be cured without a crisis. In all crises, we distinguish three states, the perturbation, digestion, and evacuation. Disease being an aberration from harmony, that aberration or predisposition may be more or less considerable, and produce more or less sensible effects, which are called *symptoms*. If those effects are produced by the course of the disease, they are called *symptomatic sensations*; if on the contrary they are the efforts of nature against the cause of illness, they are called *critical symptoms*. It is of the greatest moment to distinguish them well in practice, to prevent and stop the one, and favour the other.

It follows from what has been said, that all causes of disease disturb and alter more or less the proportion between matter and motion, the proportion of the viscera, the proportion between fluids and solids; and consequently they produce by their different applications a remission or perturbation more or less considerable in the properties of matter. To remedy the effects of remission and their perturbation, and to destroy or stop them, the remission of properties must be provoked; that is to say, in animal bodies, the irritability or animal electricity must be increased by different stimuli. There are two methods of doing this: 1. to lessen the obstacles; 2. to increase the action of nature, by a continual, shaded, soft, and harmonic, application of magnetic currents.

A body being in harmony is hardly sensible to the effect of animal electricity and magnetism, because that the application of an uniform and general action cannot alter any thing in proportions which are both exact and already conserved with that harmony. If on the contrary a body is not in harmony, that is to say, if it is in that state wherein proportions are disturbed, the habit it is in to experience that dissonance hinders it from being more sensible, and it becomes so by the application of animal electricity and magnetism; because that disposition and dissonance are increased. On these principles it is easy to conceive that sick persons drawing near their recovery become gradually insensible to animal electricity and magnetism; that absolute insensibility to its power constitutes the perfect cure.

It follows, from the same principles, that the application of animal electricity and magnetism must often increase the pain, as its action occasions the symptomatic sensations to diminish or cease; and the efforts of nature against the causes of disease being increased, it is absolutely necessary for the critical symptoms to increase in the same proportion.

It is by the exact observation of their several effects that we are enabled perfectly to discern the symptoms. The unfolding of the symptoms is made in the contrary order by which the disease was formed, and may be compared to a ball of twine which winds off in the contrary order to which it was wound on.

OF HUMAN IMPREGNATION—FORMATION of the FŒTUS—ORIGIN of DISEASES—and PRINCIPLES of LIFE and DEATH.

IT was not my intention to go into this Treatise so much at large, in my present work ; but considering that the subject is of the highest importance, and that the Medical Part could not be made complete without it, I have resolved to introduce it here, though I shall be under the necessity of extending my Plan to a few more numbers. These, I trust, will not be unacceptable ; since they will be accompanied with a set of very curious and valuable plates, designed on purpose to illustrate this interesting speculation.

In contemplating the works of creation and the word of God, unfolded to us by the light of Revelation and Scripture ; by analogy, reason, medical experiments, and anatomy, we are enabled to trace the human œconomy farther in her retirement, and deeper in her occult retreat, than some medical men are willing to suppose. Impoverished by a fashionable style of living, and driven to the necessity of multiplying potions and fees, their object is not to heal, but nourish the seeds of human infirmity. The truth of this remark has been but too often experienced ; and indeed *confessed* by some, in those awful moments, when dissimulation would be vain. Far be it from me to arraign the professional character in its general capacity ; it is only the medical locusts that I wish to eradicate ; and I am persuaded every good man in the faculty would with heart and hand assist me in so laudable a pursuit. It was principally with this view, and to assist private families in the moments of extremity, that I was induced to offer those simple modes of cure and self-preservation, so amply dispensed in my edition of Culpeper's English Physician. And my present purpose being to make that invaluable family-book still more complete, I shall here explain the nature of human generation, and the principles of animal life, that I may from thence deduce the origin of hereditary diseases, and point out with more facility those which are accidental. And in this treatise I shall endeavour to furnish my readers with such obvious directions for *eschewing the evil, and choosing the good*, as, if resolutely followed, will not fail to preserve health and long life, and prove of no small benefit to future generations.

When God created Adam, he planted in him the seeds of that Divine Essence, requisite to propagate the human *life* and *soul*. Theologians may contradict me ; yet I will not so much derogate from the wisdom and omnipotence of the Creator, as to suppose he should watch the impregnation of every human female, and, by so many separate and distinct acts of his power, give life, spirit, and *soul*, to the fœtus. The Creator of Man, viewing with unbounded foresight the purposes before him,

by one act of his omnipotence blended in Adam all the faculties of the human and celestial nature; and without any doubt, when he was formed *one, in God's express image*, he possessed the means of propagating from his own essence, beings like himself. It is here difficult to associate the imperfect ideas of human reason with the mechanism of Divine Wisdom; and yet our conception may in some degree unravel the mysteries of nature by causes and speculations, which, in proportion as they captivate our senses, and raise our admiration, excite in us a reverential awe of futurity, and a grateful sensibility of the goodness and mercy of him who gave us being.

From the evidence of Scripture it is indisputably clear, that in the person of Adam the male and female properties were originally combined; as indeed we now find them in many species of the lower class of animals. In Genesis i. 27, we read, that *God created man in his own image*, i. e. of perfection; including or containing the prolific or generating powers, which are distinguished by the expression of *male and female*; and *God blessed them*, i. e. these male and female properties, *and said unto them, Increase and multiply, and replenish the earth*, i. e. with beings like Adam: for this benediction, and this command, were *antecedent* to the formation of Eve, as every one must know who reads the Scriptures.

In this *plural* capacity, therefore, Adam received the blessing of God, when he said unto him, *Be fruitful and multiply, and replenish the earth, and subdue it; and have dominion over the fish of the sea, and over the fowls of the air, &c.* The six days creation were now completed; and on the seventh day God rested from all his work; and, having formed Adam, and breathed into his nostrils the breath of life, *he became a living soul*. God also planted the garden of Eden, and put the *man* into it, to till it and to dress it; and God commanded the *man*, saying, Of every tree of the garden thou mayest freely eat; but of the tree of the knowledge of good and evil, thou shalt not eat of it; for in the day thou eatest thereof, *thou shalt surely die*. Gen. ii. 27.

Let it here be noted, that all these transactions, injunctions, and commands, had passed *before Eve was formed*, or, in other words, before the male and female essences were separated, and made the essential parts of two distinct persons. Adam likewise, before the event took place, was appointed God's viceroy over all earthly things, both animate and inanimate; the very elements being made subject to him; for *he was formed more noble than the angels, and crowned with glory and honour*; i. e. having the peculiar advantage of *multiplying his own race*. He was, as to his external form, moulded of the celestial æther; and therefore, previous to his fall, his body emanated rays of brightness and splendour, similar to those which our ideas furnish of Moses and Elias when they conversed with God. His reasoning faculty, and living

ing soul, were formed of the eternal essence or tincture of the Divinity; being nothing less than what is termed the *breath of God*, that spark of immortality which generates *soul* and *body*, and is the distinguishing characteristic between man and beast. For, although brute animals inherit the five senses, and possess an instinct to direct them in the choice of food, and to impel the propagation of their species; yet these are only senses formed from the *out-birth*, or four elements of nature; and not from the essence or tincture of the Divinity, out of which the soul, the mental intellect, reason, sense, and understanding, are all formed, and transferred to posterity. *For with the powers God has endued man, with the same powers shall he multiply his race.*

From the foregoing passages we are warranted to infer, that the original man was possessed of his spiritual soul, and rational intellect, for the purpose of propagating the same to all future generations. By the force of this rational intellect, or eternal spirit, unclouded by the deformity of sin, he knew and perceived the nature and property of every animated being; and to exercise this intellect, God brought before him every created thing, to see what he would call them; "*and whatsoever Adam called them, that was the name thereof.*" He knew and perceived the nature and quality of all animals; and, according to their designation and subjection to the external elements, so he assigned them those names which they have ever since borne. Adam, however, in his primeval state, was not himself under the influence of celestial or terrestrial elements; but, on the contrary, they were subject to his controul. He was immortal; they corruptible. They sprung out of time, and were elementated; he sprung from the limbus of eternity; and into eternity the divine essence, or souls, propagated from him, must indisputably return.

But man, thus created in honour and immortality, abideth not. The purpose of his creation was to fill the place of the rebel angels; and hence Lucifer became his mortal foe. This fallen Spirit had entered the gate of Eden, and was preparing to seduce Adam, when the Almighty constituted the test of his obedience; for having endowed him with a *free-will*, an innate power of *choosing good or evil*, and of multiplying the same, it was but reasonable to expect from him an implicit obedience, and an angelic race. He that is alone eternal and omnipotent, could not but foresee the subsequent event; and it is his supreme goodness to counteract evil, by preventing its worst consequences. Foreseeing that the prolific tincture, or eternal essence of fecundation, might be contaminated by the malignant spirit of Lucifer infusing itself into the mind of Adam; who then, instead of multiplying an angelic race, would generate devils; and that, were man to fall in his individual capacity, there was no counterpart, no feminine principle, through the medium of which

the *serpent's head could be bruised*, or a Saviour become incarnate ;—Therefore on a further survey, after the works of creation had been completed, animals named, and man formed and compounded of the male and female tinctures, God said, Gen. ii. 18. *It is not good that the man should be alone; I will make him an help meet for him;* wherefore the rib, i. e. the feminine or conceptive essence, was taken out of Adam, and concentrated or moulded into a new being called *woman*. The emission of this feminine essence or tincture threw Adam into a deep sleep; yet, when he awoke, he knew that an essential principle had departed from him, and that the woman was *bone of his bone, and flesh of his flesh*, not having been created, *but formed out of himself*, whereby he only retained the animating principle, or active power of generation; whilst the rudiments or seeds of future beings were consigned to the matrix of the woman. Here then individual generation ceased; and Adam, without the *counterpart of himself*, had no longer the power to increase and multiply. Thus the two tinctures, or divine essences, animating and compounding soul and body, were divided; and by means only of a re-union or contact of those tinctures, could generation then, or now, be performed. It is on this ground that the male and female affections are continually turned towards each other; and that the desire of love and union so strongly pervades every individual of the human race. Hence also the Tempter's reason for beguiling Eve; and hence the seducing power of love, which determined Adam to share in all the horrors of her crime, so pathetically and affectingly described by Milton.

The fatal consequences of the fall, we most sensibly feel, and universally deplore. The earth shook from her foundations. The order of nature was quite inverted. The ætherial and terrestrial elements, which before were fashioned in harmony, and acted in unison, were now discordant, intemperate, and furious. Brute preyed upon brute, and bird invaded bird. The delicious fruits and flowers of Paradise were exchanged for thorns and thistles. The serenity of a pellucid and smiling firmament, was convulsed by the thunders of an incensed Deity, by forked lightnings, by contending seasons, by devouring winds, and impetuous storms. While man, ungrateful man, from the privilege of holding these elements in subjection, became subjected to them; and hence subject to all the perils and misfortunes of his fallen nature.

Here, then, began the conflict of the human passions, as violent and ungovernable as the elements themselves. Here the toil and labour of the man, who should *earn his bread by the sweat of his brow*, and the tears and travail of the woman, who should *conceive in pain and sorrow*, had each their source. Here likewise, the dark catalogue of human infirmities, of disease and death, had its too early date; yet

to this æra, which gave birth to our manifold misfortunes, must we look for that benign source of alleviation and cure, which the relenting hand of Providence has graciously afforded to those who will seek for them; *for out of the ground hath the Lord caused medicine to grow; and he that is wise will not despise them; for with such doth he heal men, and taketh away their pains.* Eccl. xxxviii. 4, 7.

Since, by his fall, man became subject to the elements, from them he receives the constitution of his body; but his reasoning intellect, and spiritual soul, are derived from the pure essence or tincture of the Deity, originally infused into the seed of man. To the violence and impurity of the elements, we owe the disorders of the body; to the temptations and allurements of the devil, we justly impute the diseases of the soul. Yet by due attention to our reasoning faculty, it is no hard task to preserve health, or prolong life, to the term of its *natural* dissolution; while, by the powers of the mind, and the light of the gospel, we may still avoid the poison of sin, and become members of that eternal kingdom, which is the sure reward of the good and virtuous.

The imperfections and diseases of the body, therefore, beginning with Adam, are in consequence transmitted to his posterity; and may be divided into *hereditary* and *accidental*. Hereditary complaints proceed from a certain defect of the animal powers, or imperfect state of the sanguiferous system, at the time of copulation. The accidental consist of all such maladies as are communicated by the discordant or putrid state of the elements, not only during the time the child is encompassed in the womb, but from its birth to the latest hour of its existence. And it might here be observed, that the increase or decrease of both hereditary and accidental diseases, depends almost entirely on the purity or impurity of the blood. For, if pure, in both male and female, at the time of impregnation, the fœtus will be naturally strong and healthful. So likewise, if after parturition, and during life, care be taken to keep the blood in an uncontaminated and elastic state, we shall not only avoid the common effects of excessive cold, heat, and moisture; but likewise that direful train of acute diseases communicated by putridity and infection; or, should they by chance attack us, the effect becomes slight and temporary. A circumstance this, which surely ought to weigh perpetually on the minds of those, who know how to value the blessing of health, or who would wish to live a long, an active, and a pleasant, life. This is therefore a speculation of that high importance, that I shall now show how hereditary complaints are communicated in the act of copulation—how increased and fostered in the womb—how accidental diseases grow up and follow,—and how both these enemies to the health and happiness of mankind may be prevented or overcome.

In regard to that union of the sexes to which we are instinctively impelled, or rather in the union of those essences or tinctures peculiar to the generative organs of male and

female, in the contact of which the first moments of human existence commence, the most whimsical and absurd theories have been set up. No branch of physiology has been more exposed to censure and mistake. While the phænomena of the heavens, of the earth, and even of the human mind itself, are traced with a steady hand, and with all the dignity of philosophy, the functions of the human body, in health as well as under disease, though expounded with a profusion of fantastical erudition, appear almost in as much doubt and darkness as in the days of Paracelsus.

Let us then proceed to review the mode by which generation is accomplished. I have, in the former part of this work, already explained the systems of Buffon and of Leeuwenhoek, in their speculations on the animalcules found in the seed of man and in that of brute animals; I have also in the medical part of Culpeper's English Physician, shown the mode by which generation is performed, so far as relates to the action itself, and to its gross effect. I shall now consider it in a new light, as it concerns the propagation of soul and body, and of family-temper, likeness, and disease; but, as the female is so materially concerned in the mysterious act of impregnation, and in all its consequences, I shall here take up the reasoning of a late ingenious anonymous author, whose opinion exactly coincides with my own.

The extremity of the uterine system, without the nymphæ, seems not, except from its aperture, and the lascivious susceptibility of its texture, materially requisite to generation. Immediately within the nymphæ, the *vagina*, or great canal of the uterus, begins. Before coition has disturbed its proportions, it is generally about five or six inches long; and when thrown into a circular form, without violent distention, its diameter is about a sixth part of its length. But as, in coition, the vagina is the immediate receptacle of the penis, it is capable of great distention, and may be rendered of very considerable capacity. In general, however, after frequent contact, this canal becomes much shorter, but more proportionably increased in its diameter; yet, being contrived by its organization for the purpose of exciting pleasure, it can and does accommodate itself to whatever size is necessary closely to embrace the penis in the act of copulation.

At the upper extremity of this canal, the uterus or womb is seated. It is of a pyramidal form, with its apex towards the vagina. Its greatest length, in virgins, is not more than two or three inches; and its width is scarcely one; its internal cavity must therefore be very small. It is connected to the vagina or great canal by a passage so small, that a bodkin or stilet cannot be introduced without some difficulty. In the broad or upper extremity of the womb, the ovaria are seated. Their substance is spongy, and they contain an indefinite number of vesicles of a duskyish semi-transparent quality, the involucra of which are distinct, and similar to the
neral

neral substance of the ovaria. These vesicles are the *ova*, or eggs, which contain the rudiments of the fœtus, and which must absolutely be impregnated with the male seed, before it can be possible for generation to take place.

Now it has been, and is, the common opinion, that, when venereal embraces take place, the whole genital system of the male being thrown into action by libidinous fire and violent friction, by this exertion the semen is thrown with considerable vehemence from the penis, and is either forced through the mouth of the womb, and attracted by the ovaria; or, that it is received by the Fallopian tubes, and conveyed by them through a variety of convolutions, till by their fimbriæ they are conducted to the ovaria, in the manner I have already fully described in the medical part of Culpeper's English Physician; all which tedious and complicated process is alleged to take place in the instant of coition.

Others again suppose, that the internal orifice of the womb becomes open and pervious during the exertion and enjoyment of copulation, and that the glands of the penis absolutely pass into the cavity of the womb, and eject the seed immediately upon the ovaria. To each of these theories there appear insuperable objections. In refutation of the first, we need only observe, that the vagina, from its structure, and from its organization in the act of venery, is disposed strongly, and in every part, to embrace the penis; and, as the glands must thereby be closely surrounded, although it reaches not in every person to the furthest limits of the vagina; the slight and momentary impetus of the semen will thus be very effectually resisted, if not totally subdued. If the penis be not of magnitude sufficient to occupy the vagina to its full extent, the unoccupied space must be somehow distended; and, let this vacuum be what it will, its resistance must be effectual; and, if it is not distended, the power or pressure which occasions its collapse, will over-balance the impetus of the semen. But supposing the virile member in all cases to be so exactly proportioned as to occupy the whole length of the uterine canal, which however we know is not the case; yet from what principle shall we ascertain that the feminal tube of the penis, and the apex of the womb, shall be made so exactly to correspond as to become continuous? The semen, in the event of coition, is doubtless thrown out by the penis with some force; though this force will always depend upon the vigour of the male organs, and therefore must vary from the lowest to the highest degree of vigour which these organs can be susceptible of. But even allowing the glans penis and apex of the womb to fall into exact contact upon due penetration; and that the male seed is always ejected with considerable force from the penis, and the vagina to be no barrier to the progress of it; yet how is it to force its way into the cavity of the womb? The aperture which leads from the vagina or great canal into the

the womb, is in fact no aperture at all. During menstruation, indeed, it is pervious; but even then it is only capable of admitting a very small probe; and this is no argument that it is naturally, and at other times, pervious. How often too has this aperture been entirely blocked up by preternatural obstructions, and conception nevertheless taken place? Instances of this have often occurred; and the precision and authority with which they are recorded by different practitioners, leave no room to evade the argument. Hence this mode of impregnation appears not only highly objectionable, but utterly impossible; having no correspondence with the human structure, or with the economy of Nature.

After what has been said, it may appear idle to prosecute any farther refutation of the progress of the male seed by the Fallopian tubes, or through the mouth of the womb. But, as authors of the greatest respectability have believed in its progress through the tubes, and tell us they have even seen it there; it may not be improper to enquire how far this is ascertainable. The Fallopian tubes, through which the semen is said to pass, originate, by very minute perforations, through the fundus of the womb; and, increasing rapidly in their diameters, their capacities, when dilated, may be about the third part of an inch where they approach the ovaria. Here, again, they suddenly contract, leaving only a very small opening; while their main substance is still continued, and is expanded into that plaited or jagged fringe called the fimbriæ, which is contiguous to the ovaria.* I shall now ask by what law in Nature, by what effort of it, is the male semen to be conducted through this conical and convoluted canal? Can the semen now possess any active force, to introduce itself through the rigid perforations of this organ, and to overcome the collapse of the tubes? The stimulating power of the semen must soon be lost in a vessel which it has not power to distend; and we cannot suppose it capable of acting in a direction completely opposite to what is the acknowledged office of the tubes. It must be by irritability that the ovum is conveyed into the uterus from the ovaria; and we know no vessels in any part of the body whose action is double and contrary. This system therefore favours of great improbability. But we are told, by some, that they have actually seen the male semen in its unaltered state, lodged in the Fallopian tubes. These sagacious authors might as prudently have affirmed, that they had seen snow upon the canal in Hyde-park at Midsummer. They did not know, or did not choose to recollect, because it made against pre-conceived opinion, that the human seed, when subjected to heat, especially to such a moist and natural heat as those parts constantly afford, soon loses its spissitude and

* See Medical Part of Culpeper, page 17, 89, 97, &c. where all the parts, both male and female, are anatomically described.

tenacity, and becomes very subtilly fluid, and almost colourless. Besides, it is universally acknowledged, that a considerable part of the semen is almost always, immediately after coition, rejected by the female. When we attend to the many instances of credulity and imposition in the theories of generation, we need not marvel at the aptitude and facility with which pretended discoveries creep into notice, and the solemnity with which they obtrude themselves into systems.

All the foregoing arguments against the possibility of a pervious communication between the vagina and the uterus, are also conclusive against the suggestion, that the penis, in the act of coition, penetrates into the cavity of the womb. Nor is the assertion of those who contend that this orifice, by the turgidity of the parts during coition, naturally opens and dilates itself to receive the male seed, marked with the least degree of probability. How is this dilatation of the orifice to be effected? Though the whole uterine system, during the venereal act, be rendered stiff and turgid by animal desire and influent blood, yet it is more probable that this turgidity would rather compress than dilate the orifice; and the structure and texture of the womb seem exceedingly unfavourable to sudden dilatation by any means whatever. In an unimpregnated or virgin state, the womb is so small that its sides coalesce or adhere together, and it has no hollow appearance whatever, though, from the texture and elasticity of its fabric, it may be thrown into a globular form, which will constitute a cavity. But in coition, with all its occult and uncommon phenomena, what charm have we left to overcome this coalescence, and form this cavity, by opening or separating the membranous sides of the womb? Will it here be said that the forcible ejection of the male semen will effect this purpose; or that the stiff and turgid state of the penis itself will force its way into the fabric so remote and delicate? Though females may entertain sanguine ideas of these things, we must suppose the vigilant anatomist, toiling through the unalarming and chilly organs of the dead, ought to furnish a more rational hypothesis, whence to deduce the active principle and admirable process of human impregnation.

Authors have been always eager to establish the certainty of a considerable afflux of blood to the female organs, and consequent turgidity during the voluptuous communication of the sexes; and this has been a wonderful prop to many absurd conjectures. This afflux, and consequent turgidity, they suppose originates, like the erection of the penis, from the strength of libidinous ideas, and other locally-irritating causes; and is intended by nature to induce a tension in the female organs, that the progress of the semen may thereby be facilitated. This tension, again, they suppose induces some kind of constriction, which is said to support the action of the different parts of the genital system, but particularly of the Fallopian tubes. These

tubes, it is said, are remarkably distended, during coition, by the blood rushing into the numerous vessels which creep between their coats, by which means they are erected, and their fimbriated terminations applied to the ovaria; and it is gravely added, that dissections of gravid women, and the comparative anatomy of brutes, corroborate the opinion. Were it not for the serious respect with which this anatomical observation hath for a length of time been favoured, nobody surely would be at the pains of detecting the absurdity. Allowing that this turgidity, with all its concomitant circumstances, really happens in the *living* subject, how can it possibly exist in a carcase flaccid with death, and, as is always the case in a human anatomised body, where death must have taken place some considerable time before?

But this turgidity, though it sometimes may happen, and yet in a degree very limited to what is alleged, does not always happen; and, when it really does take place, it seems rather to be the companion and promoter of libidinous gratification, than a principal and essential promoter of conception. To many women the embraces of the male are extremely, if not completely, indifferent; and to some they are absolutely disagreeable; yet even these women are prolific. There is no difficulty in suggesting a very sufficient and natural reason why the parts of the female directly subjected to the action of the penis, during the venereal congress, should become turgid with influent blood, and sometimes be constricted. Nature, though she seems in general unfriendly to excessive lust, sometimes permits it; and these are the means she seems to have appointed for heightening it. Besides, it is proper that the animal instinct, which prompts the reproduction of the species, should not be disappointed in its gratification, however brutal these sensations and ideas may appear to the purified philosopher. These means then, however they may contribute to the mutual sensibility of the sexes, in the voluptuous gratification of animal pleasure, appear to have no real influence on the process of generation, after the venereal congress has ceased; nay, we have reason to believe that their action or influence does not extend beyond the limits of the vagina, except in common with the rest of the genital system, even during that congress. If an afflux of blood to these parts were always to be attended with these effects, what violence must the ovaria be exposed to by reiterated coition, and by every return of the menstrual discharge? During the menstrual afflux, a very considerable distension must surely take place over the greatest part, if not the whole, of the genital system; and, as this turgidity is the principal reason assigned for the action of the tubes, by what means are the fimbriæ diverted from exercising those functions which turgidity, though from another cause, at another time so successfully instigates? Also, how happens it that grateful copulation is not always productive, and the contrary; that the fimbriæ, in every

every venereal act, do not operate upon the ovaria, and thereby produce more fœtuses, or a waste of the ova? and that the organs themselves are not incapacitated, or diminished in their energy, by such repeated exertions? We have every reason then to conclude, that the tension and constriction of the female organs, induced by the afflux of blood during coition, if of consequence, are intended solely to promote animal gratification; and, that they have no direct influence on the actual progress of the semen through the above-described communications to the ovaria.

Upon the whole, it is certainly no ways equivocal, that the semen cannot, in any manner, be applied to the ovaria by means of the fimbriæ; that it cannot ascend or advance through the convolutions of the Fallopian tubes; that it cannot divaricate and traverse the compressed uterus; and that it cannot even operate a passage through the rigid bulwark of the cervix uteri. The probability of the progress of the *aura seminalis*, through the same paths, is destroyed by the same arguments; and the whimsical opinions founded on the presence of animalcules in the semen, and on the organic bodies furnished by the semen of both sexes, and, uniting in the uterus, as far as this alleged aperture is concerned, must stand or fall by the same fate. It may seem however strange, that a doctrine so ancient, and so universally believed, should be so easily overthrown; and it may furnish, to the speculative reader, unfavourable ideas of the present state of medical literature. He may indeed wonder, that, while every science has become rational and respectable by the exertions of their cultivators, medicine alone has been able to resist the diligence of a thousand years; although it has been wrested from the hands of nurses, and its profession become dignified and lucrative, it can scarcely be said, at this day, to afford one unquestionable idea. In the volumes of physiology, compiled by the most learned physicians, and drawn from the most learned sources, will the unconcerned philosopher find the dogmata of medicine consistent with Nature, or with common sense?

But since the semen, in some shape or other, contains that animating principle which is indispensably necessary to generation; and since the ovaria as indisputably produced something from whence a living creature is to be evolved, it becomes demonstrably clear, that the influence of the male seed must be powerfully incorporated with the female, and directed to the ovaria, before this effect can possibly take place. We have already seen how this cannot happen; let us now endeavour to point out a rational medium by which it may be accomplished. For this purpose we must again return to the vagina, or canal of the uterus, as being the principal organ, on the part of the female, which actually contributes to propagation; and without the full and complete use of which, impregnation cannot take place. It therefore demands a very minute and attentive investigation.

The vagina is elastic, and somewhat membranous, composed of muscular fibres, blood-vessels, nerves, and lymphatics. It commences from beneath, at the nymphæ, and, rising obliquely about five inches, is lost upon the uterus. Its capacity is very different in different subjects, and in no very distant periods of life in the same subject. A very respectable anatomist finishes his description of it by saying, it is *membro virili secundum omnes dimensiones accommodabilis*. Its inner membrane, though very uneven, is delicately smooth, and, from its nervous texture, exquisitely sensible; the outer membrane is more spongy and muscular; and, the whole body of the canal is very plentifully supplied with blood-vessels, nerves, and lymphatics. We know little more of the lymphatics of these parts, than that they are more numerous proportionally than in any other part of the body. Those which originate in the exterior parts of the female genital system, traverse the inguinal glands, while the deep-seated ones take a much more direct course to their place of union with the lacteals; but of these we shall be more particular, when we adduce our observations in favour of a very powerful *absorption* subsisting in the vagina.

The entrance into the canal of the uterus from without, is guarded by the nymphæ, which form an eminence on each side, so peculiarly constructed and arranged, that we must think lightly of the physiologist who could suppose them to be only appendages in office to the urethra. Indeed, as Nature frequently operates more than one end by a particular structure, we shall not pretend to limit the secondary or inferior offices which the nymphæ may promote; but we see much reason to believe them created to assist powerfully in preventing the speedy escape of the male semen, and thereby exposing it longer to the action of the absorbent system. A multitude of circumstances corroborate this belief; and it will not be impaired by the allegation, that these ridges by no means constitute a regular and complete valve. Immediately within this barrier, a structure, on the same principles as those of the nymphæ, but more elegant and powerful, commences; and it is continued over the surface of the vagina, gradually growing finer, till it is lost in smoothness near the upper extremity of the canal. This structure is the rugæ of the vagina, so accurately drawn and described by Haller and others; but degraded by some anatomists, who mark it only as useful in exciting venereal enjoyment, or admitting expansion during coition and parturition. It is insinuating a mean and disgraceful reflection on the important order and operations of Nature to suppose, that these rugæ, which are not casually arranged, but are regulated with as much precision and uniformity as we can trace in any other part of the genital system;—I say it is nugatory and presumptuous to assert, that this intricate, extensive, and beautiful arrangement, has been so minutely laboured for no other purpose, but merely to
excite

excite a greater titillation during the gross and libidinous commerce of the sexes, and a greater extension during parturition. This stricture may indeed promote these secondary purposes; but it is intended for much nobler ends. Had these rugæ been constructed merely for simple contraction and dilatation, they would have covered equally the whole surface of the vagina, which certainly does not happen; neither, if these had been their principal uses, would they be so soon and so easily obliterated. We believe, then, that the rugæ of the vagina are thus contrived principally to protract the semen in that viscus after the penis is withdrawn, and thereby to favour *absorption*; especially as the qualities of the semen coincide wonderfully with these intentions.

The semen, as it is secreted from the blood in the testicles, is very different from that heterogeneous mixture which is expelled by the urethra in coition; though, by the alteration, its fecundating quality is not improved. When it is conveyed into the vesicles, it is of a thin consistence, of a pale yellowish colour, and little in quantity. In these vesicles it is somewhat inspissated, and its colour heightened; and, after it is mixed with the liquor of the prostrate glands, it becomes still thicker, and of a more whitish colour. This consistence which the semen acquires in its progress from the testicles, may produce other slight properties; but the principal intention of it seems to be, to correspond more effectually with the absorbent power of the vagina: for thus, by the increased tenacity of the semen, the remora of its fecundating part must be protracted in the vagina, while at the same time the absorbents are allowed more time to attack those active subtile parts intended to be carried into the circulating system. We may add here, in order farther to confirm the opinion concerning the use of the tenacity of the semen, that, when too little of this mucilage is derived from the glands, or when it is of a depraved or thin quality, the whole mixture escapes the machinery of the vagina too rapidly, and hence coition becomes unproductive. This is the feminal serosity, as it is called, held to be one of the few causes of sterility in man. And we may add farther, that, when the consent and power of procreation begins to fail on the part of the woman, the crenulations of the vagina are then always visibly decayed, whether affected by the advances of age, or by imprudently-reiterated venery. But what are we to think of a very respectable author, who gravely tells us, that the semen, by stagnation, and by the addition of the cream-like liquor of the prostrate glands, is better suited to the projecting effort of the urethra in the event of coition? Indeed, it is not to be denied, that the increase in quantity of the feminal mixture may enable the projectile power of the urethra, with its aiding muscles, to act with greater efficacy; but a boy would laugh in my face were I to tell him, that by adding to the

weight and tenacity of water, his squirt would throw it much farther. To act in concert, then, with these unquestionable qualities of the semen, the surface of the vagina, by means of its rugæ, from their elevation and arrangement, must have a very considerable effect in heightening the remora we have described. No doubt, if Nature had only had in view the prevention of the regrefs of the semen, we might have met with a much simpler mechanism; but, as to this part very different offices, and all of them material, were allotted, it has been intricately qualified for them all.— Thus, upon the whole, we see an admirable disposition in the semen, and in the surface of the vagina, to facilitate and promote the action of the absorbent vessels.

Though the *absorbent system* has not been traced with the same minuteness and success which have followed the investigation of the sanguiferous system, it is however known to be very general, and very powerful; and it is remarkably so in the cavity of the pelvis. How, otherwise, is that effusion which is constantly going on, in order to lubricate the whole genital system in the female, and to prevent the coalescence or concretion of its sides, resumed? In those unfortunate females whose menses have taken place, but in whom likewise the expulsion of them has been prevented by the unruptured hymen, or by unnatural membranes blocking up the passage, much of the blood has always been reformed; and in those whose disease has existed long, and where the thick parts of the blood have begun to be broken down, the colluvies has been reformed, and a train of symptoms induced, not to be accounted for by the mere turgidity which this obstruction occasioned. The infection and progress of syphilis or confirmed lues, not only establish the certainty of a very rapid and powerful absorption in the vagina; but also exhibit the power and influence of the irregularities of its surface. It is surely very evident, that the chief application of the venereal virus, whether in gonorrhœa or syphilis, but especially in gonorrhœa, must be near the farther extremity of the vagina, though there can be no doubt but the ulcerated glans may often affect the exterior parts by its introduction; but, in a confirmed lues, the fundus of the vagina is rarely the seat of ulcer, and it is never affected in gonorrhœa. Here, the surface of the vagina being mostly smooth, the poison runs downwards, till falling upon the rugæ, it is there intercepted and retarded. Here then the poison is multiplied, and leisurely applied to the mouths of the lymphatics, through which it is carried into the blood; where, assimilating together, it contaminates the whole mass. Though the progress of the syphilitic poison is not always thus regular, the variations do not affect the opinion. When the lymphatics, and their glands, are vigorous and easy permeable; when the application of the venereal virus is within the nymphæ; and, when it is sufficiently active, the first symptoms of disease arise from general contamination; and,

and, were this poison always very mild, and taken up by the absorbents within the nymphæ, there is no doubt but the whole mass would almost always be diseased, without much chance of ulcer or preceding bubo. But there are many circumstances which tend to retard the speedy absorption of the syphilitic virus, even when it is extremely active; and, among these, the inflammation which in general it must induce, is not perhaps the least considerable; but these cannot affect the absorption of the seminal fluid of the male. The syphilitic virus too, may, from the laxity and lubricity of the vagina, (a circumstance very general in immodest women,) not only escape absorption, but may be carried outwards, to exercise its energy on the external parts. And it is from these reasons partly, that immodest women are so little disposed to conception, and that modest women, when subjected to venereal infection, generally experience the more latent and violent species of this disease. And, as a greater surface of absorbents is exposed in the female to the contaminating influence of the diseased male organs, and as the greatest part of the female genital system has a much readier intercourse with the blood than through the inguinal glands, we meet with this species of syphilis much oftener in women than in men. The cure of syphilis, too, by specific remedies introduced into the vagina, fully demonstrates the strength and activity of the lymphatics in this canal. Is there then a ready and established communication, for disease, and for its remedies, between the vagina and the general circulating system of the blood, while a mild fluid, yet possessed of activity infinitely beyond that of any poison, and created for the highest and best of purposes, is not permitted to traverse the same channels? Many other corroborating circumstances, both in fact and in analogy, might be adduced here, were not these arguments in themselves conclusive.

In a due state of health there is what may be called an intestine motion in the blood, occasioning and promoting its commixture, as well as its separation. In all general diseases, and even in many which are called local, this intestine motion is heightened, diminished, or deranged; and in the exanthematous or eruptive disorders, it must be remarkably so. In syphilis, though this disease is not directly exanthematous, there must be excessive disturbance, and certain depravation, prevailing throughout the whole system, before such complete destruction can be brought upon it. In these cases of disease, where vehement infection, with all its consequences, is overturning all before it, we have always found, that milder infections could make no impression. Hence the practitioner never hesitates to ingraft the small-pox, though the patient may have already received the disease, either by natural contagion, or by prior inoculation: hence a milder disease is often removed by a feverer one; hence slow consumption is always retarded, and often overcome, by fecundation;

tion; and hence fecundation itself, as the feebl̄er stimulus, is often prevented by the anticipating disturbance of syphilis, or of similar diseases vehemently pre-occupying the circulating system. It is this anticipation, this prior possession, and change in the circulating blood, which reasonably and emphatically accounts for the want of influence in the human semen upon the female after impregnation has fully taken place, or while the mother is providing milk. And we might account for the production of twins, triplets, and those rare instances of more numerous progeny, from the same circumstances. One, two, or more, ova may indeed be so ripe as to meet completely the fecundating impulse of the male semen at one time; and it is perhaps more strange that the different fœtuses should be matured and expelled about the same time, than if a greater period intervened between the expulsion of each; and might not a second intercourse of the sexes be successful, when the female circulating mass was not fully pre-occupied by the influence of the first? But the extent and influence of prior infection, or impregnation of the blood, has been better observed in the venereal than in any other disease, or natural occurrence. Women, whose general system is vitiated by the syphilitic virus, are always incapable of conception; or if the vitiation is not complete, but in a slight degree, an imperfect fecundation may take place; but its product determines the want of energy, and the unqualified state of the mother from whence it drew its principal arrangement. These ideas are corroborated by the mode of cure adopted in the circumstances we have been describing, and by the general effects of it.

Thus we have endeavoured, and we hope with success, to establish the truth of a strong power of absorption in the genital system of the female, originating in the vagina; and a disposition in the whole mass of blood, to be affected according to the properties of what may be mingled with it. And as, from the present state of anatomical knowledge, we have no right to suspect any other mode than this of absorption, by which the unrejected and finer parts of the semen can in any shape, and with any effect, be determined towards the ovaria, let us see how this can be farther ascertained by what we may suppose to be the effect of the absorbed semen, and the future appearances of impregnation.

In human creatures the evolution of all their parts is gradual, and the work of time. From the moment in which the ovarian nucleus receives the vivifying impulse from the semen, till the period of puberty; from the dawn of its existence, to the completion of its figure and its powers; its alterations are so many, and so varied, that our idea of the germ is not recognisable in that of the infant, and our idea of the infant again is lost in that of the perfect animal. A gelatinous particle, without necessary form and texture, becomes a stupendous fabric, so intricate and elaborate, though at the same time perfect and complete, that human ingenuity

and reason have toiled almost fruitlessly for thousands of years in investigating the progress. It has indeed been averred by some, that all the different organs of the animal in its complete state are original and distinct in the embryo, and are only unfolded and rendered more evident by its increase. This surely is not the case. The animal is certainly endowed with power of completing itself; and can, from inorganized parts, produce an organized structure. The parts are only evolved and perfected as they become useful in the different stages; and the evolution of many of them can be prevented without the destruction of life, or excessive prejudice to those already evolved. If the different organs, or rather principles, are at first perfect, why are those effects which depend upon them not perfect also? Why is the state of infancy a state of idiotism? why is the temper of youth capricious and flexible? and why are the temper and passions of the adult but barely discernible in the preceding stages?

As we are of opinion then, that the different organs are matured only as they become requisite and necessary, consequently, we believe the evolution of the generative organs in both sexes must be among the last efforts of the increase and completion of the body. This evolution could not have taken place earlier: if it had, the mind must have been affected by those impulses which announce the maturation of these organs, by which we know the mind, body, and soul, are connected. In the male, the foundation and powers of maturation, of that strength, and of those more rational qualities which belong to him, are laid to ripen with puberty: hence communication with the female, before these are finally arranged and secured, proves inefficient, and entails upon him debility both of body and mind. The same thing holds, as far as the same ends are concerned, with respect to the female; and we cannot suppose that Nature could be so idly eccentric, as to punish the female with a disposition or propensity to procreate, before the body was capable of undergoing the various disorders and dangers of pregnancy and parturition. For the same reasons, none of the ordinary organs of sense are qualified to receive or communicate distinct impressions, till the brain, the seat of the soul, as the heart is of life, has acquired those properties which must fit it for its arduous offices. It is only when the different organs of sense have been completely evolved, and all their parts sound and just, that the power of the mind is effectuated and established. This faculty, though it seems essentially different from Reason, is no doubt the origin of it; for the extension of common sense, from memory, or rather from comparison, and what may be called the balance of the senses, constitutes what is called Reason and Judgment. While the organs are incomplete, from infancy or from disease, their communication with the understanding is also incomplete. Those who have been born blind, or whose eyes have been destroyed in infancy before they were

become useful, have none of those ideas which depend upon the eye; it is the same with the deaf, and in all cases of ideas depending upon one sense: and we may add, the early castrated have no comprehension of, or propensity to, the gratification of love. Do not these things show—and a thousand other circumstances might be adduced to strengthen the proof—that the mind acquires its powers only as the parts of the body are unfolded, and confirmed; that the body is perfected only as the mind is qualified to receive its impressions; and that the parts of the body are perfected by one another?

During infancy and youth, strictly, the ovaria are simple inorganic masses, partaking of no more life than is barely sufficient to sustain them, and connect them with that energy and progress of constitution which are afterwards to unfold all their properties. At the period of puberty, thus denominated from the change which takes place in the genital system at this time of life, this progress and development of the ovaria is finished by Nature; and those bodies are generated and completed within them, which will exist without impregnation by the male, but which this impregnation alone can finally mature and evolve. That these bodies are not generated at an earlier date, Anatomy as well as Reason, founded on the foregoing arguments, assure us; and, that the ova of all the fœtuses, which the female is afterwards to produce, are generated at that time, seems equally certain. Though this change in the ovaria is the most essential, the whole genital system also undergoes a very material change. The simple alterations of structure and dimensions in the different parts of this system, though they are necessary and subservient to generation and parturition, yet they are not so material, either in themselves, or to our purpose, as to require a minute description. This, however, is not the case with respect to the menses. It is chiefly with a view to the nutrition of the fœtus that the extra-anguification in the female is provided by Nature; which is determined to the genital system, in the same manner as the other fluids are determined to other outlets; but, as the continued drilling off of this extra blood would be exceedingly inconvenient and disgusting, Nature has prepared, as it were, a cistern for its reception. What may be sufficient to bring on the hæmorrhage, however, is only accumulated; and the general redundancy, induced by the obstruction and accumulation, subsides gradually as the hæmorrhage goes on. This is the manner of menstruation in the unimpregnated female, and these are the reasons why it assumes a periodical form. In the impregnated female again, the preparation of extra blood still continues, but its consumption becomes very different. By the extension of the uterus, and by the waste occasioned by the nourishment of the fœtus and its involucra, the surcharge or extra-preparation of blood is nearly balanced, or is taken up as it is prepared; and hence the periodical efforts are almost lost. In the first months

of pregnancy, however, the uterine system is not always able to consume the surcharge of blood, and thereby take off the periodical effort; and hence it is that the loss of the fœtus happens most generally in the early months, and at the usual period of the menses, unless some accident has supervened. And it is nearly from the same reasons that miscarriage is so often to be apprehended in the latter months of pregnancy, and that the fœtus is afterwards expelled from the womb. When the fœtus has acquired all that bulk and strength which the capacity and powers of the uterus can confer, and when a change of circulation and mode of life becomes necessary to it, the uterus and fœtus become plethoric; a general accumulation succeeds; and the periodical efforts of the menses return. During the middle months of pregnancy the fœtus is in a state of rapid growth, and is capable of consuming all the blood which the mother can furnish; but there is neither room nor waste, in the latter months, for the blood which the mother is constantly pouring in; and hence arises that plethora, both in mother and child, which is to instigate the effort to parturition, which occasions the effusion after parturition, and which is to supply the extended circulation of the born child.

But, besides the utility of menstruation to the fœtus, there is a very evident connection between it and impregnation. To speak of it as a proof of the ripened qualifications of the female, is to say nothing; its immediate action is essential to conception. In the human female, it is well known that coition is almost only successful immediately after this evacuation has subsided. Who will reconcile this—and it is no modern and groundless observation—to the consequence which has been ascribed to turgidity and tension, which we have already adverted to? Almost every woman who has frequently undergone pregnancy, and who has attended judiciously to the phenomena of that situation, calculates from the last cessation of the menses. At this time, or rather very soon after it, the plethoric tumult of the general system has completely subsided, and the absorbed semen gets quiet and unanticipated possession of the circulating blood; and at the same time the gradually-returning plethora promotes its action, and perhaps its determination to the ovaria. When the menses are interrupted, or profuse and frequent, impregnation seldom takes place; and it admits not of a doubt, that, when the determination of this blood is towards the mammæ, in the form of milk, coition is unsuccessful; and, as soon as its determination to the urine system is restored, other things being favourable, copulation succeeds. We may add as a known fact, that continuing to give suck after the usual period will occupy the plethora, and prevent its determination, in the form of blood, to the uterine system; and this practice has often been had recourse to, in order to prevent conception. Sometimes there is reason to believe that conception has taken place

while the plethoric determination to the breasts continued. I am rather disposed to believe, that in such cases its return to the uterine system had re-commenced; for about the same time the milk generally loses its alimentary qualities, and gradually dwindles away.

But we have said enough to describe and substantiate those parts of the female which puberty has prepared for generation. We shall now consider its effects on the male. It need not be repeated, that the seminal fluid is an exceedingly penetrating and active fluid. Its effects, after it is generated, even upon the male, demonstrate its activity and influence, far beyond the precincts wherein we believe it to be accumulated. After puberty, the secretion of it, during even indifferent health, is continually going on; and those collections of it in its reservoirs, which are not thrown out by venereal exercise, or by other means less decent, are reformed and mingled with the general mass. What is actually reformed about the period of puberty, before the system has been habituated to it, or saturated with it, produces very curious and remarkable effects over the whole body. The flesh and skin, from being tender, delicate, and irritable, become coarse and firm; the body in general loses its succulency; and a new existence seems to take place. The voice, a proof of the tension and rigidity of the muscular fibre, losing its tenderness and inequalities, becomes ungratefully harsh; and the mind itself, actuated by the progress of the body, and forgetting all its former inclinations and attachments, acquires distinctly new propensities and passions. These changes are not entirely the effect of ordinarily-progressive age and strength; neither are they promoted by intercourse with the world; for castration will anticipate them, and premature venery, or even gradual familiarity, and early onanism, will diminish them. Boys who have been subjected to castration never acquire either that strength of body or capacity of mind which dignifies the complete male; and the same cruel and unnatural operation performed on brute animals, diminishes their bodily strength, their courage, and the fierceness of their temper.

If such are the effects of the seminal fluid when reformed by the male, how powerful must it be when suddenly mingled, and most probably in greater quantity, with the circulating fluids of the attracting female! Coition, or rather the absorption of the seminal fluid of the male by the female, even when not succeeded by impregnation, induces an alteration very general over the female system. The local influence of which may be inferred from the general change which it is capable of inducing during complete health; from the relief which it effectuates in many species of disease; and from the general vivacity and cheerfulness diffused over the whole animal frame. It would be prolix to go over every disease which will warrant these opinions; yet, in the eye of common observation, the fallow and inanimate female,

female, by coition, often becomes plump and robust, and beautiful and active; while the widow, or married woman deprived of commerce with her husband, gradually returns to the imperfections and peculiarities of single life; and that the ancient virgin, all her life deprived of this animating effluvium, is generally consumed with infirmity, ill-temper, or disease. It is well known, too, that the want of coition at the time of life when Nature seems to require it, induces many disorders in females; and that the use of it removes these, and even other diseases. Chlorosis, or the whites, almost always attack females immediately after puberty; and, even when the violence of its symptoms have not been discerned till a later period, its origin can always be traced back to that time. When the human system is completely evolved, and all its parts have acquired their full growth, a balance is produced between the circulating and solid systems; though, from the ideas we have suggested concerning the menses, this balance in the female cannot strictly be called complete. It is only complete in her when in perfect health, and in an impregnated state; at other times, the catamenia, as preponderating against the powers of the solid system, in proportion to the degree of their period, disturb the equilibrium, and thereby more or less induce a state inconsistent with perfect health. But, when the propelling power of growth has ceased before the solids, either from actual disease, or want of uniformity in either period, or accession with respect to the progress of the circulating system, have acquired their proper vigour and tone; and when the catamenia has assumed its destination before it is accompanied by the general as well as local energy which is requisite to expel it, an universal want of balance comes on; the blood loses its stimulating influence on the vitiated solids, and these, in their turn, act feebly on the distempered blood. Accordingly, in the cure of this disease, no matter whether adopted from particular theories or from experience, medicines are directed to restore vigour to the solids, and consistence and stimulus to the circulating mass. Nature proceeds in the same manner; and the beneficial effects of coition in the cure of this disease have been too material to escape observation. It may be alleged, that these effects depend entirely upon local influence; and that even voluptuous gratification, by quieting the turbulence of passion, is of consequence in the cure. We shall not say that these things are unavailing; for it appears that the relief obtained is chiefly owing to the increased intestine motion, and consequent stimulus, communicated to the blood by the absorbed semen, whereby the solids themselves are ultimately restored; and we are the more confirmed in this opinion, because all these fortunate effects attend, whether coition be succeeded by impregnation or not. Hysterics, and other diseases, would furnish us with similar explanations and similar cures.

Let us now advance a little nearer our object. It is beyond a doubt, that, in whatever manner the semen acts upon the female, it does not act suddenly, notwithstanding the general assertions of many authors. However productive coition may be, the fecundated product of the ovaria is not immediately disengaged. We dare not avouch this fact from observations made on the human subject, because such observations never have been attempted, nor ever can with the smallest probability of success: but the dissection of brutes, by the most eminent anatomists, with a direct view to the elucidation of this fact, ascertains it as far as such evidence can be admitted. In the dissection of small animals by De Graff, he found no discernible alteration in the uterus during the first forty hours after coition, but a gradual change was perceivable in the ovaria; and what he supposed the ripened origin of the future animal, at the end of that time, losing its transparency, become opaque and ruddy. After that time, the fimbriæ were found closely applied to the ovaria; the cavities from whence the ova had been expressed were discernible; and about the third day the ova were discovered in the uterus. In large animals, and in those whose time of uterine gestation was longer, it was found that the progress which we have been describing was proportionably slower. The same experiments have been made by different anatomists, and perhaps with very different views; and, though they have not always been managed with the same judgment and dexterity, yet all of them more or less confirm the idea that there is a very considerable lapse of time intervening between productive copulation and the expulsion of the ovum from the ovaria. But, if this be the case with animals which soon arrive at puberty, and which, like human creatures, copulate not perfectly before puberty,—whose lives are short, and their progress in equal periods of time more rapid than those in man,—by parity of reason, it must happen, that in women the period between impregnation and the expulsion of the fecundated product of the ovaria must be considerably greater than what has been observed to take place in these animals. If all this is true—how are we to suppose Nature to be employed during this interval? We believe it is during this period that the whole female constitution is labouring under the fecundating influence of the seminal fluid taken into the blood by the *absorbents*; while the ovaria are largely participating, and their product ripening, by means of the general stimulating process. And the same process which matures the ovum tends to facilitate its exclusion. The ovaria, as well as their product, are at this time enlarged, and other changes, subject to the examination of our senses, induced. It is no proof against the reality of this general alteration in the circumstances of the circulating system, and consequent revolution in the ovaria, that the whole is accomplished with but little visible disturbance, either local or universal. In other

cases of material alteration in the mass of blood, equal quietness and obscurity prevail. In scrophulous or scorbutic taints; in the inoculated small-pox, or when they are produced by contagion; the poison silently and slowly diffuses itself throughout the whole mass, and a highly-morbid state is imperceptibly induced. Thus, an active and insinuating poison intimately mixes itself with all the containing, perhaps, as well as contained, parts, perverts their natures, and is ready to fall upon and destroy the very powers of life, before one symptom of its action or of its influence has been discerned. It is the same in a confirmed lues, and it is even more remarkable in the hydrophobia derived from the bite of a mad dog; and the whole round of contagious diseases have the same unalarming, yet certain, progress and termination.

That the final influence of this elaborate process should be determined particularly, and at all times, to the ovaria, is no way marvellous. To qualify the ovaria for this, they are supplied with a congeries of blood-vessels and nerves, at puberty larger and more numerous than what is allotted to any other part of similar magnitude. Were the ovaria merely a receptacle for the ova, which the venereal orgasm communicated by the nerves, or by the impulsion of the applied semen, was to lacerate; what use would there be for so intricate and extensive an arrangement of blood-vessels and nerves? But we may farther remark, that every distinct process in the human body, either during health or disease, tends to one particular and distinct purpose. The kidneys do not secrete bile, nor does the liver strain off the useless or hurtful parts of the blood which are destined to pass off by the emulgent; neither do the salivary and bronchial glands promiscuously pour out mucus or saliva; the variolous virus does not produce a morbillous eruption, syphilitic caries, or scrophulous ulcer; why then should the fecundated blood unconcernedly and promiscuously determine its energy to the skin, the lymphatics, or the substance of the bones? We know none of the operations in the human body, destined for the ordinary purposes of life and health, or for the removal of disease, but in a greater or less degree involve the machinery of the whole system. A single mouthful of food, while it is prepared, purified, and applied to its ultimate purposes, is subjected to the action of all the known parts of the body, and without doubt to all those parts the properties of which we are unacquainted with; a draught of cold water spreads its influence almost instantaneously from one extremity to the other; the slightest wound disturbs even the remotest parts, and is followed, not unfrequently, with the most unhappy effects; an almost invisible quantity of poison sets the whole frame in torture, and all the active powers of the body instinctively exert themselves to solicit its expulsion.—Can we distinguish these things, and admire them, and then suppose

suppose that the most material operation of the human body—the renovation of itself—is to be accomplished in a corner, and with infinitely less formality and solemnity than a spittle is cast upon the wind? The evident means are sufficiently degraded; we need not exert our ingenuity to degrade them farther.

It is during this interval, between productive coition and the exclusion of the ovum from the ovaria, that likenesses, hereditary diseases, and the like, are communicated and acquired. Instead of that influence which the imagination of the mother is supposed to possess over the form of the child, might we not suspect, that the seminal fluid of the male, co-operating, *during this interval*, with the influence of the female upon the ovum, instigated a likeness, according to the influence of the male and female tinctures, in the united principles? It is during this period only that the diseases of the male can be communicated to the child; and, if we admit not of this interval and general operation of the seminal fluid, we cannot see how they can be communicated, though those of the mother may be communicated then or at a much later period, considering how the child is nourished while it is in the uterus and at the breast. It may be urged against this early and effectual acquisition of likenesses, that the fœtus does not acquire even the division of its largest members till long after its exclusion from the ovaria: but then we are confident, that, as the fœtus takes all its form and other properties from the active subtilty of these blended tinctures, we cannot see any reason why it should not possess this hereditary faculty, in common with the rest. If likenesses depend upon the imagination of the female, how happens it that the children of those whose profligate manners render the father uncertain, and whose affections cease with the instant of libidinous gratification, are as frequently distinguishable by their likenesses as those children who have been born under none of these misfortunes? If the features are not planted during this period, and if imagination be not idle or useless, how was the six-fingered family, mentioned by Maupertuis, continued? When a female of that family married a man who had only the usual number of fingers, the deformity of her family became uncertain, or ceased; and we must suppose her imagination could not have been inactive or diminished, whether alarmed by the fear of continuing a deformed race, or instigated by the vanity of transmitting a remarkable peculiarity. Were imagination, in a pregnant woman, so powerful as many have endeavoured to represent it, the mother, profligate at heart, though not actually wicked, would always betray the apostasy of her affections; and even a virtuous woman might divulge that she had looked with as much eagerness at a handsome stranger as she had looked at the aquiline nose or other prominent feature of her husband.

But,

But, admitting that the feminal fluid of every male possesses some kind of influence peculiar to that male, and connected with his form, as well as his constitution; in the same or in some similar manner it contains, notwithstanding the elaborateness of its preparation, the stamina of diseases, some of which often lie longer dormant than even the features of individuals; that the ova are as peculiarly constructed, by the constitution of the female, as any other parts which depend upon gradual and solitary evolution and that these, operating upon each other by the intervention of the general system of the female, may, according to the power or prevalence of either, affect the features and figure of the incipient animal, or rather the inorganized mass from which the features and figure of the animal are afterwards to be evolved: admitting all these things, will national, or even more extensive, similitude corroborate the opinion?

While men continue in the same climate, and even in the same district, an uniform particularity of features and figure prevails among them, little affected by all those changes which improve or degrade the mind; but, when they migrate, or when they are corrupted by the migration of others, this national distinction in time is lost, though in the latter case it seems to be recoverable, unless the cause of change be continued.—The beautiful form and features of the ancient Greeks are at this day discernible in their descendants, though they are debased by intercourse with strangers, and by forms of government ultimately affecting their constitutions; the descendants of the few who by chance or design have been obliged to settle among the ugly tribes in the extremities of the North, have, by their intercourse with these tribes, and by necessarily accommodating themselves to the same modes of life, besides other circumstances, become equally ugly; and the Jew himself, though he abhors to mingle with a different nation, and though his mode of life is nearly the same in all climates, yet the settlement of his ancestors in any one particular climate for some centuries will very sensibly impair the characteristic features of his people. As equally in point, and less liable to question, we may mention the following similar observations. A Scotchman, an Englishman, a Frenchman, or a Dutchman, may, even without their peculiarities of dress, be almost always distinguished in their very pictures; the sturdy and generous Briton, notwithstanding the shortness of the period, and the uninterrupted intercourse, is traced with uncertainty in the effeminate and cruel Virginian: and the Negroes in North America, whose families have continued since the first importation of these unhappy creatures, and whose modes of living, exclusive of their slavery, are not materially changed, are much less remarkable for the flat nose, big lips, ugly legs, and long beels, than their ancestors were, or than those who are directly imported from the same original nation.

From these observations it seems allowable to infer, that, though climate, manners, occupation, or imitation, cannot materially affect the form or features of the existing animal, yet these circumstances, becoming the lot of a series of animals, may, by inducing a change in the general mass both of the male and female, be the remote cause of a change in their product.

After what has been premised, it seems rational to conclude, that the prolific fluid, in coition, is neither carried through the Fallopian tubes, nor protruded through the aperture of the uterus, to the ovaria; but that it is taken up by the absorbent vessels, and conveyed into the sanguiferous system, where indeed every active principle that can possibly affect the human constitution is also conveyed. That, after circulating through the blood, it is by its natural impulse, and the additional stimulus acquired from the mother, forced through the corresponding vessels into the ovaria; where, if it finds one or more of the ova in a state fit or ripe for impregnation, conception takes place accordingly: and either one or more are impregnated, as the matured state of the ovaria might happen to be. But if none of the ova or eggs are in a state sufficiently mature, or chance to be injured by any offending humours, by debility, or disease, in either of these cases impregnation is frustrated, just the same as happens to an addled egg, or to a damaged grain of corn thrown into the earth.

On the other hand, if the male organ be deficient in vigour, or the semen be defective in quantity, consistency, or active power, it then fails of stimulating the female fluid, and is incapable of influencing impregnation. In order therefore that the act of copulation should be productive, the male must unquestionably convey to the female an elaborate tincture, which possesses the essence of his whole system, as well mental as corporeal. In this act, the utmost energy and powers of the mind, of the body, and of the soul, are intimately connected; and all contribute their particular influence to the seed; of which every father must be sensible, when he recollects the action of the heart, the seat of life—of the brain, the seat of the soul—and of the whole powers of the body, concentrated and impelled, as it were, through the genital system.—That this liquor comprehends the active principles of *body and soul*, will not I think be doubted in those who give the foregoing arguments their proper weight; and that it conveys with it, more or less, the direct image of the parent, I take to be confirmed by the evidence of Scripture; where we are told that one absolute and unequivocal form was given to man, in the express image of the Deity. So that man, thus organized and commissioned, was doubtless to convey to future generations that divine image or signature which God had graciously stamped upon him. For this purpose the seed of man, or efficient principle



[Faint, illegible text]

[Faint, illegible text]



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Conception



First Month



Second Month



Third Month



Fourth Month

Formation of the Human Fetus.

W. H. W.

of generation, must be mingled with the vegetative fluid of the female; and, being attracted or taken up by the absorbent vessels from the uterine canal, passes immediately into the circulating system, where, assimilating with the peculiar temperature of the mother, and acquiring new energy from the enlivening quality of the blood, it is directed through its natural channels to the ovaria, impregnating the germ by its active quality, and conveying to it the peculiarities it had derived from the constitutions, forms, tempers, and dispositions, of the parents, with the seeds of whatever diseases, impurities, or taints, were lurking in their blood. For from the blood and brain is the male seed primarily elaborated, and into the female mass is this thrown and assimilated, before impregnation can possibly take place. In the course of six days, I conclude the united tinctures to have travelled through the whole circulating system—to have participated of the hereditary forms and peculiarities of the mother, and to have propelled the ovum or egg from its seat in the ovaria to a suspended situation in the womb, hanging by a minute thread, that afterwards becomes the umbilical vessel, or aperture through which nourishment and life is conveyed from the mother to the child. The first visible state of conception, which resembles the lucid appearance of a drop of water, tending to coagulation, is correctly shown in the first figure of the annexed Plate, precisely in the state it was extracted from the uterus of a female who died on the sixth day after contact with the male.

At the time the ovum, or rudiments of the embryo, descends into the womb, it is indeed very minute; but at the end of about thirty days, we may partly discover the first lineaments of the foetus, though small and imperfect, being then only about the size of a house-fly. Two little vesicles appear in an almost transparent jelly; the smaller of which is intended to become the head of the foetus, and the larger one is destined for the trunk; but neither the limbs nor extremities are yet to be seen; the umbilical cord appears only as a minute thread, and the placenta, which only resembles a cloud above, has no ramifications, or appearances of blood-vessels. This state of the embryo is expressed in the second figure of the annexed Plate.

Towards the end of the second month, the foetus is upwards of an inch in length, and the features of the face begin to be evolved. The nose appears like a small prominent line; and we are able to discover another line under it, which is destined for the separation of the lips. Two black points appear in the place of eyes, and two minute holes mark the formation of the ears. At the sides of the trunk, both above and below, we see four minute protuberances, which are the rudiments of the arms and legs. The veins of the placenta are also now partly visible; as may be seen in No. 3 of the Plate.

In the third month the human form may be decidedly ascertained; all the parts of the face can be distinguished; the shape of the body is clearly marked out; the haunches and the abdomen are elevated, and the hands and feet are plainly to be distinguished. The upper extremities are observed to increase faster than the lower ones; and the separation of the fingers may be perceived before that of the toes. The veins of the placenta are now distended, and are seen to communicate with the umbilical tube. This state of gestation is faithfully delineated in No. 4 of the annexed Engraving.

In the fourth month the *fœtus* seems to be completed in all its parts, and is about four inches in magnitude. The fingers and toes, which at first coalesced, are now separated from each other, and the intestines appear, in all their windings and convolutions, like little threads. The veins of the placenta begin to be filled with blood, and the umbilical cord is considerably enlarged; as may be seen in the fifth figure of the subjoined Plate.

In the fifth month, the bodily conformation being perfected in all its parts, and a complete circulation of the blood induced, the mother quickens. The *fœtus* now assumes a more upright figure, which corresponds with the shape of the uterus. Its head is found more elevated, its lower extremities are more distended, its knees are drawn upwards, with its arms resting upon them. It now measures from seven to eight inches in length, and is described in the first figure of the second subjoined Plate.

Towards the end of the sixth month, the *fœtus* begins to vary its position in the womb, and will frequently be found to incline either to the right or to the left side of the mother. It will by this time be increased to nine or ten inches; and its usual posture, after quickening, may be seen in the second figure of the second annexed Plate.

In the seventh month the child acquires strength and solidity; as may be demonstrated by those painful throws and twitchings which its mother feels from time to time; and it is now increased to eleven or twelve inches.

In the eighth month it generally measures from fourteen to sixteen inches; and in the ninth month, or towards the end of its full time, it is increased from eighteen to twenty-two inches, or more; when the head, by becoming specifically heavier than the other parts, is gradually impelled downwards, and, falling into the birth, brings on what is termed the pains of parturition, or natural labour. For the exact position of the child in the womb during these three last months, as well as the former, see the corresponding figures in the two annexed Engravings, the whole of which were correctly drawn from real *fœtusses*, extracted from the wombs of different women.



Fifth Month



Sixth Month



Seventh Month



Eighth Month



Ninth Month

Formation of the Human Fœtus.

Plate II.

Dodd del.

Published as the Act directs June 30th 1794.

Figs. 1-5.



The nourishment of the fœtus during all this time is derived from the placenta, which is originally formed out of that part of the ovum which is next the fundus uteri. The remaining part of the ovum is covered by a membrane called *spongy chorion*; within which is another called *true chorion*, which includes a third, termed *amnios*. This contains a liquor, or watery fluid, in which the fœtus floats till the time of its birth. Before the child acquires a distinct and regular form, it is called *embryo*; but from the time all its parts become visible, it takes and retains the name of *fœtus* till its birth. During the progress of impregnation, the uterus suffers considerable changes; but, though it enlarges as the ovum increases, yet, in regard to its contents, it is never full; for, in early gestation, these are confined to the fundus only: and, though the capacity of the womb increases, yet it is not mechanically stretched, for the thickness of its sides do not diminish; there is a proportional increase of the quantity of fluids, and therefore pretty much the same thickness remains as before impregnation. The gravid uterus, or pregnant womb, is of different sizes in different women; and must vary according to the bulk of the fœtus and involucre. The situation will also vary according to the increase of its contents, and the position of the body. For the first two or three months the cavity of the fundus is triangular, as before impregnation; but, as the uterus stretches, it gradually acquires a more rounded form. In general the uterus never rises directly upwards, but inclines a little obliquely, most commonly to the right side; its position is never, however, so oblique as to prove the sole cause either of preventing or retarding delivery; its increase of bulk does not seem to arise merely from distension, but to depend on the same cause and increase as the extension of the skin in a growing child. This is proved from some late instances of extra-uterine fœtuses, where the uterus, though there were no contents, was nearly of the same size, from the additional quantity of nourishment transmitted, as if the ovum had been contained within its cavity. The internal surface, which is generally pretty smooth, except where the placenta adheres, is lined with a tender efflorescence of the uterus, which, after delivery, appears as if torn, and is thrown off with the cleanings. This is the *membrana decidua* of Dr. Hunter; which he describes as a lamella from the inner surface of the uterus; though Signor Scarpa, with more probability, considers it as being composed of an inspissated coagulable lymph.

Though the uterus, from the moment of conception, is gradually distended, by which considerable changes are occasioned, it is very difficult to judge of pregnancy from appearances in the early months. For the first three months the os tincæ feels smooth and even, and its orifice as small as in the virgin state. When any difference can be perceived about the fourth or fifth month, from the descent of the fundus

through the pelvis, the tubercle or projecting part of the os tinæ will seem larger, longer, and more expanded; but, after this period, it shortens, particularly at its fore-parts and sides, and its orifice or labia begin to separate, so as to have its conical appearance destroyed. The cervix, which in the early months is nearly shut, now begins to stretch and to be distended to the os tinæ; but during the whole term of utero-gestation, the mouth of the uterus is strongly cemented with a ropy mucus, which lines it and the cervix, and begins to be discharged on the approach of labour. In the last week, when the cervix uteri is completely distended, the uterine orifice begins to form an elliptical tube, instead of a fissure, or to assume the appearance of a ring on a large globe; and often at this time, especially in pendulous bellies, disappears entirely, so as to be out of the reach of the finger in touching. Hence the os uteri is not in the direction of the axis of the womb, as has generally been supposed.

About the fourth, or between the fourth and fifth, month, the fundus uteri begins to rise above the pubes, or brim of the pelvis, and its cervix to be distended nearly one-third. In the fifth month the belly swells like a ball, with the skin tense, the fundus about half way between the pubes and navel, and the neck one-half distended. After the sixth month the greatest part of the cervix uteri dilates, so as to make almost one cavity with the fundus. In the seventh month the fundus advances as far as the umbilicus. In the eighth it reaches mid-way between the navel and scrobiculus cordis; and in the ninth to the scrobiculus itself, the neck then being entirely distended, which, with the os tinæ, become the weakest part of the uterus. Thus at full time the uterus occupies all the umbilical and hypogastric regions; its shape is almost pyriform, that is, more rounded above than below, and having a stricture on that part which is surrounded by the brim of the pelvis. The appendages of the uterus suffer very little change during pregnancy, except the ligamenta lata, which diminish in breadth as the uterus enlarges, and at full time are almost entirely obliterated.

The various diseases incident to the uterine system, and other morbid affections of the abdominal viscera, in weak and sickly females, will frequently excite the symptoms, and assume the appearance, of real pregnancy. Complaints arising from a simple obstruction are sometimes mistaken for those of breeding; when a tumor about the region of the uterus is also formed, and gradually becomes more and more bulky, the symptoms it occasions are so strongly marked, and the resemblance to pregnancy so very striking, that the ignorant patient is often deceived, and even the experienced physician imposed on.

Scirrhus, polypous, or farcomatous, tumours, in or about the uterus or pelvis; dropfy or ventosity of the uterus or tubes; steatoma or dropfy of the ovaria, and ventral conception; are the common causes of such fallacious appearances. In many of these cases the menses disappear; nausea, retchings, and other symptoms of breeding, ensue; flatus in the bowels will be mistaken for the motion of the child; and, in the advanced stages of the disease, the pressure of the swelling on the adjacent parts. Tumefaction and hardness of the breasts supervene, and sometimes a viscid or serous fluid distils from the nipple; circumstances that strongly confirm the woman in her opinion, till time, or the dreadful consequences that often ensue, at last convince her of her fatal mistake.

Other kinds of spurious gravidity, less hazardous in their nature than any of the preceding, are commonly known by the names of *false conceptions* and *moles*: the former of these is nothing more than the dissolution of the fœtus in the early months; the placenta is afterwards retained in the womb, and, from the addition of coagula, or in consequence of disease, is excluded in an indurate or enlarged state; when it remains longer, and comes off in the form of a fleshy or scirrhus-like mass, without having any cavity in the centre, it is distinguished by the name of *mole*. Mere coagula of blood, retained in the uterus after delivery, or after immoderate floodings at any period of life, and squeezed, by the pressure of the uterus, into a fibrous or compact form, constitute another species of mole, that more frequently occurs than any of the former. These, though they may assume the appearances of gravidity, are generally, however, expelled spontaneously, and are seldom followed with dangerous consequences. But, when two or more of the ova descend into the uterus, attach themselves so near one another as to adhere in whole or in part, so as to form only one body, with membranes and water in common, this body will form a confused irregular mass, which is called a *monster*; and thus a monster may be either defective in its organic parts, or be supplied with a supernumerary set of parts derived from another ovum. This proceeds from a defect or accident in nature, which it is entirely beyond the power of medicine to rectify or prevent.

It would seem, however, from a due contemplation of the foregoing facts, from the frame and structure of females, and from the ultimate end and purpose of their conformation, that almost every malady resulting from a state of pregnancy, except the last-mentioned, may be in a great measure prevented or removed. The natural temperature of women differs in a very considerable degree from that of men, inasmuch as their blood and juices are determined to an opposite and distinct purpose; and hence it is that obstructions of the menses, their excess, or privation of the office intended them, constitute those peculiar maladies which we term *Diseases of Women*.

men. The natural temperature of the male, is *hot* and *dry*; that of the female, *cold* and *moist*. The action of the procreative tincture of man is SOLAR, i. e. of the heating and quickening faculty; that of the woman is LUNAR, i. e. of a cool and vegetative quality. As the sun heats, and gives prolific energy to the fruits of the earth, so man fecundates and gives life to the prolific tincture of the woman. Thus the male, as the microcosm, or epitome of the celestial system, possesses an inherent similitude with the sun, which vivifies and quickens; and thus the female, possessing an inherent similitude with the moon, vegetates and brings forth the fruit of her womb, and not only feels the influence and sympathy of that luminary in her monthly discharges, but in all the travail and vicissitudes of pregnancy. To the same source likewise we trace the cause, and decide the question, Whether the fruit of the womb be male or female? for, if the male seed be predominant, heat will abound, and the male foetus will be generated; but, if the cooling moisture of the woman overcomes the masculine heat in the male seed, a female is then produced. The old and exploded notion of this cause depending on the child's falling to the right or left side of the mother, is too absurd to weigh a moment on the mind of any reasonable enquirer.

We discover likewise that the male, being constituted of the solar temperature, is naturally subjected to those infirmities of body and mind which result from the elements of fire and air; while those of the female are of lunar tendency, arising from the elements of water and earth. Of these four elements our gross or material part is formed, and by their due and proper commixture in the constitution, or circulating mass, are life and health established; whilst, on the contrary, by their discordant, defective, or predominant, power, disease and death are produced. Now the male abounding in heat, and the female in moisture, is the reason why many disorders incident to man are alleviated by contact with the woman, as those of the woman are by contact with the man. In the grand scale of Nature, we find the meridian heat and scorching rays of the sun are qualified and corrected by the cooling moisture and mild influence of the midnight moon; but, when either of these are obstructed in their effect, by the intervention of accidental causes, by storms, by tempests, or unseasonable blasts, we then endeavour to repress by art the evil consequences that are likely to ensue. Just so in the human economy, the grand purpose and design of medicine is to correct and modify the discordant elements in the constitution, and give that vigour and tone to the vital powers, which constitute the genuine principles of health and life.

From what has been suggested we might safely infer, that the constitution and temperature of the female require a medicine of an opposite action and tendency to that

that adapted to the male, and which ought to be compounded of elements congenial to the intentions of Nature, calculated to purge the uterus, to purify the seminal fluid, and give stimulus to the catamenia; which, if not put in motion by the functions of Nature, becomes dull and stagnant, and vitiates the whole circulating mass: whence those disorders, peculiarly incident to the most amiable, as being the most virtuous, of women, are confessedly derived; and for the cure and prevention of which, a peculiar and distinct remedy has long been wanting.

These, and other considerations, influenced by the known power of second causes, and their faculty of acting upon the mechanism of the human frame, induced me to attempt the chemical preparation of two subtile Tinctures, constituted of a co-mixture of the purest elements of which our blood is composed, and adapted to the particular temperature and constitutions of the opposite sexes. That intended for the use of Man, I call the SOLAR TINCTURE, as being congenial to the seminal functions and vital principles of his constitution. That adapted to Woman, I call the LUNAR TINCTURE, as being calculated to act upon the menstrual and vegetative fluids, and as being compounded of those elements which make up the frame and temperature of her body. The invention of these Tinctures hath been the result of a long and laborious application to the study of unveiled Nature—of the properties of fire, air, earth, and water, in the propagation of animal and vegetable life, and in the composition of medicine; in which, though these elements form the PABULUM of the universe, yet the art of collecting, uniting, and assimilating them with the vital fluids, seems to be unknown among modern chemists, and has escaped the observation of medical science. The fixidity of these Tinctures at once establishes their power and efficacy beyond all others; for they can never be affected by change of weather or climate, nor by heat or cold; nor will they suffer any diminution of their strength or virtue by remaining open, or uncorked; a circumstance which cannot be affirmed of any other fluid at present known, throughout the world.

I shall now proceed to show the action of the LUNAR Tincture on Female constitutions; and, as this medicine is only intended to remedy such complaints as particularly relate to pregnancy, and the menstrual discharge, I shall omit to notice any other maladies, until I come to treat of the SOLAR Tincture, which, though essentially directed to give tone and vigour to the constitution of the male, is nevertheless equally efficacious to the female in removing all disorders of the blood and lymph, that are alike common to valetudinarians of both sexes. No complaint in the female habit, therefore, comes under our present enquiry, till at or near the age of puberty. Until this important period of the sex arrives, the Rules heretofore laid down in the Medical Part of my new edition of Culpeper's Family Physician, for the ma-

nagement and future health of young ladies, deserve a very close and serious attention. The evident distinction between the male and female in their structure and design, in their bodily strength and vigour, and in the procreative fluids, demands the utmost attention from themselves, and the tenderest care from the physician. Nor can we too often or too earnestly caution parents and guardians against the evils of that absurd though fashionable style of bringing up young ladies, by confining them almost entirely to their apartments, keeping them on poor low diet, and using artificial means to make them spare and delicate, which contributes more to their prejudice than all the incidental diseases to which they are otherwise subject. These refinements in female education, besides destroying their ruddy complexion, (which is often the design of it,) relaxes their solids, impoverishes their blood, weakens their minds, and disorders all the functions of their body, whereby they are often rendered incapable of conception, and denied the felicity of becoming mothers. On the contrary, it ought to be the study, as it certainly is the duty, of all that have girls under their care, to indulge them in every innocent diversion, and in every active exercise, that can give freedom to the limbs, or agility to the body; all of which have a natural tendency to exhilarate their spirits, to promote digestion, to stimulate their blood and juices, and, at the proper age, to bring on a free and easy discharge of the menstrual flux.

Though it is universally admitted, that this flux is absolutely necessary to nourish and support the fœtus, and that without it human generation cannot be carried on; and that it is consequently and obviously peculiar to the female uterine system; yet is it curious to observe the various absurd and contradictory opinions some physicians have laboured to establish, merely, one would suppose, to bewilder the understanding, and subject delicate females still more to that erroneous or misguided treatment, in which their health, their life, and every earthly blessing, are too frequently involved.

Dr. Bohn, and Dr. Freind, insist that this flux is nothing more than a plenitude of the common mass of blood, which nature throws off only for relief against the too abundant quantity. Dr. Freind supposes, that this plenitude arises from a coarction in the blood-vessels of a superfluity of aliment, which, he thinks, remains over and above what is expended by the ordinary ways; and that women have this plethora, and not men; because their bodies are more humid, and their vessels, especially the extremities of them, more tender, and their manner of living generally more inactive than that of men; and that these things, concurring, are the occasion that women do not perspire sufficiently to carry off the superfluous alimentary parts, till they are accumulated in such quantities as to distend the vessels, and force their way through the capillary arteries of the uterus. It is supposed to hap-
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pen to women more than to the females of other species, which have the same parts, because of the erect posture of the former, and the vagina and other canals being perpendicular to the horizon; so that the pressure of the blood is directed towards their orifices: whereas in brutes they are parallel to the horizon, and the pressure is wholly on the sides of those vessels. The discharge, he thinks, happens in this part rather than in any other, as being more favoured by the structure of the vessels; the arteries being very numerous, and the veins sinuous and winding, and therefore more apt to retard the impetus of the blood; and consequently, in a plethoric case, to occasion the rupture of the extremities of the vessels, which may last, till, by a sufficient discharge, the vessels are eased of their overload. To this he adds the consideration of the soft pulpy texture of the uterus, and the vast number of veins and arteries with which it is filled. Hence a healthy maid, being arrived at her growth, begins to prepare more nutriment than is required for the support of the body; which, as there is not to be any further accretion, must of necessity fill the vessels, and especially those of the uterus and breasts, they being the least compressed. These will be dilated more than the others; whence, the lateral vascules evacuating their humour into the cavity of the uterus, it will be filled and extended. Hence a pain, heat, and heaviness, will be felt about the loins, pubes, &c. and the vessels of the uterus at the same time, will be so dilated as to emit blood in the cavity of the uterus, and its mouth will be lubricated and loosened, and blood issue out. As the quantity of blood is diminished, the vessels will be less pressed, and will contract themselves closer, so as again to retain the blood, and let pass the grosser part of the serum; till at length only the usual serum passes. Again, there are more humours prepared, which are more easily lodged in vessels once dilated; and hence the menses go and return at various periods in various persons.

This hypothesis is judiciously opposed by Dr. Drake, who maintains, that there is no such plenitude, or at least that it is not necessary to menstruation; arguing that, if the menses were owing to a plethora so accumulated, the symptoms would arise gradually, and the heaviness, stiffness, and inactivity, necessary symptoms of a plethora, would be felt long before the periods were completed, and women would begin to be heavy and indisposed soon after evacuation, and the symptoms would increase daily; which is contrary to all experience, many women, who have them regularly and easily, having no warning, nor any other rule to prevent an indecent surprise, than the measure of time; in which some that have slipped have been put to confusion and shifts no ways consistent with the notice a plethoric body would give. He adds, that even in those who are difficultly purged this way, the symptoms, though very vexatious and tedious, do not make such regular approaches

proaches as a gradual accumulation necessarily requires. If we consider what violent symptoms come on in an hour, we shall be extremely puzzled to find the mighty accession of matter, which should, in an hour or a day's time, make such great alterations. According to the hypothesis, the last hour contributed no more than the first: and of consequence, the alteration should not be greater in the one than in the other, setting aside the bare eruption.

There are others who give into the doctrine of fermentation, and maintain the evacuation in those parts to be an effect of an effervescence or ebullition of the blood. This opinion has been maintained by Dr. Charleton, and by Bale, De Graaf, and Drake, the two first of whom suppose a ferment peculiar to women, which produces this flux, and affects that part only, or at least principally. Dr. Graaf, less particular in his notion, only supposes an effervescence of the blood, raised by some ferment, without assigning how it acts, or what it is. The sudden turgescence of the blood occasioned them all to think, that it arose from something till then extraneous to the blood; and led them to the parts principally affected to seek for an imaginary ferment, which no anatomical enquiry could ever show, or find any receptacle for, nor any reasoning necessarily infer. Again, that heat which frequently accompanies this turgescence, led them to think the case more than a plethora, and that there was some extraordinary intestine motion at that time.

Dr. Drake contends, that it is not only necessary there should be a ferment, but a receptacle also for this ferment; concluding, from the suddenness and violence of the symptoms, that a great quantity must be conveyed into the blood in a short time, and consequently that it must have been ready gathered in some receptacle, where, while it was lodged, its action was restrained. He pretends to ascertain the place both of the one and the other, making the gall-bladder to be the receptacle, and the bile the ferment. The liquor he thinks well adapted to raise a fermentation in the blood, when discharged into it in quantity; and, as it is contained in a receptacle that does not admit of a continual issue, it may be there reserved till, in a certain period of time, the bladder becoming turgid and full, through the compression of the incumbent viscera, it emits the gall; which, by the way of the lacteals insinuating itself into the blood, may raise that effervescence which occasions the aperture of the uterine arteries. To confirm this, he alleges, that persons of a bilious constitution have the menses either more plentifully, or more frequently, than others; and that distempers manifestly bilious are attended with symptoms resembling those of women labouring under difficult menstruation. But, if this argument be admitted, men would have the menses as well as women. To this however he answers, that men do not abound in bile so much as women, the pores of the former being more open, and carrying off more of the ferrous part of the blood, which is the
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vehicle of all the other humours, and consequently a greater part of each is discharged through them than in women, wherein the superfluity must either continue to circulate with the blood, or be gathered into proper receptacles, which is the case in the bile. The same reason he gives why menstruation should not be in brutes; the pores of these being manifestly more open than those of women, as appears from the quantity of hair which they bear, for the vegetation whereof a large cavity, and a wider aperture of the glands, is necessary, than where no such thing is produced: yet there is some difference between the males and females even among these, some of the latter having their menses, such as the orang outang,* &c. though not so often, nor in the same form and quantity, as women. But without dwelling on these abstract reasonings, the absurdity of which will be obvious to every person who turns to the foregoing system of human impregnation, we need only remark, that there are two critical periods in every woman's life that completely destroy their hypothesis. These are that, at the age of fourteen or fifteen, the menses begin to flow; but subside at the age of forty or fifty. At their commencement, we generally find the difficulty, and consequent disease, arise from their *deficiency*; whereas, according to the foregoing doctrine, they would then *always* flow with the greatest freedom. At the period when they should cease, they are apt to come in such abundance as to bring on a flooding, which not only endangers, but too frequently destroys, life,—a fatal consequence that could not possibly happen were the above arguments true.

OF FEMININE, OR LUNAR, DISEASES.

THAT the vegetative or procreative faculties of women are universally governed by the lunations of the moon, their own experience, as well as the demonstrations given in my *ILLUSTRATION OF ASTROLOGY*, indisputably prove. The first flow of the catamenia, if it be natural, invariably comes with the new or full moon; or sometimes, though very seldom, at the commencement of her first or last quarters; and this effort of nature is justly considered as the sure sign of a procreating ability, and of complete puberty. Whenever this season arrives, whether early or late, the constitution of every female undergoes a considerable change, and the greatest care and attention are then necessary, since the future health and happiness of every woman depends, in a great measure, upon her conduct at this period. It is the duty of mothers, and of those who are entrusted with the education of girls, to instruct them early in the conduct and management of themselves at this critical moment. False modesty, inattention, and ignorance of what is beneficial

* See this curious subject, concerning the orang outang, and other animals resembling the human species, treated at large, both historically and philosophically, in my new *System of Natural History*, vol. ii. 8vo.

or hurtful at this time, are the sources of many diseases and misfortunes, which a very little attention might now prevent. Nor is care less necessary in the subsequent returns of this discharge. Taking improper food, violent agitations of the mind, or catching cold, is often sufficient to ruin the health, or to render the female for ever after incapable of procreation.

In order to escape the chlorosis, and other similar diseases incident to young women at that period when the menses commence, let them avoid indolence and inactivity, and accustom themselves to exercise in the open air as much as possible. The discharge in the beginning is seldom so instantaneous as to surprise them unawares. The eruption is generally preceded by symptoms that indicate its approach; such as a sense of heat, weight, and dull pain, in the loins; distention and hardness of the breasts, head-ach, loss of appetite, lassitude, paleness of the countenance, and sometimes a slight degree of fever. When these symptoms occur, every thing should be carefully avoided which may obstruct the discharge, and all gentle means used to promote it; as sitting frequently over the steam of warm water, drinking warm diluting liquors, &c. When the menses have begun to flow, great care should be taken to avoid every thing that tends to obstruct them; such as fish, and all kinds of food that are hard of digestion, and cold acid liquors. Damps are likewise hurtful at this period; as also anger, fear, grief, and other affections of the mind. From whatever cause this flux is obstructed, except in the state of pregnancy, proper means should be instantly used to restore it; and if exercise in a dry, open, and rather cool, air, wholesome diet, generous liquors in a weak and languid state of the body, cheerful company, and amusement, fail, recourse must be had to medicine. In all such cases, blood-letting must be carefully avoided; but let the patient take from 20 to 30 drops of the Lunar Tincture, in a wine-glass of warm water, or penny-royal tea, every morning before breakfast, every day at noon, and every night before going to bed, until the intention be answered, which will usually take place in three or four days, without the assistance of any other medicine whatever. But it sometimes happens in relaxed constitutions, that the menstrual discharge, on its first appearance, is vitiated, and over-abundant; the consequence of which is, that the patient becomes weak, the colour pale, the appetite impaired, and the digestion languid, so that dropsy or consumption is likely to ensue. Effectually to prevent these, let the patient be kept two or three days in bed, with her head low, and observe a slender diet, principally of white meats, and her drink red-port negus. Every night and morning, for ten or twelve days, let her take one table-spoonful of the Solar Tincture, diluted in double the quantity of decoction of nettle-roots, or of the greater comfrey; and, after the flux has

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abated,

abated, and her health and strength seem to return, let her only take a table-spoonful of the Solar Tincture every other day at noon, in a glass of cold spring-water; which wonderfully contributes to restore a due consistency to the circulating mass, promotes digestion, and invigorates the spirits. Before the customary period returns, she must discontinue the Solar Tincture; and, if there be the least appearance of irregularity or obstruction, let her again take, night and morning, for two or three days, from 20 to 30 drops of the LUNAR TINCTURE, in a glass of pennyroyal tea, and she will quickly find a regular habit, and her health amazingly established. In obstinate or neglected cases, where the menses have seceded, and, after an irregular appearance, have turned wholly into the habit, both these Tinctures should be used with a less sparing hand, particularly under circumstances in any respect similar to the following remarkable

C A S E.

Being called to the assistance of a young lady of fifteen years of age, I was informed her menses had made an irregular appearance about five or six times, coming first with the full and then with the new moon, and afterwards at the distance of two or three months apart, until they totally disappeared, and turned back upon the habit. No notice was taken, until the patient was seized with a violent bleeding at the nose, attended with fever, and epileptic fits. After being under the care of an eminent physician for several months, who directed venesection, and almost every customary application, to no kind of purpose, the disorder fixed in her neck, forming a large tumour, the acrimony of which fell upon her lungs, and threw her into strong convulsions. In this extremity, I was sent for. Perceiving the whole system deranged by spasmodic affections, and a locked jaw almost finally completed, my first object was to relieve the vital organs, by giving force and elasticity to the circulating mass. With this view, I with difficulty forced open the mouth, and administered one table-spoonful of the Solar Tincture *undiluted*; and within half an hour, to the astonishment of her friends, I had the pleasure of seeing every convulsive symptom die away, and of hearing the patient's voice, of which she had been totally deprived for upwards of a week before. Two hours after, another spoonful of the Solar Tincture was taken with additional success; and the patient afterwards continued this medicine in the quantity of a table-spoonful, in a wine-glass of warm water, three times a-day, for six days, at the expiration of which time her appetite and strength were surprisngly returned; and she was then put under a regular course of the Lunar Tincture. Twenty drops in a wine-glass of pennyroyal tea were taken every night and morning for thirteen successive days, and on the morning following, it being the full moon, with which her menses originally came,

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she had the consolation to find that every obstruction was removed, and that the due course of nature was completely re-established. The glandular swellings gradually subsided, her natural complexion quickly returned, and she now continues in blooming health, perfectly regular, free from all obstructions, and from every consequent complaint, thankful for the blessings of her recovery, and desirous of communicating the means to any unfortunate female under similar affliction; and to whom reference may at any time be had, by application to the author.

CHLOROSIS, or GREEN-SICKNESS; by some called the LOVE-FEVER.

THIS disease usually attacks virgins a little after the time of puberty, and first shows itself by symptoms of *dyspepsia*, or bad digestion. But a distinguishing symptom is, that the appetite is entirely vitiated, and the patient will eat lime, chalk, ashes, salt, &c. very greedily; while at the same time there is not only a total inappetence to proper food, but it will even excite nausea and vomiting. In the beginning of the disease, the urine is pale, and afterwards turbid; the face becomes pale, and then assumes a greenish colour; sometimes it becomes livid or yellow; the eyes are sunk, and have a livid circle round them; the lips lose their fine red colour; the pulse is quick, weak, and low, though the heat is little short of a fever, but the veins are scarcely filled; the feet are frequently cold, swell at night, and the whole body seems covered with a soft swelling; the breathing is difficult; nor is the mind free from agitation as well as the body; it becomes irritated by the slightest causes; and sometimes the patient loves solitude, and becomes sad and melancholy. There is a retention of the menses throughout the whole course of the disorder; which eventually fixes in the vital organs, and death ensues.

The above complaint indisputably arises from stifling or suppressing the calls of nature at this vernal season, or juvenile spring of life, when the primary command of God, "*increase and multiply,*" is most sensibly impressed upon the whole human fabric. Every tube and vessel appertaining to the genital system, being now filled with spermatic or procreative liquor, excites in the female a powerful, yet perhaps involuntary, irritation of the parts, which strongly solicits the means of discharging their load, that can only be done by venereal embraces. These, from prudential reasons, being often necessarily denied, the prolific tinctures seize upon the stomach and viscera, pen back and vitiate the catamenia, choke and clog the perspirative vessels, whereby the venal, arterial, and nervous, fluids, become stagnant; and a leucophlegmatia, or white flabby dropical tumour, pervades the whole body, and quickly devotes the unhappy patient to the arms of death. Thus, I am sorry to remark, are thousands of the most delicate and lovely women plunged into eternity, in the

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very blossom of life, when female excellence is but budding forth, big with the promised fruit of deliciousness and joy! How much then does it become the duty of parents and guardians, who have daughters or wards in situations like these, and where no very gross objection can arise, to suffer them to marry with the men they love, or otherwise to provide suitable matches for them; since this will effect the most rational and most natural cure, by removing the cause of the complaint altogether. If, however, matrimony be not then convenient, nor likely in a short time to take place, recourse must forthwith be had to proper regimen, and medical aid, otherwise delirium or consumption will quickly ensue. The best method of regimen is laid down in the medical part of my edition of Culpeper, page 217, which, if well observed, in addition to the following course, will generally perform a cure. Take leaves of mugwort, briony, and penny-royal, of each a handful; infuse them four days in two quarts of soft water, and then pour off the clear liquor for use. Take a gin-glass three parts full, with thirty drops of the Lunar Tincture added to it, three times a-day, viz. morning, noon, and night, till the decoction be all used. Then reduce the dose to twenty drops of the Tincture in a wine glass of cold spring-water morning and evening, for fifteen days; after which it may be taken only once a-day, or every other day, until the patient find herself free from every symptom of the disease. For this malady, it is the only specific hitherto known; it unclogs the spermatic tubes; purges and cools the uterus and vagina; promotes the menstrual discharge, cleanses the urinary passages, dissolves viscid humours in the blood, sharpens the appetite, stimulates the nerves, and invigorates the spirits, which in all stages of *chlorosis* are so apt to be depressed. When this disorder is not very obstinate, nor far advanced, let the patient take from twenty to thirty drops of the Lunar Tincture, in a wine-glass of cold spring-water, for thirty or forty days successively, and it will perform a cure without the trouble of preparing the decoction. In this malady, I have lately had the happiness of completing an elegant cure, which I mention here, merely for the information of such unfortunate maids as may be languishing under the same deplorable circumstances. The following is a literal statement of the

C A S E.

A young lady, turned of seventeen, had been afflicted with *chlorosis* almost three years. In the early part of the malady, she conceived an unconquerable appetite for wood-cinders, concreted mortar, tobacco-pipes, sealing-wax, &c. The courses appeared at different intervals of the disease, but always irregularly, and more or less in a vitiated state. About half a year preceding my attendance, this flux had totally ceased; but, upon the approach of every new moon, with which her menses

originally came, she was afflicted with pains in the back and loins, heaviness and turgidity about the region of the womb, and other customary symptoms of the catamenia; yet not the smallest show could be brought to appear. A little before this, the lady's affections had been placed on a young man in the neighbourhood; but whose situation in life was by no means on a scale adapted to the views of her father and family. The moment, therefore, this attachment was discovered, the lady was confined to her apartment, and not suffered to take either exercise or fresh air, but when it suited for some trusty attendant to accompany her. This confinement brought on a settled melancholy, a green fallow complexion, dejected spirits, universal lassitude, and wasting of the flesh. The morbid state of her body having thus undermined her constitution, without attracting either her own or her father's observation, the disorder fell upon the vital organs, and with so rapid a progress, that within twenty-four hours she was seized with an ardent fever, attended with loss of appetite, delirium, and a total privation of speech. In this shocking state, she had the alternate advice of three physicians of the first respectability; but the disorder increasing, and putting on the most dangerous symptoms, after having baffled their utmost skill, a consultation was had, and the miserable patient was consigned to the grave.

Under these deplorable circumstances, it was my lot to be called in; and, upon a close examination of the patient, scarcely any visible signs of life remained. The pulse had nearly subsided. The action of the heart and lungs could scarcely be discerned. The eyes were sunk and fixed; yet retained an uncommon look of expression and sentiment. At this time she had a large blister round her neck, another on the pit of her stomach; a third, very large, between her shoulders; a fourth on the head; a fifth and sixth inside the ankles and legs. Venesection had been so often repeated, that scarcely blood enough remained to support the heat and action of the heart. In this exhausted state, I only administered three table-spoonfuls of the Solar Tincture, *undiluted*, at intervals of little more than an hour apart; and, in the space of four hours after, I had the heart-felt satisfaction of seeing the energy of the blood restored; pulsation gradually resumed its action, the lungs were dilated; respiration became free; and a profuse sweat, which the Tincture induced, fortunately opened the perspiratory vessels; and the patient began to give evident signs of ease and sensibility. Warm nourishing food was afterwards taken in small quantities; and I was enabled to remove the blisters, and perform the dressings, without pain or torture to the languid patient. The Solar Tincture was now administered every day for ten days, in the quantity of a table-spoonful in a wine-glass of warm barley-water, three times in the day, and once in the night, whenever watchfulness came on. About the middle of the seventh day, she began to articulate, though

though not a word had been uttered for upwards of six weeks before; and, on the tenth day, her voice and bodily functions were so far restored, that I deemed it safe to give her an interval of six days' rest, without any medicine whatever. I had the happiness to find my expectations completely answered; for nature, assisted by nourishing food, effected more than a profusion of drugs; so that in little more than twenty days my patient was able to walk about her room, and to put herself under a course of the Lunar Tincture. This she persisted in, with nourishing diet, seconded by occasional but very gentle airings in the carriage, for near a month longer; when on the approach of the ensuing new moon, to the unspeakable joy of her friends, the menstrual flux resumed its natural course: the comfort and relief of which were so visible to the patient, that she in ecstasy exclaimed, "*My sufferings are at an end.*" This lady has ever since continued to improve in health and spirits in so surprising a degree, that looking back on her late miserable and reduced state of body, forms a contrast so great as almost to exceed belief. Yet the lady and her worthy parent are at all times ready to authenticate the fact to any reputable enquirer, or to the friends of any unfortunate female labouring under a similar affliction.

OF THE FLUOR ALBUS, OR WHITES.

THE fluor albus, female weakness, or whites, as it is commonly called, is a disease of the womb and its contiguous parts; from which a pale-coloured greenish or yellow fluid is discharged, attended with loss of strength, pain in the loins, bad digestion, and a wan sickly aspect. The quantity, colour, and consistence, of the discharge, chiefly depend upon the time of its duration, the patient's habit of body, and the nature of the cause by which it was produced. Weakly women of lax solids, who have had many children, and have long laboured under ill health, are of all the most subject to this disagreeable disease; from which they unfortunately suffer more severe penance than others, as the nicest sensations are often connected with such a delicacy of bodily frame as subjects them to it. In Holland it is very frequent, and in a manner peculiar to the place, from the dampness of its situation; the surrounding air being so overcharged with moisture, as to relax the body, stop perspiration, and throw it upon the bowels or womb; producing in the first a diarrhoea or flux, in the last the fluor albus or female weakness. The discharge often proceeds from the vessels subservient to menstruation; because, in delicate habits, where those vessels are weak, and consequently remain too long uncontracted, the fluor albus sometimes immediately follows the menses, and goes off by degrees as they gradually close. It also comes from the mucous glands of the womb, as is particularly evident in very young females of eight or ten years old; in whom, though very rarely, it

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has been observed, and where it must then necessarily have escaped from those parts, as the uterine vessels are not sufficiently enlarged for its passage at so early a period. Sometimes, as in women with child, it proceeds from the passage to the womb, and not from the womb itself; which, during pregnancy, is closely sealed up, so that nothing can pass from thence till the time of labour. The application of those instruments called pessaries, from the pain and irritation they occasion, are also apt to bring on this discharge. The fluor albus has been supposed to supply the want of the menses; because, where the first prevails, the last are generally either irregular, or totally wanting: but it might more properly be said, that the presence of the fluor albus, which is a preternatural evacuation, occasions the absence of that which is natural; as is evident from the return of the menses after the fluor albus has been cured. Indeed, when this discharge appears about the age of thirteen or fourteen, and returns once a-month, with symptoms like those of the menses, then it may be deemed strictly natural, and ought not to be stopped. The fluor albus may be distinguished into two kinds. The first arises from a simple weakness, or the relaxation of the solids; which may either be general, where the whole bodily system is enervated and unstrung; or partial, where the womb only is affected, in consequence of hard labour, frequent miscarriages, a suppression or immoderate quantity of the menses, or a sprain of the back or loins. In the first case, the discharge being generally mild, may be easily taken away. In the second, it may proceed from a vitiated or impure blood, where the body from thence is loaded with gross humours, which nature, for her own security and relief, thus endeavours to carry off. In such cases, the discharge is often of a reddish colour, like that from old ulcerous sores; being sometimes so sharp, as to excoriate the contiguous parts, and occasion a smarting, and heat of urine. A deep-seated darting pain, with a forcing down, attending such a discharge, is a very dangerous and alarming sign, and indicates an ulceration or cancerous state of the womb. This malignant state of the disease, if of long continuance, is extremely difficult of cure; and disposes the patient to barrenness, a bearing down, dropsy, or consumption. In short, as this is a malady of the most disagreeable kind, which by long continuance or neglect becomes difficult of cure, and often proves fatal, it were to be wished that women, on such occasions, would be more attentive to their own safety, by using all possible means, in due time, to prevent the disorder.

As women are sometimes connected with those who do not conscientiously regard their safety, it is a circumstance of the utmost consequence to distinguish a fresh venereal infection from the fluor albus, or whites: for, if the first be mistaken for the last,

last, and be either neglected or improperly treated, the worst consequences may arise. In addition therefore to what I have stated in page 219 of the Medical Part of my edition of Culpeper, the following signs will serve to inform the patient whether there be occasion for her doubts or not. A fresh infection, called gonorrhœa, is malignant and inflammatory; the fluor albus most commonly arises from relaxation and bodily weakness; and therefore the remedies proper in the first disorder, would render the last more violent, by locking up and confining the infectious matter. In the gonorrhœa, the discharge chiefly proceeds from the parts contiguous to the urinary passage, and continues whilst the menses flow; but in the fluor albus it is supplied from the cavity of the womb and its passage, and then the menses are seldom regular. In the gonorrhœa, an itching, inflammation, and heat of urine, are the forerunners of the discharge; the orifice of the urinary passage is prominent, and the patient is affected with a frequent irritation to make water. In the fluor albus, pains in the loins, and loss of strength, attend the discharge; and, if any inflammation or heat of urine follow, they happen in a less degree, and only after a long continuance of the discharge, which, becoming sharp and acrimonious, excoriates the surrounding parts. In the gonorrhœa, the discharge suddenly appears without any evident cause; but in the fluor albus it comes on more slowly, and is often produced by irregularities of the menses, frequent abortion, sprains, or long-continued illness. In the gonorrhœa, the discharge is greenish or yellow, less in quantity, and not attended with the same symptoms of weakness. In the fluor albus, it is also often of the same colour, especially in bad habits of body, and after long continuance; but is usually more offensive, and redundant in quantity. The whites often afflict maids of a weakly constitution, as well as married women and widows; and indeed there are few of the sex, especially such as are sickly, who have not known it more or less. For whatever disease renders the blood poor, foul, or viscous, and reduces a woman to a languid condition, is commonly succeeded by the whites, which, when they come in this manner, continue to weaken the body more and more, and are in great danger, without speedy remedy, of wearing away the patient, and making her a miserable victim to death. Let no woman, therefore, neglect this disorder, when she finds it on her, but endeavour to obtain an immediate cure. The regimen and general management are pointed out in the Medical Part of the work just referred to, p. 220; and, in lieu of all other medicines, make a decoction of tormentil-root, bistort, comfrey, and red-rose leaves; take a gill-glass three parts full, and add to it thirty or forty drops of the Lunar Tincture, which must be persisted in morning, noon, and night, for ten days; then take it morning and evening only for ten days more; after which discontinue

the decoction, and take the Tincture every morning for a month, twenty drops in a wine-glass of cold spring-water: the disease will be found gradually to abate; and, upon any symptoms of a return of it, take from fifteen to twenty drops of the Tincture in a wine-glass of cold water every morning for a week, and it will go entirely off; as hath been verified in a great number of patients, who are ready to testify that they owe their cure, even in the most obstinate cases, entirely to the Lunar Tincture.

OF BARRENNESS, OR INFERTILITY.

BARRENNESS is such a state of a woman's body, as indisposes it, upon the use of the natural means, to conceive and propagate her species. This proceeds from many sources, which may be reduced to these two general heads: First, An indisposition of the parts to receive the male semen in the act of copulation, or that vital effluvia streaming from it, which alone can impregnate the ovaria. Secondly, An inaptitude in the blood to retain and nourish the vital principle after it is communicated, so as to make it grow and expand its parts, till it becomes a proper foetus. Conception is also hindered by a hectic, hydropic, or feverish, sickly habit; by a deficiency or obstruction of the monthly courses, which impoverishes the fluids; by the whites, which, continuing too long, relax the glands of the womb, and drown, as it were, the prolific particles; and too often by a *vice* which utterly destroys the tone and vigour of the parts; as is fully exemplified in the Medical Part of my CULPEPER, p. 221.

Preparatory to the cure of infertility, it is proper to use evacuations, unless any particular symptom shows them to be dangerous. Bleeding, lenient purgatives, such as the solutive electuary, and a gentle vomit of ipecacuanha, especially if the person be plethoric or cacochymic, cannot but be of great service; then proceed with the following strengthening electuary: Take roots of satyrion and eringo candied, of each one ounce; powders of cinnamon, sweet fennel seeds, and preserved ginger, of each half an ounce; mace, roots of contrayerva, and Spanish angelica, of each one dram; troches of vipers, one ounce; juice of kermes, six drams; tincture of cantharides, half a dram; syrup of cloves, a sufficient quantity to make an electuary. Let the quantity of a large nutmeg be taken every morning early, about five o'clock every afternoon, and at night going to bed; and, immediately after taking the electuary, drink a wine-glass full of the following infusion, adding to it from twenty to thirty drops of the Lunar Tincture, viz. Take cinnamon powdered, one ounce; of sweet fennel-seeds bruised, and lavender-flowers, of each half an ounce; Spanish angelica root, ginger, contrayerva, mace, and cochineal,

of

of each one dram and a half; canary wine two quarts: infuse according to art for two or three days, and strain off the infusion for use. Continue the electuary for ten days successively; then omit a week, and continue it for ten days more; after which continue the infusion and Tincture only, three times a-day, for ten days more: then take it only twice a-day for a month, or as long as the case requires, adding from fifteen to thirty drops of the Tincture to each glass, as the age or constitution of the patient may require. This course will be found most excellent for barrenness and debility; particularly while thus assisted by the Lunar Tincture; which will greatly warm and rectify the blood and juices, increase the animal spirits, invigorate and revive the whole human machine, and not only raise the appetite to venereal embraces, but remove the usual impediments to fertility; prepare the womb for performing its office, and the ova for impregnation. The Tincture warms, comforts, and excites the generative parts, to admiration, and seldom fails of curing all common occasions of barrenness in a month or six weeks, if duly followed; as a proof of which I beg leave to add the pleasing circumstances of the following singular

C A S E.

A YOUNG LADY of rank and fortune, but of delicate frame, entered into the marriage state about four years ago. Instead of deriving from it that blissful gratification which gives the honoured name of Mother, she became weak, languid, pale, and melancholy. The whole nervous system was relaxed—the natural functions of the body were suspended—œdematous tumours obstructed the sanguiferous passages, whence incurable barrenness and lingering consumption were the sad prospects left in view. In this melancholy state of body and mind, by advice of her physician, when all hopes were at an end, she was put under a regular course of the LUNAR TINCTURE; which, to the astonishment of all, gradually deterged the obstructed vessels—propelled the animal juices through the system—strengthened and braced the nerves—induced a regular habit—restored the sparkling eye and rosy cheek, and gave new vigour to the animal functions—the result of which has been, that before the end of the ensuing year, after her health was thus recovered, the lady became the happy mother of a SON and HEIR, to the inexpressible joy of an affectionate husband and a sympathizing family!

INDISPOSITIONS ATTENDANT ON PREGNANCY.

THOUGH pregnancy is not a disease, but rather a natural alteration of the animal œconomy, which every female is formed to undergo, yet it is attended with a variety of complaints which require great attention; but, for the cure or alleviation of which, medical aid has proved very deficient. In these complaints, however, the Lunar Tincture exerts most extraordinary properties, and excels whatever has been heretofore offered under a medical form. It is an universal purifier of those heterogeneous particles which produce nausea, and arise from the combining efforts of the masculine and feminine tinctures; from whence, according to the grossness of the procreative essences at the time of conception, proceed vomiting, pains in the head and stomach, fainting, &c. occasioned by the jarring elements arising from the disproportion in the heat and active principle of the constituent parts of the male and female seed; which is not only attended with great debility and depression to the mother, in her whole nervous system, but often with hereditary diseases, and dreadful consequences to the infant offspring. Indeed so great has been the conflict of the male and female procreative tinctures for the mastery or predominant power, while passing through the circulating mass or habit of the mother, that the most curious and astonishing phenomena have, on many occasions, been observed to result from it.—In a small village in Somersetshire, in the year 1759, a girl was born with the hair on her head of two remarkably distinct colours; the right side, from an exact parallel line which divided the skull, into two equal parts, was almost black; but the left side, from the same line, was of a reddish yellow. As she grew up, the dark hair became of a jet black, exactly like that of her father; whilst the other became of a strong carotty red, precisely resembling that of her mother; and after the age of puberty, the hair on the privities, and under the arm-pits, as well as on the arms and legs, was diversified in the same manner; that on the right side, all the way down from head to foot, being black, whilst that on the left was entirely red. The young woman lived till the 28th year of her age, and was resorted to as a great curiosity.

Another well-known yet remarkable instance of this conflict of the male and female procreative tinctures at the time of impregnation, was the case of a man who a few years since kept a public-house in Tooley-street, Southwark. His father was a white man, belonging to one of the West-India packets; and his mother was a negro-girl, whom he had taken a fancy to, and purchased on the arrival of one of the Guinea slave-ships at the island of Jamaica. He brought her with him

to London, and in the course of the ensuing year shew as delivered of a son, the whole right side of which was white like the father, but the whole of the left side was black like the mother. As he grew up, this visible distinction became more strongly marked; and, during the time he kept the above public-house in Tooley-street, he was resorted to by an immense concourse of people, who flocked there to spend their mite, in order to be satisfied that so great a curiosity really existed. The whole of his body appeared to be intersected by an exact parallel line, by which the efforts of conception seem to have united the male and female tinctures in precise equilibrio, without suffering them to intermix in coagula, or in impregnating and expelling the ovum from the ovaria, to its suspended state in the uterus. Hence the hair on the right side was long and brown, like that of the father; and half the face, neck, body, and privities, with the arm, thigh, leg, and foot, on the right side, were white; while the corresponding parts on the left side were black, like the mother, with half the hair on the privities and head black and woolly, exactly like that of a true negro.

A still more curious and striking example of this astonishing effort in the male and female procreative fluids, is verified in the case of Mr. John Clark, of Prescott-street, Goodman's-fields. His father was a native of Africa, who by dint of good fortune had amassed a considerable sum of money, and settled in London. He married a remarkably healthy white woman, a native of Devonshire, who had been some time his servant. By her he had two sons and three daughters, who were mulattos, except the eldest son, who was the first born, and the person here alluded to. From the head to the navel, all round his body, he was remarkably fair, had a fine skin, handsome round features, light-brown hair, and sanguine complexion, like his mother; but from the navel downwards he was completely black, with short black woolly hair on the privities, exactly like the father. At the age of thirty he married a young lady of good family and fortune, but of a delicate disposition. For near three months he had the address to conceal this deformity of colour from the knowledge of his wife, by wearing flesh-coloured silk drawers and stockings, which he pretended were lined with flannel to keep off the rheumatism, with which he had been sorely afflicted, even to a degree that endangered his life, every time he attempted to leave them off. It happened, however, from some neglect of concealment before going to sleep, that the curiosity of his wife was strongly excited; and the opportunity proving favourable in other respects, it being quite daylight in the morning, and her husband fast asleep, she eagerly proceeded to satisfy her doubts. Gently turning down the bed-clothes, and removing the other impediments in the way of a complete inspection, she no sooner discovered the real

state of things, than she shrieked out vehemently, and fainted away! The husband, thus suddenly awakened, beheld his wife in a fit, and saw with sorrow and regret the consequences of a discovery which resulted from his own neglect. He immediately arose, called up the servants, and procured medical assistance with all convenient speed; but in vain—the sudden surprize, added to the mortification and terror of mind, had so powerful an effect, that the lady died in convulsions, nearly two months gone with child. I have often lamented that fortune did not throw me in the way at this critical juncture, for two reasons: in the first place, I have the vanity to think I could have saved the patient's life; but, had I failed, in the second, I would have persuaded Mr. Clark, from motives of philosophical speculation, and for the improvement of medical science, to have suffered me to open the womb of this unfortunate lady, in order to extract the fœtus; which, under the circumstances of this uncommon conformation of the father, might have enabled me to throw a new light on this very curious subject of occult enquiry, perhaps so as to have accounted, more obviously, for the jarring conflicts and struggling efforts of the masculine and feminine tinctures; to which alone we are to look to for the formation of hermaphrodites, the production of monsters, &c.

Sympathy and antipathy most certainly operate very powerfully on females in the early state of pregnancy, and might, as was then suggested, have had a principal share in carrying off the above unhappy patient, while no means were used to counteract their influence on the mass of blood. Sudden frights, longing and loathing, and all marks on the fœtus, are obviously derived from this cause, and can only be corrected by giving energy and stimulus to the circulating system, whereby the functions both of mind and body are strengthened, and the nervous fluid fortified and protected against the sudden impression of external objects. It seems to be admitted by many eminent practitioners, that the diseases incident to a pregnant state in the early months, arise from sympathy; whilst those peculiar to the more advanced stages of gestation, are produced by the stretching and pressure of the uterus on the contiguous viscera. Thus heart-burn and diarrhœa, tension and pains of the breast, nausea and head-ach, desire of unnatural food, tremors, and dejected spirits, fainting and hysteric fits, premature menstruation, and consequent abortion, proceed from the first of these causes; while costiveness, strangury, cramp, and cholic, appear to result from the other. And, though the celebrated Dr. Stahl, Dr. Cullen, and others, have so much differed as to the theory of these diseases, yet they all agree that gentle opiates, aromatic infusions, strengthening bitters, and medicines calculated to give energy to the languid state of the circulation, and to purify the gross and viscid elements which oppress the stomach and viscera, are the only proper remedies.

medies to be administered. Now the Lunar Tincture possesses the aromatic and astringent virtues in an admirable degree; and is elegantly adapted to invigorate and assist the active faculties of nature, in expelling all viscid humours from the stomach and bowels; and, being compounded of the most subtle and occult elements, which preserve the vital principle, it hence produces the most salutary effects on all women in a state of pregnancy, by stimulating the procreative faculty to the formation of the finest children; correcting and purifying the procreative fluid from infection or disease; preventing moles or false conceptions, removing all loathings, longings, or vomiting, and effectively preventing abortion, from any cause whatever.—For these reasons, when a woman enters into the state of matrimony, she would do well to take twenty drops of the Lunar Tincture every other morning, to promote conception; she should then continue it three times a-week, from conception to the end of the fourth month; then it may be omitted till a fortnight before her time, when she should take twenty drops in a wine-glass of cold spring-water every morning till her labour, at which time it will wonderfully strengthen her, assist her throws, facilitate the birth, promote the lochia, and carry off the after-pains. She might take it occasionally during the month, in any symptoms of cold, fever, or hysterics, diluted in a wine-glass of warm barley-water, about the middle of the day.

Women who are subject to miscarriages, should never fail to take this medicine, from the time they have reason to believe they are pregnant, until a full month after they have quickened. It may be taken once, twice, or thrice, a-day, or every other day, as the urgency of the case may require, from twenty to thirty drops, in a glass of forge-water, or in soft spring-water in which common oak-bark has been steeped; and she will effectually get over all causes of abortion. Women after sudden miscarriages, or bad labours, will find wonderful relief by taking twenty drops of it in a wine-glass of warm barley-water, for a week or ten days. Nurses, also, whose milk is griping, or defective, should take it once or twice a-day, or as often as occasion may require. The intention will quickly be experienced, the milk will be purified and augmented, and all the fluid secretions promoted in a manner productive of sound health, both to the mother and child.—In cases where œdematous swellings of the legs and labia are occasioned by the interruption of the reflux blood from the pressure of the distended uterus on the vena cava—in violent floodings—in nervous spasms—in epileptic fits, and in obstinate convulsions, where the *vis vitæ* must be supported by replenishing the vessels with the utmost speed—recourse should be had to the Solar Tincture, which in the most dangerous cases has been found to give immediate relief; and, if duly persisted in, according to the bill of directions, will scarcely ever fail to effect a cure.

STATE OF WOMEN AT THE TURN OF LIFE.

THE most critical and dangerous time of a woman's life is that wherein the menses cease to flow, which usually happens between forty and fifty years of age. The great change that this produces, by so copious a drain being returned into the habit, without previous preparation, is the sole cause of its danger. Every woman must be more or less sensible when this period arrives, and should conduct herself accordingly; for, when the menses are about to go off, they appear for the most part irregularly, both in time and quantity; once in a fortnight, three, five, or six, weeks; sometimes very sparingly, and other times in immoderate quantities. For want only of necessary care and attention, during the time that the menses thus give symptoms of their departure, many and various are the complaints that ensue; amongst which are cold chills, succeeded by violent flushings of the face, and heats of the extremities; restless nights, troublesome dreams, and unequal spirits; inflammations of the bowels; spasmodic affections; stiffness in the limbs, swelled ankles, sore legs, with pains and inflammation; the piles, and other symptoms of plenitude. But all this might easily be prevented, by attending to a due regimen, and taking these Tinctures as occasion may require. Whenever a woman has reason to suspect her menses are about to leave her, let her lose four, five, or six, ounces of blood, as her habit of body will admit; then let her make a decoction, by taking gentian-roots, one pound; fenna and orange-peel, of each half a pound; pour upon them a gallon of hot water, and, after it has stood twenty-four hours, pour off the liquor for use. Let her take from twenty to forty drops of the Lunar Tincture in a gill-glass of the above decoction, every night and morning for ten days; then let her continue it every morning for ten days more, and afterwards once every two or three days, or oftener if the terms are of an ill colour and scent, until they are corrected. This course must be followed every spring and fall, for a month or six weeks successively, by all women who find their menses come irregularly, or too sparing, until they entirely cease; after which let the patient put herself under a course of the Solar Tincture for a month or six weeks, taking one spoonful in a wine-glass of warm water every night and morning for a week; then let it be taken only once a-day, in cold water, for the residue of the time; and, if she takes occasionally two table-spoonfuls of the Solar Tincture, diluted in a tumbler of warm water, as a beverage after dinner or supper, instead of wine or brandy and water, it will be productive of great benefit in establishing a healthful state of the blood, and carrying off the viscid humours generally produced by the menstrual flux returning into the habit.

Should

Should it at this time happen, which it often does, that the terms flow too abundantly, and produce a flooding, the patient must immediately lose six or eight ounces of blood, and be kept as much as possible at rest, with her head low, until the medicine has had time to take effect; let her diet be spare, but not too lax; and let her apply to the following course: Take conserve of red roses, marmalade of quinces, juice of kermes, candied nutmegs, syrup of quinces, and syrup of coral, of each half an ounce; aromaticum rosalbum, and astringent saffron of iron, of each two drams; oil of cinnamon, six drops: mix into an electuary, (which might be made up by any apothecary, if the receipt be sent him;) and take the quantity of a large nutmeg every day at noon for six, eight, or ten, days, or longer, as the urgency of the case may require, drinking immediately after it twenty drops of the Lunar Tincture in a wine-glass of warm water: the flooding, by this means, will gradually abate, the feverish symptoms will go off, the back will be strengthened, the womb-vessels cleansed, and the patient wonderfully restored. After the tenth day, in most cases, the electuary might be discontinued; and the Lunar Tincture should then be taken every morning for a month, from fifteen to twenty drops, according to the constitution of the patient; by which time the parts will be braced, comforted, and coiled up; so as to fear no danger of a relapse. About a month after, let her undergo a course of the Solar Tincture, for the purpose of rectifying and stimulating the mass of blood; this should be taken for a month; a table-spoonful night and morning in a wine-glass of cold spring-water for the first ten days; and then once a-day only for the residue of the time; the good effects of which will be sensibly and quickly felt.

The intention of nature in returning this flux back into the habit, is to nourish and preserve life, not to destroy it. Until the age of puberty, girls require this blood for the sustentation and nourishment of their bodies; when that is sufficiently established, it is applied to the purposes of nourishing the fœtus, and of suckling the infant after it is born. When child-bearing ceases, and the eve of life comes on, the flux is returned back, to comfort and preserve it; therefore, if women were but careful to observe a regular course before this flux returns upon them, by adopting the methods I have prescribed, and by taking the medicine spring and fall for two or three years previous to the time, they might not only escape the perils and dangers attendant on this period, but would lay the foundation of a settled state of health, and enjoy a sound constitution of body to extreme old age.

OF MASCULINE, OR SOLAR, DISEASES.

SOLAR diseases are all such as proceed from a hot and dry cause, and have their origin in the blood and lymph. For, as the beams flowing from the sun are the fountain of life and heat to the great world, or universal system of nature, so the blood, flowing from the heart, is the fountain of life and heat to the little world, or universal system of the *microcosm*, or body of man. And again, as the stream of rays from the sun regulates the seasons, and produces the variety of climates, so the stream of blood in man's body, as affected by the sun, regulates and diversifies the form and figure of the whole race of human beings. As seasons and climates are subject to the external elements, which are still governed by the superior influence of the sun, so they are rendered either mild, healthful, and productive, or turbulent, pestilential, and barren. Just so the whole circulating mass is affected by change of climates and seasons, and by all the variations and agitations of the external elements; and hence diseases are induced in the blood, and are either mild, ardent, or acute, in proportion as the sanguiferous fluid becomes distempered and impaired by the action of the ambient, or contiguous atmosphere. Thus we perceive the solar influence on the human frame, and discover that the origin of disease is in the blood; for, no longer than this vital stream is kept in due circulation, pure and uncontaminated, can animal life be sustained, or the body preserved in health and vigour.

From the express words of Scripture, Levit. xvii. 11, 14. Deut. xii. 23. we are warranted to infer, that "*in the BLOOD is the LIFE;*" and there is not a doubt but the living principle of the blood constitutes the life of the body. Of this opinion was the celebrated Hervey, as well as many of the ancient philosophers and physicians; and the late Mr. John Hunter declared himself to be of the same way of thinking. We find the blood unites living parts, in some circumstances, as certainly as the yet-recent juices of the branch of one tree unite it with that of another. Were either of these fluids to be considered as extraneous or dead matters, they would act as stimuli, and no union would take place in the animal or vegetable kingdoms. This argument Mr. Hunter established by the following experiment. Having taken off the testicle from a living cock, he introduced it into the belly of a living hen. Many weeks afterwards, upon injecting the liver of the hen, he injected in the testicle of the cock likewise, which had come in contact with the liver, and adhered to it. In the nature of things there is not a more intimate connection between life and a solid than between life and a fluid. For, although we are more accustomed to connect it with the one than the other, yet the only real
 difference

difference which can be shown between a solid and a fluid is, that the particles of the one are less moveable among themselves than those of the other. Besides, we often see the same body fluid in one case and solid in another. The blood will also become vascular, like other living parts. Mr. Hunter affirms, that, after amputations, the coagula in the extremities of arteries form vessels, and may be injected by injecting these arteries; and he had a preparation by which he could demonstrate vessels rising from the centre of what had been only a coagulum of blood, and opening into a stream of circulating blood. If blood be taken from the arm in the most intense cold which the human body can bear, it raises the thermometer to the same height as blood taken in the most sultry heat. This is a strong proof of the blood's being alive; for living bodies alone have the power of resisting great degrees both of heat and cold, and of maintaining in almost every situation, while in health, that temperature which we distinguish by the name of *animal heat*. Blood is likewise capable of being acted upon by a stimulus; for it coagulates from exposure, as certainly as the cavities of the abdomen and thorax inflame from the same cause. The more it is alive, that is, the more the animal is in health, it coagulates the sooner on exposure; and the more it has lost of its living principle, as in the case of violent inflammations, the less is it sensible to the stimulus produced from its being exposed, and it coagulates the later. We may likewise observe, that the blood preserves life in different parts of the body. When the nerves going to a part are tied or cut, the part becomes paralytic, and loses all power of motion; but it does not mortify. If the artery be cut, the part dies, and mortification ensues. What keeps it alive in the first case? nothing but the living principle which alone can keep it alive; and this phenomenon is inexplicable on any other supposition than that the life is contained in the blood. Another argument is drawn by Mr. Hunter from a case of a fractured os humeri. A man was brought into St. George's hospital for a simple fracture of the os humeri, or arm; and died about a month after the accident. As the bones had not united, Mr. Hunter injected the arm after death. He found that the cavity between the extremities of the bones was filled up with blood which had coagulated. This blood was become vascular, or full of vessels; in some places it was very much so. He does not maintain that all coagulated blood becomes vascular: and indeed the reason is obvious; for it is often thrown out and coagulated in parts where its becoming vascular could answer no end in the system; as, for example, in the cavities of aneurismal sacs. If it be supposed, that, in such cases as that just now mentioned, the vessels are not formed in the coagulum, but come from the neighbouring arteries, it is equally an argument that the blood is alive; for the substance into which vessels shoot must be so.

The

The very idea, that such a quantity of dead matter as the whole mass of blood circulates in a living body, is absolutely absurd.

Those who have ventured to oppose this doctrine, and the evidence of Scripture with it, consider the brain and nervous system as the fountain of life; and that, so far from receiving its life from the blood, the nervous system is capable of instantaneously changing the crasis of the blood, or any other animal fluid; and, though the nervous system cannot continue its action for any length of time if the action of the blood-vessels is suspended, yet the heart and blood-vessels cannot act for a single moment without the influence of the nervous fluid. For this reason, say they, it is plain we must suppose the nervous system, and not the blood, to contain properly the life of the animal, and consequently to be the principal vital organ. The secretion of the vital fluid from the blood by means of the brain, is, by the supporters of this argument, denied. They say, that any fluid secreted from the blood must be aqueous, inelastic, and inactive; whereas the nervous fluid is full of vigour, elastic, and volatile in the highest degree. The great necessity for the circulation of the blood through all parts of the body, notwithstanding the presence of the nervous fluid in the same parts, they say is, because some degree of tension is necessary to be given to the fibres, in order to fit them for the influx of the nervous fluid; and this tension they receive from the repletion of the blood-vessels, which are every-where dispersed along with the nerves.

To follow this opinion through every argument would prove tedious and unnecessary, as the following short observations will decide the matter absolutely against the patrons of the nervous system. In the first place, then, if we can prove the life of the human body to have been communicated from a fluid to the nervous system, the analogical argument will be very strongly in favour of the supposition that the case is so still. Now that the case once was so, is most evident; for the human body, as well as the body of every other living creature, in its first state, I have shown to be a gelatinous mass, without muscles, nerves, or blood-vessels. Nevertheless this gelatinous matter, even at that time, contained the nervous fluid. Of this there can be no doubt, because the nerves are formed out of it, and have their power originally from it; and what is remarkable, the brain is observed to be that part of the animal which is first formed. Of this gelatinous or procreative fluid we can give no further account, than it is the nutritious matter from which the whole body appears to be formed. At the original formation of man and other animals, therefore, the nutritious matter was made the substratum of the whole body, consisting of muscles, nerves, blood-vessels, &c. nay more, it was the immediate efficient cause of the nervous power itself. Again, in the formation of the embryo,

we see a vital principle existing as it were at large, and forming to itself a kind of regulator to its own motions, or a habitation in which it chooses to reside, rather than to act at random in the fluid. This habitation, or regulator, is undoubtedly the nervous system; but at the same time, it is no less evident that a nutritious fluid is the immediate origin of these same nerves, and of that very nervous fluid. Now we know, that the fluid which in the womb nourishes the bodies of all embryo animals, is necessarily equivalent to the blood which nourishes the bodies of adult ones; and consequently, as soon as the blood became the only nutritious juice of the body, at that same time the nervous fluid took up its residence there, and from the blood diffused itself along the nerves, where it was regulated exactly according to the model originally formed in the embryo. Perhaps it may be said, that the vital power, when once it hath taken possession of the human or any other body, requires no addition or supply, but continues there in the same quantity from first to last. If we suppose the nervous power to be immaterial, this will indeed be the case, and there is an end of reasoning upon the subject; but, if we call this power a volatile and elastic fluid, it is plain that there will be more occasion for recruits to such a power than to any other fluid of the body, as its volatility and elasticity will promote its escape in great quantities through every pore of the body. It may perhaps be objected, that it is absurd to suppose the blood capable of putting matter in such a form as to direct its own motions in a particular way: but even of this we have a positive proof in the case of the electric fluid. For, if any quantity of this matter has a tendency to go from one place to another where it meets with difficulty, through the air for instance, it will throw small conducting substances before it, in order to facilitate its progress. Also, if a number of small and light conducting substances are laid between two metallic bodies, so as to form a circle, for example; a shock of electricity will destroy that circle, and place the small conducting substances nearer to a straight line between the two metals, as if the fluid knew there was a shorter passage, and resolved to take that, if it should have occasion to return. Lastly, it is universally allowed, that the brain is a secretory organ, made up of an infinite number of small glands, which have no other excretories than the medullary fibres and nerves. As a considerable quantity of blood is carried to the brain, and the minute arteries end in these small glands, it follows, that the nervous fluid *must come from the blood*. Now, there is no gland whatever, in the human or any other body, but will discharge the fluid it is appointed to secrete, in very considerable quantity, if its excretory is cut. Upon the cutting of a nerve, therefore, the fluid secreted by the brain ought to be discharged; but no such discharge is visible. A small quantity of glairy matter is indeed discharged from the large nerves;

but this can be no other than the nutritious juice necessary for their support. This makes it plain, even to demonstration, that the fluid secreted in the brain is *invisible* in its nature; and, as we know the nervous fluid hath its residence in the brain, it is very probable, to use no stronger expression, that it is the peculiar province of the brain to secrete this fluid from the blood, and consequently that the blood originally contains the vital principle.

This fact being established, I shall now endeavour to describe the action of *quickening*, or mode by which life is communicated to the child in the womb, which usually takes place in the fifth month of pregnancy. Opportunities, however, of dissecting the human gravid uterus at or near this critical juncture occurring but seldom, it is with great difficulty that a subject of this delicate and abstruse nature can be treated with perspicuity, and is the principal cause why it has not been attempted by former physiologists. I have already shown, that the rudiments of the embryo puts forth four membranes, viz. the placenta, the navel-string, the chorion, and the amnios, which contains the fluid above-mentioned, in which the fœtus floats. Until the period of quickening arrives, the embryo possesses only vegetative life, similar to that of a common plant; and its growth is nourished and preserved by the fluid in which it swims, until the nerves, veins, arteries, and vital organs, are entirely formed, and the circulation of its mother's blood is completed through them, which is conducted in the following manner.

The *placenta* is the medium by which the blood from the heart of the mother is communicated to that of the child; but to check its too rapid progress, which would overwhelm the tender vessels of the infant frame, the texture of the placenta is formed similar to that of a sponge, round like a cake, of considerable dimensions, and capable of great absorption, being chiefly made up of the ramifications of the umbilical arteries and vein, and partly of the extremities of the uterine vessels. The arteries of the uterus discharge their contents into the substance of this cake; and the veins of the placenta, receiving the blood either by a direct communication of vessels, or by absorption, at length form the umbilical vein, which passes on to the sinus of the vena porta, and from thence to the vena cava, and heart of the infant, by means of the *canalis venosus*, a communication that is closed up in the adult. But the circulation of the blood through the heart is not conducted in the fœtus as in the adult: in the latter, the blood is carried from the right auricle of the heart through the pulmonary artery, and is returned to the left auricle by the pulmonary vein; but a dilatation of the lungs is essential to the passage of the blood through the pulmonary vessels, and this dilatation cannot take place till after the child is born, and has respired. This deficiency is therefore supplied in the fœtus by an
immediate

immediate communication between the right and left auricle, through an oval opening, in the septum which divides the two auricles, called *foramen ovale*. The blood in the fœtus is likewise transmitted from the pulmonary artery to the aorta, by means of a duct called *canalis arteriosus*, which, like the *canalis venosus* and *foramen ovale*, gradually closes after birth. The blood is returned again from the fœtus to the mother through two arteries called umbilical arteries, which arise from the iliacs. These two vessels, taking a winding course with the vein, form with that and the membranes by which they are surrounded, what is called the umbilical chord. These arteries, after ramifying through the substance of the placenta, discharge their blood into the veins of the uterus, in the same manner as the uterine arteries discharged their blood into the branches of the umbilical vein. So that, after quickening, the blood of the mother is constantly passing in at one side of the placenta, and out again at the other, for the nourishment of the child.

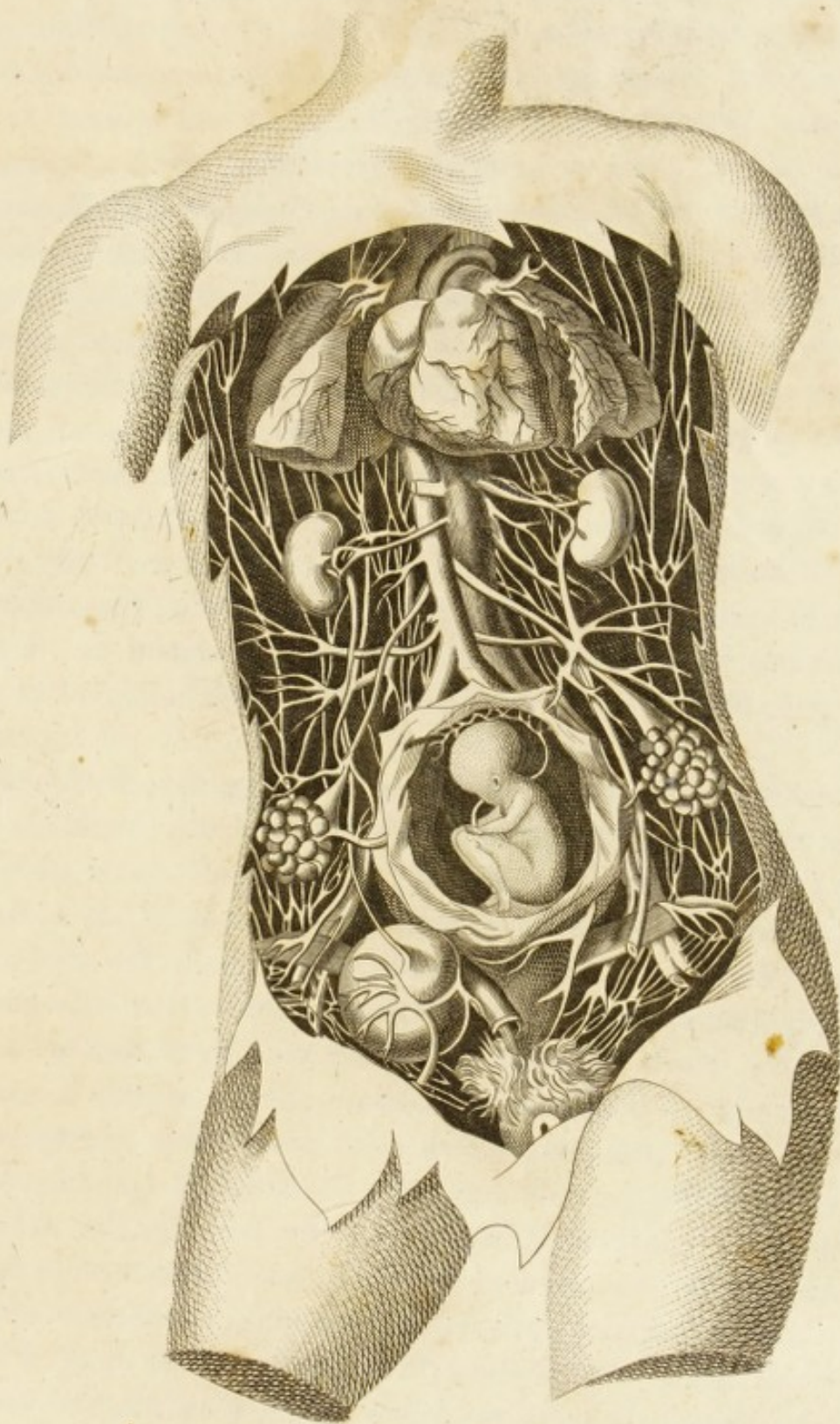
Now what we call the *action of quickening*, is that instantaneous, yet undefinable, motion of the vital principle, which, the instant the fœtus has acquired a sufficient degree of animal heat, and is completely formed in all its parts, rushes like an electric shock, or flash of lightning, conducted by the sanguiferous and nervous fluids, from the heart and brain of the mother, to the heart and brain of the child. At this moment the circulation begins; the infant fabric is completely set in motion, and the child becomes a living soul. As soon, therefore, as the circulation commences, the child starts into life; and the instant the circulation ceases, life ceases also. This *act of quickening* is therefore derived from the blood; and is so sensibly felt by the mother, that she often faints, or feels an internal depression of her animal and vital powers, which may be said, in some measure, to have departed from her. But the *act of quickening* does not take place in all women at the same period, nor always in the same woman at the same distance of time from her conception; nor is it governed by any given number of weeks or days after conception has taken place; but depends entirely on that instant of time, when the joint influence of animal heat, and an entire completion of the nerves, veins, arteries, and other parts and organs, of the fœtus, are fitted and ready to receive and support a due circulation of the blood and juices; for this, and this alone, is the source of quickening, and the beginning of animal life. Strong and healthy women will therefore quicken sooner than the weak and delicate, by reason that their procreative and stimulating powers are more robust, and can sooner contribute that portion of animal heat which is necessary to the entire completion of the fœtus in all its parts; and which will happen sooner or later, according to the health and strength of the pregnant woman, and her sufficiency of menstrual blood to support the demand. For this flux will

now be wholly taken up by the new subject, until the hour of birth; after which it either renews its monthly evacuation, as being redundant in the mother: or if she suckles the child, it is then determined to the mammæ, and is converted into milk.

Such is this curious and most admirable contrivance of nature, for the re-production and propagation of mankind; and such the nature and event of that mysterious action of quickening, which has hitherto been involved in so much darkness and obscurity, as to lead the unthinking multitude to suppose, that giving life to the fœtus was in every instance a new and distinct interposition of the Deity, instead of religiously imputing it to that primary exertion of his omnipotence, which, in the original formation of Adam, implanted in his nature the power of re-producing his like, and of imparting life and soul to his species, by a fixed and immutable decree, to be continued down from father to son, to the final end and consummation of this sublunary world. If the seed of Adam had not been originally endued with the gift of imparting life and spirit to his future generations, how could the souls of his descendants be subjected to original sin? Were any one child descended from the race of Adam to receive the gift of life and soul from a subsequent exertion of the power of God, it would become a new and distinct act of creation; and the offspring could not possibly be contaminated by the Fall, nor be subjected to the miseries and misfortunes resulting from it, as having received its being from an independent cause.

I have, to the best of my ability, endeavoured to illustrate this occult process of Nature, by means of the annexed copper-plate engraving, taken from the viscera and womb of an afflicted female, who fainted and died at the time of quickening, the fœtus itself being now preserved in spirits. The structure of the gravid uterus is, however, extremely difficult to be shown, and the more so under these peculiar circumstances. In the wombs of women who die after this period, or at the time of labour, or soon after delivery, fibres running in various directions are observable more or less circular, that seem to arise from three distinct origins, namely, from the place where the placenta adheres, and from the aperture and orifice of each of the tubes; with all the veins and vessels communicating to and from the placenta and the mother, surcharged with blood; but it is almost impossible to demonstrate regular plans of vessels and fibres, continued any length, without an interruption which involves us in doubt, and destroys that view of the admirable connexion which nature has formed between the vital organs of the mother and child in a state of advanced pregnancy.

From the foregoing observations we may safely conclude, that the mass of blood is the universal medium by which life is propagated, and health preserved, to every class



The Action of Quickening.

W. Al. del.

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elafs of beings; and that, in its impure or infected ftate, it is the fource from whence the endless number of hereditary difeafes derive their origin. Whatever fault impairs the parent blood, fails not to taint the tender habit of its young; whence it has become an eftablifhed maxim, that, as healthy parents naturally produce healthy children, fo difeafed parents as naturally produce a difeafed offspring. Some of thefe difeafes appear in the earlieft infancy; others occur equally at all ages; whilst others lurk unfufpected in the habit to extreme old age, or even to a new generation, flowly impairing the vital organs, and gradually undermining the conftitution, before their fource, and fatal tendency, can poffibly be difcovered. There are fome difeafes indeed, which, though born with us, cannot be faid to be derived from the parent, as when a fœtus receives fome hurt by an injury done to the mother, while others, neither born with us nor having any foundation in the conftitution, are fucked in with the nurfe's milk. Let it then be the care of every parent, who from fome local misfortune is fo far compelled to depart from the ties of nature as to abandon her tender offspring to the breaft of another, to be fatisfied, as far as human foresight and medical penetration can reach, that the conftitution and blood of the nurfe are free from fcrophula and every other hereditary impurity.

Accidental difeafes, though not derived from the parents, neverthelefs in general fpring from the blood; which, conftituting or propagating animal life through every part of the body, is neceffarily expofed to every external offending caufe, from which imprefion particular accidental difeafes enfue. The climate, itfelf, under which people live, will often produce thefe affections in the blood; and every particular climate hath more or lefs a tendency to produce a particular difeafe, either from its excefs of heat or cold, or from the mutability of the weather. An immense number of difeafes are alfo produced in the blood by impure air, or fuch as is loaded with putrid, marfhy, and other noxious vapours. The fame thing likewise happens from high-feafoned or corrupted aliment, whether meat or drink; though even the beft and moft nutritious aliment will hurt, if taken in too great a quantity; not to mention poifons, which are endowed with fuch pernicious qualities, that, even when taken in the fmalleft quantity, they produce the moft grievous ferment in the blood, ending perhaps with death itfelf. There are likewise other accidents and dangers to which mankind are expofed, that ingraft innumerable difeafes in the mafs of blood; fuch as the bite of venomous reptiles, or of a mad dog; an injudicious inoculation or mis-treatment of the fmall-pox, or measles; the pfora, or itch; the venereal infection; alfo broken limbs, wounds, and contu-
 fions;

fions; which, though proceeding from an external cause at first, fail not to impair the blood, and often terminate in internal diseases and premature death.

Man, however, is not left without defence against so many and such great dangers. The human body is possessed of a most wonderful power, by which it preserves itself from diseases, keeps off many, and in a very short time cures some already begun, while others are by the same means more slowly brought to a happy conclusion. This power, called the *autocrateia*, or *vis medicatrix nature*, is well known both to physicians and philosophers, by whom it is most justly celebrated; for this alone is sufficient for curing many diseases, and is of service in all. Nay, even the best medicines operate only by exciting and properly directing this expulsive force, by which the excrementitious humours from the aliments and blood are expelled, through the proper channels of evacuation, through the excretory ducts, chiefly by means of the *insensible perspiration*, by which power the offending humours from the blood and juices are perpetually flying off. But though physicians justly put confidence in this power, and though it generally cures diseases of a slighter kind, yet it is not to be thought that those of a more grievous tendency are to be left to the unassisted efforts of nature. Physicians have therefore a two-fold error to avoid; namely, either despising the powers of the *vis medicatrix* too much, which, if left alone, would work a radical and perfect cure; or, putting too great confidence in these exertions of nature, they are left unseconded and alone, till the virulence of infection or disease undermines the constitution, and bears down all before it.

The grand and perpetual means by which the foul and offending humours in the blood and juices are continually carried off, is undoubtedly through the perspirative pores and vessels, which it is highly compatible with sound health to keep open, and for which purpose medicaments are principally used. When this evacuation is copious, and gross enough to be discerned by the eye, as in sweat, the perspiration is said to be *sensible*; but where it is so volatile as to escape the notice of the senses, as is the case in the ordinary state of the body, it is called *insensible perspiration*.—The vessels through which the perspiration is performed lie obliquely open under the squamæ or scales of the cuticle or scarf-skin. They are inconceivably small; from a calculation of Leeuwenhoek it appears, that the mouths of 125,000 of them may be covered with a common grain of sand. The most considerable of these pores are the orifices of the ducts arising from the miliar glands. Through these vessels there is continually transuding a subtle humour, from every point of the body, and throughout the whole expanse of the cuticle. The matter evacuated this way is found by certain experience to be more than equal to that
evacuated

evacuated all the other ways, *i. e.* by stool, urine, &c. Sanctorious found in Italy, under the circumstances of a moderate diet, middle age, and easy life, that the matter insensibly perspired was five-eighths of that which was taken in for food: so that there only remained three-eighths for nutrition, and for the excrements of the nose, ears, intestines, bladder, &c.

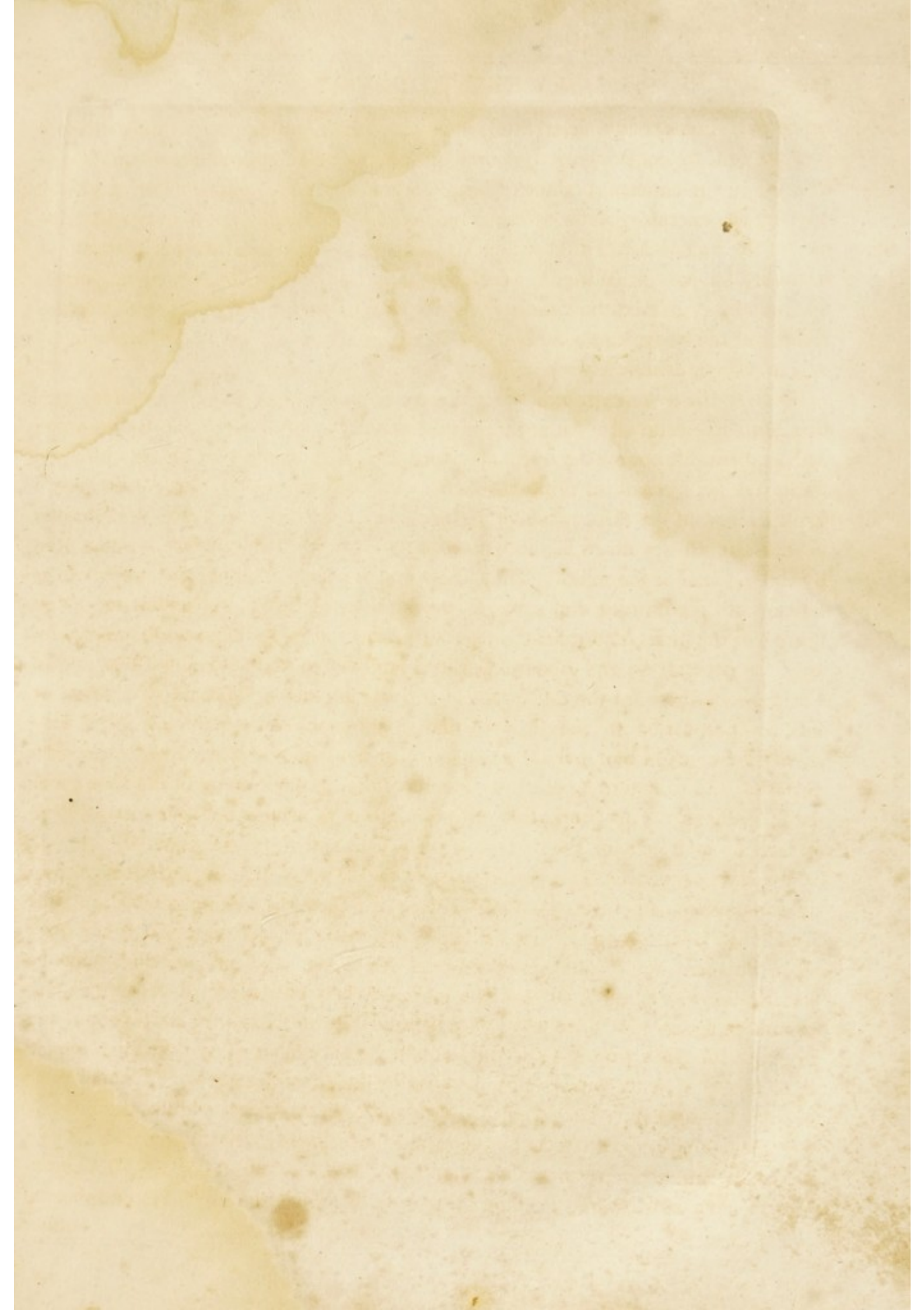
The same author shows, that as much is evacuated by insensible perspiration in one day as by stool in fourteen days; particularly that, in the space of a night's time, about sixteen ounces are ordinarily discharged by urine, four ounces by stool, and above forty ounces by insensible perspiration. He also observes, that, if a man eat and drink eight pounds in a day, five pounds of it are spent in insensible perspiration; and adds, as to the times, that within five hours after eating there is perspired about one pound; from the fifth to the twelfth hour about three pounds; and from the twelfth to the sixteenth scarcely half a pound. M. Dodart, from a number of experiments made thirty-three years successively, proves that we perspire much more in youth than in age. In some persons the perspiration is so copious, that they void very little of the coarser excrements, though they eat heartily. The benefits of insensible perspiration are so great, that without it animal life could not be preserved. The general cause of perspiration is the circulation and heat of the blood, which enables it to throw off the offending matter. The great subtlety, equability, and plenty, of the matter thus perspired, its increase after sleep, &c. constitute the grand symptoms of a perfect state of health; and the chief means of preserving the same. On the contrary, the departing from these is the first sure sign of approaching disease.

Perspiration is performed, preserved, and increased, by the viscera, vessels, and fibres; by motion or exercise as far as the first appearance of sweat; by moderate use of venery; by sleep of seven or eight hours, the body well covered, yet not loaded with bed-clothes: cheerfulness; light, fermented, yet solid, food, not fat; pure, not heavy, air, &c. The contraries of all these, as also the increase of the other excretions, diminish, prevent, and deprave, it. Hence we see the cause and effect of this perspirable matter, its use in preserving the parts soft and flexible, and in supplying what is lost; but chiefly in preserving the nervous papillæ moist, fresh, lively, and fit to be affected by objects, and to transmit their impressions. Hence it is, that upon a stoppage of the usual perspiration there arise so many indispositions, particularly fevers, agues, rheums, &c. Too much perspiration occasions weakness, and swoonings; whilst too little, or none at all, occasions the capillary vessels to dry, wither, and perish. Hence also the larger emunctories come to be obstructed; hence the circulation is disturbed, sharp humours retained; and hence

hence putridity, crudity, fevers, inflammations, and imposthumes. Cold prevents perspiration, by constringing the pores of the skin, and thickening the liquors circulating in the cutaneous glands; heat, on the contrary, augments it, both by opening the excretory ducts of the glands, and by increasing the fluidity and velocity of the humours. To determine the state and condition of the perspiration, so necessary for judging of those of the body, Sanctorious invented a weighing-chair, whereby he examined the quantity, degree, &c. of perspiration in several circumstances of the body, under several temperatures of the air, and in the several intervals of eating, drinking, sleeping, &c.

Some of the more extraordinary phenomena observed in this speculation, are, that, for some time after eating, the perspiration is least of all; that between the fifth and twelfth hour after meals perspiration is greatest; that riding either on horseback, in a coach, or ship, &c. swift motion on the ice, &c. but, above all, a brisk friction of the skin, promote perspiration surprisngly; and that perspiration is naturally always much less in women than in men. Perspiration is influenced by the passions of the mind. Thus anger and joy increase, and fear and sadness lessen, both perspiration and urine. Anger causes a strong motion in the membranes of the heart, and quickens its contraction and dilatation, and thereby quickens the contraction and dilatation of the blood-vessels and secreting ducts, and of consequence increases the discharges of perspiration and urine; and that more or less, in proportion to the strength and continuance of the passion. Joy affects these discharges in like manner as anger. In the passions of fear and sorrow, perspiration and urine are lessened, by the depression of the activity of the soul under those passions. The proportion of perspiration to urine is increased by all those exercises which increase the motion of the blood, and warm the skin.

We have an account of a person who, by passing many nights in astronomical speculations, had his perspiration so obstructed by the cold and damp of the air in Holland, that a shirt he had worn for five or six weeks was as clean as if it had been worn but one day. The consequence of this was, that he gathered subcutaneous waters; but was cured in time. The garments best calculated to encourage and promote insensible perspiration, to keep the mouths of the minute vessels open, and to guard the body from the too sudden and violent effects of cold, are those made of flannel. Whence flannel shirts and waistcoats, or a square piece of flannel worn over the breast or pit of the stomach, particularly in the winter months, are productive of such beneficial effects to weakly and debilitated constitutions, and act as a valuable preservative to the hale and robust. In the annexed copper-plate engraving, I have endeavoured to show the manner in which the insensible perspiration
issues





The Insensible Perspiration

W. D. del.

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issues from the pores of the body, which can only be discerned by means of a lens ; being of so volatile and subtle a quality, that it passes through our garments with the utmost ease, particularly if woollen ; and it even ascends through the bed-clothes like a mist, in the greatest abundance when we are asleep, and the animal functions are at rest.

In this manner Nature, from all casual obstructions, endeavours to relieve herself ; and, so long as diseases are recent, and of a mild tendency, they are usually carried off by this means, without requiring any aid from medicine. When, however, diseases are of long standing, and the humours in the blood become too foul and viscous to be thrown off by the *vis medicatrix naturæ*, the whole habit is quickly vitiated, and the circulating mass becomes morbid ; yet even in this infected state, the vital heat and activity of the blood strives to purify itself, by determining these morbid particles to the skin, where they form scabs, ulcers, pimples, and other spots, as in the scrophula, leprosy, small-pox, measles, syphilis, &c. or else the virulent matter is directed inwards, where falling upon the lungs and other viscera, death quickly ensues. Here then we may view the shocking consequences which result to those who enter into matrimony under a tainted or infected state of the blood. Indeed persons that are afflicted with the leprosy, scrophula, or king's evil, should never marry until a perfect cure has been effected, and a pure and healthful state of the blood induced. To enter into wedlock under a venereal taint, is a most unwise, a most cruel, and an ungenerous act. A man with only a slight infection, by contact with the woman, will himself perhaps experience a perfect cure, in consequence of the foul and infectious matter being drawn from the parts of the female organs, seconded by the action of the rugæ and absorbent vessels on the surface of the vagina. But the unhappy female is sure to take the disorder ; and, should she prove with child, she not only carries the poisonous infection into the marrow of her own bones, but brings an infant offspring into the world, devoted to misery and disease ; for whatever foul or infectious humour is implanted in the parent blood, it is immediately carried by the circulation to the vital organs of the child, just as the flame of one candle is by contact communicated to another. Nor can we be surpris'd at these things, if we only reflect on what has already been adduced, and contemplate the system and œconomy of the human frame. Consider only the powerful effects of a few grains of cantharides, which, if externally applied, act as a burning caustic ; but, if taken into the stomach, instantly overturn the natural course of the circulation, by forcing the whole mass of blood into the extremities, but more particularly, with great vehemence and turgidity, into the private parts ; for which reason cantharides are taken with intent to

cure the weakness and debility of the penis; but the truth is, that greater debility, and an emaciated constitution, are sure to follow, and not unfrequently instant death.

If, then, so powerful an effect can be wrought on the blood by swallowing a few irritating particles of a small insect, may we not justly infer, that by infusing into the circulating mass particles congenial to itself, the utmost relief may be afforded to it, even in its most depraved and inactive state? From this consideration alone, we may venture to pronounce, that all disorders originating in the blood might either be prevented or repelled, could such a medium be discovered, by which we might infuse immediately into the mass a combination of such elemental principles as the blood and juices themselves consist of in their purest and most elastic state; for this, in fact, is the aim of all medicines; but which they miss, by being administered in their gross form, and being obliged to pass the several digestive operations of the stomach, before they can reach the blood, whereby the principal part of their occult virtue is lost among the food, or secreted in such small quantities as to produce very little effect. But a medium, possessing these congenial principles, ready digested, and so combined as to be taken instantly, and without diminution, into the habit, would not only keep the cruor and the serum in due proportion, which is so essential to health, but would stimulate, correct, purify, and augment, the blood, as its reduced or disordered state might from time to time require. Such a medium, after infinite labour, and unlimited experience, I pronounce the Solar Tincture to be; and such will be found its operative effects, under whatever circumstances it may be administered, in any climate or season; the innocent and balsamic qualities of which are as grateful to the internal organs of the human frame as the solar rays are cheering to the external; and it affords me no small gratification to assert, that, in offering it to the public, I invade no man's property, nor imitate any medicine at present known in public or private practice.—The experiments I have made with it upon a variety of diseased wretched objects, exceed belief; and I shall still continue to administer it gratis to the poor, who are given over by others, or who have not the means of applying for medical assistance.

The infinite variety of complaints an impure or infected state of the blood induces, almost exceeds belief; and hence the new and deceptive forms a scrophulous or scorbutic taint puts on, which often deceive the most eminent of the faculty, and baffle the best intention towards a cure. An impure or scrophulous taint will invade the noblest organs of the human frame, before the patient can be aware of his danger. In the first stage of its visible effects, a weary pain seizes the joints and muscles, attended with a wasting of the legs and loins. In the second stage, the gums swell, grow painful, hot, and irritable, and bleed upon the slightest pressure;

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the roots of the teeth become bare and loose, and the breath nauseous. In the third stage, the gums grow putrid, the teeth black and rotten, the sublingular veins become varicose, and the breath cadaverous; foetid blood distils from the lips, gums, mouth, nose, lungs, stomach, liver, spleen, pancreas, intestines, womb, kidneys, &c. scabs and ulcers break out in all parts of the body; and the joints, bones, and viscera, become morbid. In the fourth stage, putrid, eruptive, and spotted, fevers, ensue, which end in an atrophy; or else follow diarrhœas, dysentery, dropsy, consumption, palsy, contractions, melancholy, and all the long and direful train of nervous disorders, which to describe would fill a volume.

To counteract this most virulent of all chronic complaints, the utmost exertions of human skill have been employed. The remedies prescribed in its different stages are almost innumerable. The object is to reduce the virulence of the infection, and to eradicate its seeds from the blood and lymph; to which end the mildest and most simple medicines are recommended. Mineral and tar waters, for their warm and stimulating quality; milk or whey, from their similitude to the chyle; the cold bath, for bracing the solids and quickening the circulation; antiscorbutic vegetables, &c. for purging and sweetening the blood, such as scurvy-grass, water-creffes, wormwood, hemlock, centaury, vervain, water-trefoil, juniper-berries, the Peruvian bark, saffra, guaiacum, aloes, assa-fœtida, camomile, diascordium, saffron, fenna, rhubarb, manna, Æthiop's mineral, hartshorn, native cinnabar, antimony, &c. When these fail, mercury, or a mercurial salivation, is looked upon as the only cure; which, in fact, is but to give the human frame its last vehement shock, and to send the wretched patient in agonies to the grave!

The intention of all these remedies is to impregnate the blood with qualities opposite to those with which it is infected; and this must be done in a superior degree of force and power, before a cure can be completed. But these medicaments are often administered under such nauseous forms, and in so crude and unqualified a state, that they not only torture the patient, but miss entirely their intended aim. The nauseous taste of medicine is nothing but its grosser particles; which, instead of entering the stomach, to irritate and oppress its organs, ought to be drawn off by chemical processes; for it is the occult virtue of every drug, not its grosser part, that performs the cure. Now the peculiar excellence of the Solar Tincture is, that it combines the essential and occult virtues of all the scorbutic vegetables, ready digested, concocted, purified, and resolved into an elegant balsamic essence, pleasing to the taste and grateful to the stomach. It flies immediately to the heart, whether internally or externally applied, blends and assimilates with the venal and arterial blood, which it generates, corrects, warms, purifies,

rifies, animates, and impels through the whole system. It cleanses all the viscera, and glandular parts, particularly the lungs and kidneys; stimulates the fibres, whereby the gastric juice and digestion are promoted; dissolves viscid humours, and expels infection. It exerts very considerable effects on the whole nervous system, sensibly raises the pulse, strengthens the solids, and invigorates the animal spirits. It penetrates into the most intimate parts, opens the mouths of the minuter vessels, restores the natural perspiration, and promotes all the fluid secretions. In every stage of infectious diseases, and in all sudden epidemical disorders, which usually follow from a wet, putrid, and unwholesome, state of the atmosphere, it is an absolute specific; and, as a preventive, an alterative, and purifier of the blood, it has not its equal in the world. It quickly relieves every common malady originating in the blood, such as relaxations, debility, lassitude, tremors, sinking of the spirits, and all those nervous affections which harass and oppress the weak, sedentary, and delicate; and are often the consequences of high living and luxuriant indulgences, without bodily exercise and fresh air. In all these cases, the Solar Tincture is calculated to warm and steady the cold tremulous nerves; to sheath and invigorate the muscular system; to animate the spirits; and renovate the whole man; whereby the chill watery fluids become rich and balsamic, and the circulating mass resumes its healthful state. It is an infallible cure for joint-achs, cramps, spasms, rheumatic gout, nervous head-ach, agues, and all disorders arising from obstructed perspiration. In complaints of the breast, stomach, and bowels, it gives immediate relief; and, in asthmatic and consumptive cases, is an elegant and expeditious cure. It will stop mortification in very advanced stages, by expelling the poisonous matter, and correcting the juices of the whole body. It requires no argument to convince, more than a single trial; after which, I think, no family who value their health or life will choose to be without it; particularly under any of the following afflictions:

SCROPHULA, SCURVY, OR KING'S EVIL.

IN the first and second stages of this disorder, a small table-spoonful of the Tincture, taken in a wine-glass of cold spring water night and morning, will prevent the further progress of the disease, and in a very short time restore the blood to its healthful state, the effects of which will be so obvious to the patient, that he will be at no difficulty when to discontinue the medicine. In the third stage, it is often requisite that the medicine be internally and externally applied. The mouth should be frequently washed with the Tincture diluted in warm-water; and it will very soon expel the poison from the gums. If the viscera be in a morbid state, which
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may be known by the excrements, or foulness of expectoration, it will be necessary to take the medicine, night and morning, for several days, in the quantity of a table spoonful *undiluted*; and, at noon, a table-spoonful in the same quantity of warm water. The scabs, whether dry or moist, should be frequently washed with the Tincture, *undiluted*, which, being absorbed by the minuter vessels, and taken into the habit, will expel the humour, and clear away the scurf. If tumours or foul ulcers occur, wash them frequently with a dilution of the medicine in the same quantity of warm-water, until the heat and virulence be abated; then apply the Tincture *undiluted*, with lint or fine rags, by which means the infectious matter will be totally eradicated, the blood and juices purified, and the ulcers healed.

In the fourth stage, whatever may chance to be the sad malady to which the disorder ultimately turns, a strict attention to regimen, exercise, and fresh air, as far as the strength and condition of the patient will admit, must be particularly attended to. And, in all these cases, the best and most simple methods of treatment are laid down in the Medical Part of this work, p. 168, &c. to which I beg leave to refer every patient in this dreadful stage of the disease; and, in aid of the advice there given, let the Solar Tincture be regularly persisted in every night and morning, in the quantity of one table-spoonful in as much warm water; and, at twelve o'clock at noon, take a table-spoonful *undiluted*.—Let this be continued eight or ten days; then take a table-spoonful diluted in warm water three times a-day, morning, noon, and night, till the nerves and organs begin to resume their healthful tone; then let the doses be gradually abated to a spoonful in water every other morning, which should be continued till health is perfectly re-established; and which, by God's blessing, will generally happen, even in these desperate cases, in the course of a month or six weeks.—As a preventive of all foul or scrophulous taints in the habit, and as an alterative, and purifier of the blood, it may be occasionally taken every other morning for a week together, particularly in the spring and fall, in the quantity of a table-spoonful in a wine-glass of cold spring water; or it may be occasionally taken as a beverage after dinner or supper, mixed in a tumbler with warm water, and made palatable with sugar. It will be found pleasant to the taste, and grateful to the stomach, superior to any spirits, or punch. The many instances of elegant and uncommon cures effected by the Solar Tincture, on persons of the first eminence, may be inspected at any time, on application at my house. But at the particular request of the parties, I have here added the following remarkable:

C A S E.

Mr. R. Pinder, of Bramstone, near Bridlington, in Yorkshire, had been long afflicted with a violent scorbutic humour in his blood, which threw out sometimes

dry, and sometimes moist, scabs and tumours on the skin. Being neglected, it at length pervaded the whole system, till, turning inwardly, it fell upon his lungs, and reduced him to the last stage of a consumption. In this deplorable state, given over by the faculty, left totally emaciated, and incapable of turning in his bed, he fortunately had recourse to the Solar Tincture. The first dose was given *undiluted*, which threw him into a fine perspiration, and composed him to sleep, which had long been a stranger to his eyes. After one large bottle had been administered, agreeable to the bill of directions, at the end of a week he was so much restored, that with very little assistance he was enabled to put on his own clothes; and, after continuing the medicine for little more than a month, he was able to walk abroad. And now, after having continued the Tincture night and morning, and occasionally using it as a beverage made similar to warm brandy and water, he has quite recovered his former health and strength; being, to the surprise of every body who beheld him in his late emaciated condition, as robust and as hearty as it is well possible for a man to be.

DEBILITATED, TAINTED, AND ENFEEBLED, CONSTITUTIONS.

MUSCULAR debility was a misfortune but little known to our forefathers. Whether immured in venereal embraces, or sacrificing at the shrine of Bacchus, moderation and seasonable hours directed the measure of their enjoyment. If revelry or voluptuousness by chance unstrung their nerves, gymnastic exercises and field-sports, or the more pleasurable delights of the chace, quickly restored them to their proper tone,—gave new vigour to the blood,—health to the cheek,—and lighted up afresh the flame of love. But now, how strange is the reverse. Habituated to effeminacy, and fed with dainties,—revelling all night with wine, and stretched on beds of down all day,—shut up in stews and brothels, scarcely breathing wholesome air,—clasped in the arms of tainted or diseased females, until enjoyment palls upon the senses, and the muscular powers absolutely refuse their office;—no wonder so many men are found old in every thing but years; whose constitutions are fairly worn down, blood stagnant, solids relaxed, secretions diverted from their proper course, muscles debilitated, eyes sunk, cheek pallid, and spirits gone. These are not half the evils resulting from this fashionable source of destructive folly. It may not be amiss, however, to describe the remarkable cases of a few, of whom the Solar Tincture has made perfect cures, by infusing a new portion of health into the mass of blood; sincerely hoping, that a more wise and manly course of life will shortly eradicate these disgraceful complaints, and restore to the ladies a genuine race of Englishmen and Britons.

CASES.

C A S E S.

PREMATURE DEBILITY.—A gentleman in the army, under thirty years of age, complained to me that he had all at once *become incapable of enjoying his wife*. Suspecting the nature of his disorder, I desired him to be open and candid, to relate to me his *real* situation, and not a *pretended* one, which was only to impose on his own understanding. He thanked me for the rebuke—said he would be frank, and in a few words declared, That from excessive lust, and continual debauch, he had lost his virility; and, to add to the misfortune, he was on the eve of being married. In other respects he felt no diminution in his health or constitution; and, from external appearances, this was surely the last imperfection that could have been suspected. His complexion was vigorous and lively, his flesh firm, and conformation excellent; yet, notwithstanding this, he was impotent to such a degree, that neither the strength of his own desires, nor the excitations of the female, could affect the part. It often happens, that, though the organs remain sound, yet, if the nervous and feminal fluids have degenerated from a healthful state—if they are impoverished by being too much drained, or turned into an unnatural course—they cannot then perform their office, by reason that their moving powers and stimulus on the blood are become too weak to direct their force and action in the manner nature requires in the act of copulation. I therefore enjoined him, to abstain entirely from all attempts of the kind, for three months at least; directed the ointment as in p. 240 of the Medical Part of this work, with the Solar Tincture three times a-day for two months; then twice a-day, until he found it no longer necessary. After taking six large bottles, he generously thanked me for a more hale and robust state of body than he ever remembered to have enjoyed before. He has since sent me several patients, in almost as debilitated a state as himself, who are now ready to unite with him in giving full testimony to the renovating powers and peculiar efficacy of the Solar Tincture.

A RELAXED HABIT.

LITTLE more than three months ago, a gentleman, about fifty years of age, lately returned from the East-Indies, applied to me for the cure of what he termed a *broken constitution*. He had made very free with the fable beauties of Bengal—had undergone a mercurial salivation, and appeared to be sinking under an universal languor and debility of the whole muscular system. The sphincter of the bladder was so weakened, that the urinary secretion came from him by drops, in so perpetual and involuntary a manner, as not to be perceived until the moisture of one set of cloths became so sensibly afflicting as made it necessary to supply
fresh

fresh ones, which usually happened every hour. The corporeal functions were dissipated and relaxed, the tone of the stomach and viscera was nearly gone, the tremulous nerves reluctantly performed their office, and the circulation was become stagnant and morbid. I advised an immediate recourse to the most nourishing food, with strong port-wine negus for his drink, and the Solar Tincture to be taken four times a-day for the first month; three times a-day for the second month, and once or twice a-day afterwards, as occasion might seem to render necessary. Before the expiration of twenty days, the sphincter muscle acquired its proper tone; the pulse became strong and regular, and the nervous tremors were considerably abated. By the end of the second month, a renovation of the whole animal œconomy seemed to have taken place, and a visible accumulation of the blood and juices had retrieved the circulation. Before the expiration of three months, I had the gratification to see this patient completely restored to such a state of bodily health and strength, as utterly astonished himself, after taking only eight large bottles of the Solar Tincture.

HYPOCHONDRIACAL DEBILITY, OR WEAK NERVES.

A GENTLEMAN in Oxfordshire lately came to town on purpose to consult me in his complaint. He appeared to be near thirty years of age, of middling stature, but of a weakly constitution: He had for upwards of seven years past paid his addresses to a lady, whom he had long promised, and very much desired, to marry; but, whenever he proposed in his mind to fix the day, or whenever it happened that he attempted to salute or embrace her, he was seized with an unaccountable tremor of the whole body, his spirits sunk, his virility left him, and a violent palpitation of the heart ensued. In short, he was so distrustful of his own powers, that he confessed it was the fear of not being able to perform the rites of the marriage-bed, that had been the real and the sole cause of thus protracting his wedding-day. This is certainly a most singular instance of the hypochondriacal affection, and of its derangement of the nervous system. The debility induced by it, seems to arise from the weaker energy of the brain, the fault of which, however, cannot be detected by the nicest anatomist. For this reason, we do not well know how such defect should be restored; but as nature, seemingly for this purpose, excites the motion of the heart and arteries, we must ascribe the continuance of such debility to the too-weak reaction of the sanguiferous system. The heart will generally palpitate from a violent excitement of the nerves, especially when the blood is endowed with too small a share of stimulus. Hence palpitation from any affection of the mind, and from hysterics in women. Under whatever circumstances this hypochondriacal affection happens, it debilitates the whole animal machine, and renders the person unable to perform the proper offices of life. The prostration of spirits, weakness, and languor, are often:

often surprizingly great, though the pulse seems tolerably strong, as being heightened by animal desire. The effect, however, is sure to produce a languid circulation, the blood seeming to adhere, with uncommon energy, about the region of the heart. I suspect it is in these cases that cantharides are most frequently used. The patient acknowledged, after some hesitation, that he had tried them; but they only produced an involuntary though violent erection, by no means adapted to the cure, nor to the purpose he intended. Hence this remedy is not only inadequate, but extremely dangerous; for it too much exhausts the vital powers, and is followed by a vast dejection of spirits, tremors, startings of the tendons, &c. which bring on rigours, cold clammy sweats, syncope, and often premature death.

The means, therefore, which nature points out for the cure of this species of debility, are directed to support and increase the action of the blood through the heart and arteries; and the remedies to be employed are tonics and stimulants. Of all the stimulants, which in this constitutional defect may be advantageously employed, port-wine seems to be the most eligible. It has the advantage of being grateful to the palate and stomach, and of having its stimulant parts so much diluted, that it can be conveniently given at all times and seasons, and may be employed with sufficient caution; but it is of little service unless taken pretty largely.—It may be suspected that wine has an operation analagous to that of opium; and on good grounds. But we can distinctly mark its stimulant power only; which renders its effects in the phrenitic delirium manifestly hurtful, but in cases of debility as remarkably useful.—Hence I directed the Solar Tincture to be taken morning, noon, and night, in strong doses, for the first month; once a-day, or oftener, at the discretion of the patient, until the end of the third month; but to drink every day after dinner, a pint of generous port; and to inform me at intervals the change he might find in his constitution. He took with him a dozen large bottles of the Solar Tincture; and before a month elapsed, I had the pleasure of receiving an epistle of unfeigned thanks. He found himself so much restored by the course I laid him under, that, before the expiration of the three months, he married the lady; and I have no doubt will very shortly have issue.—I have been somewhat more elaborate in describing the particulars of this case, having reason to believe it is not an uncommon malady; and would therefore wish to enable every patient to become as much as possible a judge of his own infirmity.

NOCTURNAL EMISSIONS, OR INCONTINENCE OF THE SEMEN.

A YOUNG man, of robust make, and in the prime of life, being under twenty-six years of age, applied to me for relief in the above unfortunate complaint. It appeared, that, from the time of puberty, he had found a weakness in the part, and

an occasional discharge of the seed, upon the slightest irritation. As he grew up to greater maturity, the malady increased upon him. Upon every attempt to have contact with a female, semen passed involuntarily from him, before even a complete erection could take place, whereby his purpose was continually defeated. This defect grew upon him, until the bare sight or thought of any thing which tended to excite venereal desires brought away the seed; yet it had no affinity whatever to a gleet, because the emission never occurred but either in the attempt or in the desire of copulation, or under the influence of lascivious dreams. In proportion as this weakness grew upon him, his desire of familiarity with the sex became the stronger; and, I am inclined to think, was the principal reason of the increase of the malady, and of the nocturnal emissions, which happened more or less every time he went to sleep. This incessant discharge had reduced him to a meagre visage, fallow complexion, hollow eyes, depression of spirits, and slow fever; and a galloping consumption would soon have followed. I directed the Solar Tincture every morning at sun-rising, at mid-day, and at six o'clock in the afternoon, in the quantity of a wine-glass full, with one-third warm water; and every night at going to bed, twenty drops of liquid laudanum, for the purpose of making his sleep too strong to be affected by the influence of dreams. This course, assisted by a strengthening regimen of calf's-foot jelly, veal-broth, and strong port-wine negus, had very quickly the desired effect. His sleep was perfectly sound and calm, and, after the first night, he could not recollect the return of any nocturnal emission. The strengthening ointment, directed in page 240 of the Medical Part of my work, was used every other morning; and within the space of only two months, the femoral vessels were completely braced up, and the disorder so totally removed, as not to leave a single symptom of his former weakness.

O N A N I S M.

A YOUTH, apparently under age, applied to me for the cure of a disorder, which, he said, had deprived him of the power of erection, and of all sensation in the privities. In so young a subject, I could not suppose this want of tone to arise from a general debility of the nervous system, particularly as no other symptoms warranted the conclusion. I had a strong suspicion it was the effect of Onanism, or secret venery, which usually ends in this species of absolute impotency; but this he denied. He told me he had some time ago contracted the foul distemper, and through shame, and the dread of its coming to the knowledge of his friends, he had neglected to disclose his misfortune to any person, until the present malady was brought on. Of the foul distemper, however, I could find no other symptom than a simple gleet; and, upon putting the necessary questions, not a single reply corre-

sponded

sponded with the usual effects of that disorder. After half an hour's close examination, I brought him to confess what I above suspected, that he had so much addicted himself to this shameful and destructive vice, that the feminal vessels were completely relaxed; the erectories, the nerves, and glans, of the penis, had entirely lost their tone; an involuntary discharge of the semen, without irritation, or turgidity of the parts, had long taken place, and brought on a want of appetite, an impoverished state of the blood, and an universal lassitude of the body. The lecture I gave him upon this occasion, will never, I trust, be effaced from his memory; and he has since faithfully promised that it shall not. I directed the strengthening electuary and ointment, in page 239 and 240 of the Medical Part of this Work, to be used as therein prescribed; then to take, four times a-day, a table-spoonful of the Solar Tincture in an equal quantity of warm water, for a month at least; then three times a-day for the second month, and twice a-day, in cold spring-water, for the two months following; which gradually coiled up the debilitated parts, gave elasticity to the blood, retrieved the sensation of the glans, and the sympathetic office of the erectories, braced the nerves, ligaments, and tendons, and gave that due tone and energy to the muscular system, which in less than four months restored the patient to perfect health and vigour.

AN IMPURE OR TAINTED HABIT.

THIS malady, so common among our dissipated youth, generally arises from a venereal complaint badly cured. Indeed the scrophula, the king's evil, the leprosy, and other foul humours, when too long suffered to prey upon the blood, will naturally induce this consequence; yet ninety-nine cases out of every hundred, are found to result from the improper use of mercury, either taken too abundantly into the stomach, or too often applied externally, in the venereal disease. A gentleman in the militia very lately came to me under this misfortune, who had absolutely worn down the organs of his stomach by taking medicines for its cure, without obtaining the smallest relief. He was no sooner warm in bed, than deep-seated nocturnal pains attacked his arms, shins, and head, which many of the faculty mistook for rheumatism. The membranes, muscles, and ligaments, of the joints, were scarcely ever free from pain; whilst carious ulcers occasionally broke out upon the ulna, tibia, and bones of the cranium. These symptoms had also deceived several of the faculty, who, taking his complaint to be a confirmed lues, still added to the malady, by loading him with fresh doses of mercury. The truth is, that this disorder was by no means of a venereal nature, but was rather the consequence of the remedy than of the disease, since it arose entirely from the long and repeated doses of mercury his body had sustained, and which was grounded in his habit by salivation.

salivation. The mercury had infinuated itself into the marrow of his bones, had vitiated every fluid secretion, and tainted the very air he breathed. Under such circumstances I will allow, it is very difficult, if not almost impossible, for a physician, upon a superficial inspection, absolutely to decide, whether the original disease hath been altogether overcome; yet surely he ought attentively to distinguish and consider the several symptoms apart; and then, by comparing them with each other, a clear judgment may be formed upon the general review. Finding, by this method, the real state of the patient's case, I ordered him a nourishing diet, gentle exercise, and an absolute denial of the smallest intercourse with women. To this he readily submitted, putting himself under a regular course of the Solar Tincture, which he took three times a-day, in the quantity of a wine-glass three parts full, filled up with warm water, for the first month. At the expiration of this time he paid me a visit, when his company was infinitely *more agreeable*, because the pleasing odour of health had superseded the nauseous effluvia of his disease. I now only enjoined him to follow the same regimen and *abstemious* mode of living for a month or two longer, taking the Tincture diluted in a glass of cold spring-water once or twice a-day, as he might find himself inclined. This he rigidly attended to; and I have now the pleasure to declare, that only nine large bottles of the Solar Tincture have restored this gentleman from the most dangerous and deplorable state of a tainted and corrupted habit, to sound health, and a renovated state of the blood and juices.

A TAINTED HABIT IN A STATE OF PREGNANCY.

THIS is the most shocking case my practice or experience ever produced. The patient was taken in labour, and in the act of parturition, the child presented its right arm, which separated from the body, while the operator was returning it into the womb. The life of the mother being despaired of, I was sent for; when, on inspection, I quickly perceived conception had taken place under an infected state of one of the parents. I performed the residue of the operation myself, and brought away the foetus without a further separation of the joints, but with great difficulty, since it was ulcerated and half rotten with disease. By a most tender and judicious treatment of the woman, assisted by the Lunar Tincture, her life was preserved; and in the space of five weeks she appeared to have regained her health and strength; when, to the astonishment of every one, she fell into a violent salivation. Being sent for upon this singular occasion, I thought it right to interrogate the husband; when, after a vast deal of hesitation and dissembling, he confessed having had connection with his wife under a venereal infection; and, with a view to prevent the consequences, he had prevailed on her to swallow strong doses of mercury, which I have reason to suppose lay dormant in the body until after her delivery; when the

efforts

efforts of nature being no longer directed to the preservation of the child, suffered the mercury to attack the salival glands, and to produce the effect we have just described. I ordered her a spare but nourishing diet; worked off the mercury in the customary way, and then began a course of the Solar Tincture. A table-spoonful, in an equal quantity of warm water, was taken four times a-day for the first week; then three times a-day until the end of the month; afterwards twice a-day in cold spring-water for a month longer; and then once or twice a-day, or every other day, as the patient found convenient; by this means she happily experienced a complete cure in less than three months, and now enjoys a perfect state of health, desirous of certifying the fact to any unfortunate female, who, under similar circumstances, wishes to call upon me for that purpose. Indeed every woman, who has the misfortune to suspect even the smallest taint of a similar nature to be lurking in her blood, should put herself under a course of the Solar Tincture, and persist in it every night and morning, in the quantity of a table-spoonful diluted in a wine-glass of cold spring-water, during the whole nine months state of pregnancy.

The above case brings to my recollection a very singular instance of an accidental salivation, brought upon a young lady by a foreign substance irritating one of the parotid glands; the particulars of which I shall here insert, for the sake of those who may happen to be under similar circumstances.—In the month of April, 1751, a young lady, about the age of sixteen years, of a delicate habit, but subject to no particular complaints, perceived the beginning of a disease which afterwards proved most obstinate and loathsome, viz. an incessant spitting. The quantity of this discharge was different at different times, varying from one pint to two pints and a half in twenty-four hours. As to its quality, it seemed to be no other than the ordinary secretion of the salival glands. By so large and constant an evacuation, her strength became extremely impaired; and the most efficacious medicines had proved useless. She had taken large quantities of the Peruvian bark, both alone and combined with preparations of iron; and afterwards the fetid gums, opium, amber, alum, and the Neville-Holt water, had in succession been given her. In the mean time an exact regimen had been prescribed, she had been ordered to ride constantly; and to confine herself to a mucilaginous diet, such as veal, calves' feet, &c. Likewise a gently-opening medicine had now and then been interposed. The disease still continued unaltered; she had afterwards tried the *tinctura saturnina*; and had, at the same time, been encouraged to chew the Peruvian bark, and to swallow the saliva. But all these attempts had been vain; and after she had taken some or other of the medicines above-mentioned until the end of September, 1753, namely, above two years, it appeared to her physician, Sir George Baker, unreasonable to expect relief in such a case from any internal medicines whatever. He

now conceived a suspicion, that some extraneous body, having accidentally found its way into the *meatus auditorius*, might possibly be the cause of this extraordinary secretion, by keeping up a continued irritation in the parotid glands. With this view he examined her ears, and extracted from them a quantity of fetid wool. How, or when, it came thither, no account could be given. To this substance he attributed the beginning of the salivation, notwithstanding that the disease did not immediately abate on the removal of the wool; as it appeared to be no improbable supposition that the discharge might be continued by the force of habit, though the original cause no longer remained. It seemed therefore expedient to introduce some other habit, in the place of the increased secretion of saliva; which habit might afterwards be gradually left off. With this intention, he prevailed on the patient to chew perpetually a little dry bread, and to swallow it with her spittle. In a few weeks, it became necessary for her to chew the bread only at certain hours in the day; and thus, after two months, she became entirely free from a most disgusting and tedious disorder. It is worthy of observation, that, at first, the swallowing of so much saliva frequently occasioned a nausea; and that then, for a few hours, she was obliged to spit it out as usual; and that, during the greatest part of the time, when she chewed the bread, she had a stool or two every day more than common.

TABES DORSALIS, OR CONSUMPTION OF THE BACK.

A YOUNG gentleman, twenty-two years of age, applied to me in the above disorder, which had worn him down to a mere skeleton. The tabes is seldom distinguished by any remarkable fever, cough, or difficulty of breathing; but is attended with want of appetite, a weak digestion, and a morbid state of the blood, whence the body grows languid, and wastes by degrees. Sometimes this species of consumption is brought on by a venereal ulcer; but it most commonly proceeds from excessive evacuations of the semen, which was the case with this patient. He had too early addicted himself to an intercourse with lewd women, which eventually brought on an involuntary shedding of the seed, which came from him on the least exertion, whether of walking, riding, lifting a weight, or even of pulling off his clothes.—I ordered him a strong nutritious diet, with a table-spoonful of the Solar Tincture four times a-day, in the same quantity of warm water, which he pursued for a month. He found his strength was so much recovered, that I could safely advise moderate exercise both on horseback and on foot. The gleet, however, was uncommonly obstinate; and the Tincture was continued for the second month in the same quantity. By this time the parts were considerably braced; he could run or jump without perceiving the smallest emission; and the healthful colour of his
cheek

cheek began to return.—He now persisted in the Tincture, only three times a-day, for a month longer; after which the dose was reduced to night and morning for another month; he then took it twice a-day for two months more, at the end of which period every symptom of the complaint was removed, he had fully recovered his flesh and strength; and now preserves it by taking the Solar Tincture as a beverage, made after the manner of brandy and water. This disorder has in general been deemed incurable. It is true, that even in its early attacks, it is so essentially necessary to abstain from venereal embraces, that, without it, the best remedies will prove altogether useless; hence the *tabes dorsalis* so often proves mortal, because the patient has seldom resolution enough to dispense with his amours.

RHEUMATIC GOUT.

THIS disease is generally brought on by alternate heats and colds in the blood, whereby a humour is produced which attacks the joints and muscles, sometimes accompanied with discolorations and swellings, and at other times without either; but it is always attended with excruciating pain. Mr. John Brandham, of Bridlington Quay, was attacked in this manner; when, after some time, the severe pain of his joints, falling into his legs and thighs, deprived him of the use of his limbs, and confined him entirely to his bed. He was soon after seized with a violent pain in his head and stomach, which so much affected his respiration, that instant death was expected. In this extremity, half a wine-glass of the Solar Tincture was administered, *undiluted*, which removed the danger, and gave his stomach immediate ease. A table spoonful, in the same quantity of warm water, was then given every third hour during the succeeding day and night, by which the pains were considerably abated. He continued the medicine four times a-day for a month longer; at the expiration of which time he experienced a perfect cure, and has never since found the smallest return of his complaint; of which he is desirous of satisfying any enquirer, who chooses to apply for that purpose.

AGUES, CONVULSIONS, CHOLIC, BLOODY-FLUX, and VIOLENT SPASMS IN THE STOMACH AND BOWELS.

DURING the fit, let one or two table-spoonfuls of the Solar Tincture, *undiluted*, be administered successively, as the extremity of the case may require; and afterwards let the patient continue the medicine, night and morning, in the quantity of a table-spoonful in a wine-glass of warm water, or oftener, as the obstinacy of the case may render necessary, and in a very short time a perfect cure will be experienced; a few instances of which I shall add, in the words of those who have transmitted me the facts.

To E. SIBLY, M. D.

SIR,—A few nights ago, I was attacked in bed with a violent pain in my stomach and bowels, which alternately produced such a succession of convulsive spasms and cold chills, that I really thought I was seized for death. Fortunately a bottle of your Solar Tincture was in the house, purchased the day before by my son, of which my servant gave me a table-spoonful and a half, unmixed with water. The instant effect it had on my stomach, I could only compare to electricity; for, to the astonishment of all about me, the spasms instantly ceased, a gentle perspiration came on, in which state I fell asleep, and did not awake till the morning, when I found myself entirely free from pain. On getting up, I took a spoonful more of the Tincture in an equal quantity of warm water; and have not since experienced the smallest return of the disorder. Requesting you will make this known, for the benefit of others, I remain, with grateful esteem, &c.

No. 25, Philpot-lane, Fenchurch-street, Feb. 12.

M. ARMSTRONG.

To E. SIBLY, M. D.

SIR,—In gratitude, I cannot but thank you for that excellent medicine, the Solar Tincture. It has saved my life. I was suddenly seized with a violent cholera, which brought on a mortification of the bowels. The efforts of the faculty were tried in vain, and I was given over. In these moments of extremity, my existence was preserved by only two spoonfuls of your medicine, *undiluted*, which instantly relieved me from the rack of torture. After two more doses, the obstruction was removed by natural evacuation, and a few hours restored me to my usual state of good health. I intreat you to publish this for the public good, and shall be ever gratefully your's,

Clifton, near Bristol, Feb. 24.

JOHN POWELL.

To E. SIBLY, M. D.

SIR,—Actuated by a principle of gratitude, I cannot omit acquainting you of an extraordinary cure performed on me by means of your Solar Tincture.—I had for some time been afflicted with the dysentery or bloody-flux, and was reduced to a very weak and languid state, without deriving any benefit from the prescriptions of the faculty. This induced me to make trial of your Solar Tincture; when, after taking only two small bottles, I found myself perfectly recovered; therefore, by publishing this to the world, you will confer a favour on your grateful, &c.

WILLIAM JACKSON.

No. 8, Windmill-street, Tottenham-court-road, May 15.

DISEASES

DISEASES OF THE BREAST AND LUNGS, ASTHMA, DROPSY, OR CONSUMPTION.

TAKE one spoonful of the Tincture, night and morning, for twenty days successively, diluted in two spoonfuls of cold spring-water; then reduce it to the same dose every other day, which will in general remove the malady in the course of a month; but, if the dropsy or consumption have been far advanced, it will be necessary to continue the medicine for one, two, or even three, months longer, reducing the number of doses in proportion as health and strength appear to return, and as the blood shall have resumed its proper consistency, and a brisker circulation. In these complaints, it will not be amiss to take the Tincture in a tumbler of warm water, as a beverage, for some time after the cure is perfected, as it will infallibly prevent the blood from returning to its watery and impoverished state, and will rarefy and expel the viscid cohesions in the pulmonary vessels. In these disorders, the Solar Tincture may be safely administered to females even during obstructions of the catamenia, as hath lately been experienced by perfecting an admirable cure on a lady in Grafton-street.

This lady was afflicted with obstructions of the liver and spleen, inasmuch that she could not walk up one pair of stairs without much pain, and shortness of breath. Her menses were obstructed; and twice or thrice a-day she was attacked with asthmatic spasms, accompanied with febrile symptoms. This affliction being of a peculiar nature, I was obliged to prescribe both the Solar and Lunar Tinctures, in the following manner: Whenever the fever came on, she took a dose of the Solar Tincture; and every morning and evening, sixty drops of the Lunar Tincture in a gill of mugwort tea; and in twenty-one days she was perfectly recovered, and restored to her usual colour and vivacity, to the great joy of her parents and friends.

MENTAL DEPRESSION, OR LOWNESS OF SPIRITS.

THIS may be considered the primary disorder of the nervous train; and, if resisted in time, may in most cases be easily cured. For this purpose take a table-spoonful of the Solar Tincture, diluted in a wine-glass of cold spring-water, every forenoon at eleven or twelve o'clock, for fourteen successive days; then use it in every two or three days for a month, and the complaint will be entirely removed, as all patients will sensibly feel, by their alertness, activity, and unusual flow of natural spirits; of which the following case may serve as an example:

To E. SIBLY, M. D.

SIR,—From a full conviction of the efficacy of your Solar Tincture, I cheerfully come forward to inform you, that, having been much afflicted with depression of
 No. 24. 5 A spirits,

spirits, a nervous tremor, and palpitation of the heart, (owing, I believe, to close application to study, and much professional duty,) I have lately experienced a perfect cure, by taking one large bottle of your medicine. Impressed, therefore, with a sense of gratitude to God and you, and having a certain knowledge of many other cures performed by your Tincture, I do hereby request this may be made public for the benefit of the afflicted, and am with esteem, &c.

Borough, Southwark, March 10.

W. WOOLLEY, M. A.

BILE ON THE STOMACH.

ALL bilious complaints are removed by the Solar Tincture in a most extraordinary manner. Whenever a fit appears to be coming on, with the stomach loaded and oppressed, one large table-spoonful, taken in the same quantity of warm water, will in ten minutes carry off the offending matter, cleanse and comfort the digestive organs, and give the patient immediate relief.

BITE OF A MAD DOG, OR ANY VENOMOUS REPTILE.

THE fatal disease consequent on the bite of a mad dog, is the *hydrophobia*, or "dread of water;" which circumstance first suggested dipping in the sea for cure. It is very remarkable that these patients have not only a dread of water, but of every thing bright or transparent. Soon after this affection takes place, the mind becomes impaired; which shows that the poison is carried through the blood to the nervous fluid, and thence to the brain. Dr. James, in his Treatise on Canine Madness, mentions a boy sent out to fill two bottles with water, who was so terrified by the noise of the liquid running into them, that he fled into the house crying out that he was bewitched. He mentions also the case of a farmer, who, going to draw some ale from a cask, was terrified to such a degree at its running into the vessel, that he ran out in great haste with the spigot in his hand. But, in whatever manner this symptom comes on, it is certain that the most painful sensations accompany every attempt to swallow liquids. Nay, the bare sight of water, of a looking-glass, of any thing clear or pellucid, will give the utmost uneasiness, or even throw the patient into convulsions. In this disease there seems to be an extreme sensibility and irritability of the nervous system. The eyes cannot bear the light, nor the sight of any thing white; the least touch or motion offends them, and they want to be kept as quiet and in as dark a place as possible. Some complain of the coldness of the air, frequently when it is really warm. Others complain of violent heat; and have a great desire for cold air, which yet never fails to increase the symptoms. In all there is a great flow of the saliva into the mouth; which is exceedingly troublesome to the patients, as it has the same effect upon their fauces that other liquids

have. This therefore they perpetually blow off with violence, which in a patient of Dr. Fothergill's occasioned a noise not unlike the hollow barking of a dog, and which he conjectures might have given rise to the common notion that hydrophobious patients bark like dogs. They have an insatiable thirst; but are unable to get down any drink, except with the utmost difficulty; though sometimes they can swallow bread soaked in liquids, slices of orange, or other fruits. There is a pain under the *scrobiculus cordis*, as in the tetanus; and the patients mournfully point to that place as the seat of the disease. Dr. Vaughan is of opinion that it is this pain, rather than any difficulty in swallowing, which distresses the patient on every attempt to drink. The voice is commonly plaintive and mournful; but Dr. Vaughan tells us there is a mixture of fierceness and timidity in the countenance which he cannot describe, but by which he could know a hydrophobious person without asking any questions. Some seem to have at times a furious delirium, and an inclination to spit at or bite the by-standers; while others show no such inclination, but will even suffer people to wipe the inside of their mouths with the corner of a handkerchief in order to clear away the viscid saliva which is ready to suffocate them. In some male patients there is an involuntary erection of the penis, and emission of the semen; and the urine is forced away by the frequent return of the spasms.

In a letter from Dr. Wolf, of Warsaw, to Henry Baker, F. R. S. dated Warsaw, Sept. 26th, 1767, we have the following melancholy account of the cases of five persons who died of the hydrophobia: None of them quite lost their senses; but they were all talking without intermission, praying, lamenting, despairing, cursing, fighting, spitting a frothy saliva, screeching, sometimes belching, and retching, but rarely vomiting. Every member is convulsed by fits, but most violently from the navel up to the breast and œsophagus. The fit comes on every quarter of an hour; the fauces are not red, nor the tongue dry. The pulse is not at all feverish; and, when the fit is over, nearly like a sound pulse. The face grows pale, then brown, and during the fit almost black; the lips livid; the head is drowsy, and the ears tingling; the urine limpid. At last they grow weary; the fits are less violent, and cease towards the end; the pulse becomes weak, intermittent, and not very quick; they sweat, and at last the whole body becomes cold. They compose themselves quietly as if to get sleep, and so they expire. A general observation was, that the lint and dressings of the wounds, even when dry, were always black, and that when the pus was very good in colour and appearance. In one of Dr. Wolf's patients who recovered, the blood stank intolerably as it was drawn from a vein; and one of Mr. Vaughan's patients complained of an intolerable fœtid smell proceeding from the wounded part, though nobody but himself could perceive it. In general, the violent convulsions cease a short time before death; and even the hydrophobia goes

goes off, so that the patients can drink freely. But this does not always happen; for Mr. Vaughan mentions the case of a patient, in whom, "when he had in appearance ceased to breathe, the spasmus cynicus was observable, with an odd convulsive motion in the muscles of the face; and the strange contrariety which took place in the action of these produced the most horrid assemblage of features that can well be conceived. Of this patient also it was remarkable, that in the last hours of his life he ceased to call for drink, which had been his constant request; but was perpetually asking for something to eat."

The hydrophobia seems to be a symptom peculiar to the human race; for the mad animals which communicate the infection do not seem to have any dread of water. Notwithstanding this, dipping is the common remedy for the cure of dogs and men. With regard to the symptoms of madness in dogs, they are very equivocal; and those particularly enumerated by some authors, are only such as might be expected in dogs much heated or agitated by being violently pursued and struck. One symptom indeed, if it could be depended upon, would determine the matter; namely, that all other dogs avoid and run away from one that is mad; and even large dogs will not attack one of the smallest size who is infected with this disease. Upon this supposition they point out a method of discovering whether a dog, who hath been killed, was really mad or not; namely, by rubbing a piece of meat along the inside of his mouth, and then offering it to a sound dog. If the latter eats it, it is a sign the dog was not mad; but, if the other rejects it with a kind of howling noise, it is certain that he was. Dr. James tells us, that among dogs the disease is infectious by staying in the same place; and that, after a kennel has been once infected, the dogs put into it will be for a considerable time afterwards in danger of going mad also. A remedy for this, he says, is, to keep geese for some time in the kennel. He rejects as false the opinion that dogs when going mad will not bark; though he owns that there is a very considerable change in their bark, which becomes hoarse and hollow.

With regard to the immediate cause among mankind, there is not the least doubt that the hydrophobia is occasioned by the saliva of the mad animal being mixed with the blood. It does not appear that this can operate through the cuticula; but, when that is rubbed off, the smallest quantity is sufficient to communicate the disease, and a slight scratch with the teeth of a mad animal has been found as pernicious as a large wound. It is certain also, that the infection has been communicated by the bites of dogs, cats, wolves, foxes, weasels, swine, and even cocks and hens, when in a state of madness. But it does not appear that the distemper is communicable from one hydrophobious person to another, by means of the bite, or any other way.

It has been generally allowed by practitioners, that, though the hydrophobia may be prevented, yet it can seldom be cured after the disease has made its appearance. The most essential part of the treatment therefore depends on an immediate use of the proper means of prevention. For this purpose some advise the instant cutting out the part bitten, which must certainly be an effectual mode, provided we could be sure the poison had not reached beyond the wound. When, however, we consider the rapidity with which the blood and juices flow, it seems impossible we can ever wholly depend on such an operation. I should nevertheless advise it to be done; after which let the part be well soaked with the Solar Tincture; and, to fortify the blood, let the patient immediately swallow a table spoonful every three hours, *undiluted*, for the first day; and the same dose night and morning, for a month following. Let the part be again soaked with the Tincture four times a-day, for three or four days; and I am satisfied a safe and perfect cure may be relied on. For the bite of adders, snakes, &c. bathing the part, and taking the medicine *undiluted*, will counteract the virulence of the poison, and preserve the patient from further injury.

FOR GUN-SHOT WOUNDS, CUTS, STABS, &c.

GENTLEMEN in the army and navy, and all persons liable to gun-shots, stabs, wounds, &c. should never be without the Solar Tincture. Its salutary effects on the blood, in all these cases, are really surprising. It totally prevents, and will even stop, mortification, in very advanced stages. It quickly supplies the greatest loss of blood; fortifies the heart, cherishes the vital organs, and heals and unites the flesh in an uncommon degree. If taken internally, and poured at the same time into the wound, it is quickly propelled through the heart by the veins and arteries; and thus renovates the exhausted spirits, and preserves life. Its effect on a few simple wounds may be seen in the following cases.

To E. SIBLY, M. D.

SIR,—For the sake of those liable to accidents, I think it right to inform you of a most remarkable cure performed by your Solar Tincture, on a very deep and dangerous wound made on Mrs. Cook by a case-knife, of more than the depth of my fore-finger. After trying every means in vain to stop the blood, I sent for a bottle of your Solar Tincture, and well bathed the wound therewith. The blood and Tincture readily assimilated, and formed a crust on the orifice of the wound, which very soon stopped the effusion of blood. But what is most remarkable, the wound was completely healed in less than six days, and is now so perfectly closed, as to be almost imperceptible. You are welcome to publish this, and in so doing will oblige, &c.

Seymour-street, Portland-square, April 14.

WILLIAM COOK.

To E. SIBLY, M. D.

SIR,—In justice to my own feelings, I cannot but acquaint you with a cure performed by your Solar Tincture, in a very uncommon manner. As I was travelling in the stage to Boxley-Abbey, near Maidstone, in Kent, a gentleman, who sat next me, putting his head out of the window, received a violent cut across the eye with the coachman's whip, which produced an immediate swelling and inflammation, attended with so much agony, that he declared the pain was insupportable. I had purchased a bottle of your Solar Tincture while in town, knowing it had performed many surprising cures in my neighbourhood. This I immediately opened, and applied to the inflamed part; and, after washing the eye well with it, I bound a white handkerchief tight over it, wetted with the Tincture. In less than ten minutes the anguish was greatly alluaged; and in the course of three hours it was quite well. The gentleman expressed the utmost astonishment at the celerity of the cure, as did every passenger in the coach. I wish this to be made as public as possible, for the benefit of those who are liable to accidents; and am with respect, &c.

M. STABLES.

I shall only remark further, with respect to wounds, bruises, &c. that a short time ago, as a coach was driving furiously out of Cavendish-square, the horses unfortunately beat down a girl of eight years of age, the daughter of Robert and Elizabeth Larken, of Clipston-street; and, the wheels passing over her body, she was taken up to all appearance dead. The spectators were for carrying her immediately to the hospital; but, the accident happening very near my house, I was sent for. I avoided letting blood, but bathed the bruised parts thoroughly with the Solar Tincture, and introduced half a spoonful, *undiluted*, into her stomach. It was now about nine o'clock at night. She was composed and asleep before ten, being overcome by the medicine. A spoonful more of the Tincture was given her at different periods of the night, the sudorific power of which brought on a plentiful perspiration. At ten o'clock the next morning she awoke, and got up, and was so well recovered as to be able to play about with her companions, in all respects the same as if nothing had happened. The girl, and her parents, are pleased with every opportunity of recounting the circumstances of this event, to any enquirers.

Let it not be said, that, because this medicine appears to be prescribed for many disorders, it can be good for none.—I affirm, that every complaint for which it is recommended, *originates in the blood, or in obstructed perspiration*. The action of the Solar Tincture is on the blood and juices; it strikes at the root, not at the branches; by which peculiar advantage it effects a cure when other medicines fail. And, though there is a medicine, sold in regular practice at a guinea an ounce, which

which possesses no one virtue comparable to the Solar Tincture; yet the proprietor, unwilling to adopt such examples, or to withhold from the afflicted in every line of life the benefits of his discovery, has determined to render it to the public at only 7s. 6d. the small, and 13s. the large, bottles, duty included, with ample directions in every complaint for which it ought to be administered.—A single bottle will in many cases perform a speedy cure, when, in the ordinary course of medical practice, it would occupy a month, and cost many pounds for unnecessary attendance, and excess of drugs.

OF THE

PRINCIPLES

OF

LIFE AND DEATH.

LIFE denotes the animated state of nature; and, in human beings, exists as long as an union of the soul and body lasts. With us, therefore, life continues, until such separation has really taken place; which can no more be said to have happened during the paroxysm of a fit, or of a blow which for a time deprives us of sensation, or in the *early* period of an unnatural or sudden death, than during the time we are asleep. It is the want of proper skill at such times that too often occasions death to take place, when life absolutely exists in the blood, and might with little care have been preserved. Death is therefore the act of separation of the soul from the body; in which sense it stands opposed to life, which consists in the union thereof. An animal body, by the actions inseparable from life, undergoes a continual change, and receives its dissolution by degrees. Its smallest fibres become rigid; its minuter vessels

vessels grow into solid fibres no longer pervious to the fluids: its greater vessels grow hard and narrow; and every thing becomes contracted, closed, and bound up: whence the dryness, immobility, and extenuation, observed in old age. By such means the offices of the minuter vessels are destroyed; the humours stagnate, harden, and at length coalesce with the solids. Thus are the subtlest fluids in the body intercepted and lost, the concoction weakened, and the reparation prevented; only the blood continues to run slowly through the greater vessels, assiduous to preserve life, even after the animal functions are destroyed. At length, in the process of these changes, death becomes inevitable, as the necessary consequences of life. But it is rare indeed that life is thus long protracted, or that death succeeds merely from the natural decays and impairment of old age. Accidental diseases, and our neglect of preserving health, cut the work short.

The signs of death are often very uncertain. If we consult what Winslow or Bruchier have said on this subject, we shall be convinced, that between life and death the shade is so very undistinguishable, that even all the powers of art can scarcely determine where the one ends and the other begins. The colour of the visage, the warmth of the body, and suppleness of the joints, are but uncertain signs of life still subsisting; while, on the contrary, the paleness of the complexion, the coldness of the body, the stiffness of the extremities, the cessation of all motion, and the total insensibility of the parts, are but uncertain marks of death begun. In the same manner also, with regard to the pulse and breathing; these motions are so often kept under, that it is impossible to perceive them. By bringing a looking-glass near to the mouth of the person supposed to be dead, people often expect to find whether he breathes or not. But this is a very uncertain experiment: the glass is frequently sullied by the vapour of the dead man's body; and often the person is still alive, though the glass is no way tarnished. In the same manner, neither noises in the ears, nor pungent spirits applied to the nostrils, give certain signs of the discontinuance of life; and there are many instances of persons who have endured them all, and afterwards recovered without any external assistance, to the astonishment of the spectators. This surely ought to be a caution against hasty burials, especially in cases of sudden death; for it is shocking to reflect, that some hundreds of valuable members of society are annually torn from their disconsolate families by some accidental sudden cause, and hurried thoughtlessly to the grave, in whom the principles of life were capable of being revived! This lamentable truth has been established by the happy success of the Humane Society, from whose laudable exertions several hundred persons have been restored to life, who, to all visible appearance, *were past recovery*. Every age and country affords some instances of persons having been recovered, even after lying long for dead; and from the number of

those preserved by mere lucky accidents, it is evident still greater numbers might be saved by timely pains and skill. Those who have contemplated the structure of the human machine know, that its dissolution cannot *naturally* happen but by that gradual decay of the whole system above described, when the vessels are become impervious to the fluids, the circulation weakened or destroyed, and the vital organs no longer able to perform their office. But, when their functions are merely suspended by some sudden shock, it may be likened to the state of a watch stopped by a fall, which resumes its motion the instant that injury is repaired. In the animal œconomy, "*the BLOOD is the LIFE;*" Levit. xvii. 11, 14. Deut. xii. 23. therefore, if its circulation be suspended or destroyed, death follows. But, if the blood can be re-agitated, and its circulation resumed, life will of necessity be restored. For this reason, whenever any accident has happened, by which sudden death appears to have taken place, whether by blows, fits, falls, suffocation, strangulation, drowning, apoplexy, convulsion-fits, thunder and lightning, assassination, duelling, or the like, let the unfortunate person be carried into a warm house, and laid by the fire, or put into a warm bed; let two or three table-spoonfuls of the Solar Tincture be introduced as early as possible into the stomach, and rubbed profusely in, by a warm hand, upon the spine of the back, loins, breast, and region of the heart, and poured into the wound, if there be any; the warm stimulating quality of the medicine, assisted by the external heat and friction, will quickly rouse the stagnant blood and juices, particularly in the grand reservoir the heart, where, rarefying, pressing every way, and being resisted by the valves, it will swell so as to fill the flaccid right auricle of the heart, which by the shock had become empty and at rest; and thus, stimulating its fibres, will put them in motion. The right auricle being thus filled, and stimulated into contraction, fills the ventricle; which, by this means being irritated, likewise contracts and empties itself into the pulmonary artery; and, the moment this is done, the circulation begins again where it left off; and the lungs, being filled by the dephlogisticated air contained in the medicine, begin to act, and life is restored, provided the organs and juices are in a fit disposition for it; which they undoubtedly are much oftener than is imagined. Nor is this stimulating action of the Tincture upon the heart at all surprising; for every medical man knows, or ought to know, that the heart, even when taken out of the body, if it be pricked with a pin, or hath warm water thrown upon it, will beat afresh, and endeavour to exert its functions, though for some time before it had been motionless. No person therefore ought to be considered *dead*, until the energy of the blood is so far gone, that it can never again be agitated so as to fill and stimulate into contraction the right *sinus venosus* and auricle of the heart.

When the patient is thus far recovered, he ought to be treated with great care and tendernefs; and fome warm milk, wine and water, elder-flower-tea, or any nourifhing fpoon-meat, fhould be given to him as foon as he appears capable of taking food. In fome cafes it may be neceffary to open the temporal artery and the external jugular, or to bleed in the arm; but this fhould never be done, if it can fafely be difpenfed with, as it certainly weakens the animal principle, which it is the firft object of this medicine to ftrengthen. Under different circumftances, and as particular occafions may require, the rules laid down in p. 196 of the Medical Part of this work, and recommended by the Humane Society, will be found of confiderable advantage. Above all, let me entreat an anxious perfeverance in this fublimeft of all virtues—the attempt to recover perifhing lives. Humanity calls for it in the moft moving accents; and what can infpire a good heart with more fincere, perfect, confcious, and commendable, fatisfaction, than a retrofpect of fuch endeavours as have been generoufly exerted and fuccefffully contributed to recover, perhaps to reftore, the life of a fellow-creature from the moft deprecated calamity—fudden death, with its alarming retinue of threatening confequences to thofe who die unprepared? fince, by thus preferving a finner to a future period, perhaps a foul may emerge in full maturity to felicity which fhall have no end!

To demonftrate the reanimating power of the medicine, experiments may be made upon a fowl, lamb, cat, dog, or other animal, by plunging them under water until they are apparently dead, or piercing them through the head, or any part of the body except the heart; by fuffocation, or an electrical fhock: for fudden death, howfoever it happens, whether by drowning or otherwife, is much the fame as to its effects on the vital organs; confequently they are all to be treated in a fimilar manner.

Upon the whole it is evident, that by contemplating the œconomy and harmony of our ftructure, both external and internal, we may quickly difcern a proper line of conduct for the confervation of health, and the prolongation of life; and we fhall alfo perceive a more auguft view of the marvellous works of divine wifdom in the ftructure of the human frame, than we fhall perhaps again find in the whole compafs of nature. The gift of health was evidently the defign of our benevolent Creator in the conftruction of our bodies; it is therefore no lefs our duty than our intereft to preferve this bleffing to our lateft moments, as the feafoning and fund which gives the relifh to all our other enjoyments. To enumerate the various abufes of health, which take place from our earlieft infancy, particularly among the rich and gay, and which are continued through the fucceeding ftages of modifh life, would fill a volume. Suffice it to obferve, that they prevail more particularly among people who are the moft highly polished and refined. To compare their artificial mode of living with that of nature, would afford a very ftriking contraft,

and supply an obvious reason why persons in the lower orders of society are generally the longest lived, and enjoy the best state of health; and hence we are warranted to conclude, that a large proportion of the diseases to which we are subjected are produced by ourselves.

Notwithstanding this unaccountable abuse of our health, yet the want of it unfits us for most of the common avocations of life, and is more especially an enemy to the social and humane affections, as it generally renders the unhappy sufferer peevish and fullen, disgusted at the allotments of Providence, and apt to induce suicide, by suggesting gloomy and suspicious sentiments of the Almighty. It obstructs the free exercise and full improvement of our reason, makes us a burden to our friends, and useless to society. Whereas the uninterrupted enjoyment of health is a constant source of good humour, and good humour is a great friend to openness and benignity of heart; enables us to encounter the various ills and disappointments of this world with more courage, or to sustain them with more patience; and, in short, conduces much, if we are otherwise duly qualified, to our acting our part in every exigency of life with more firmness, consistency, and dignity. Therefore it imports us much to preserve and improve the habit of its enjoyment, without which every other external entertainment is tasteless, and most other advantages are of little avail. To this end, we ought above all things to cultivate prudence, temperance, sobriety, fortitude, and equanimity of temper; for without a prudent care of the body, and a steady government of the mind, to guard the one from disease, and the other from the feuds of passion and prejudice, sound health is unattainable. By *temperance* we enjoy the real gratifications of life, without suffering any consequent inconvenience. Sobriety enables us to be content with simple and frugal fare, and protects us from the pain and disgrace of intoxication. Fortitude enables us to bear those infirmities which prudence and sobriety cannot shun, and banishes all dread of imaginary evils from our thoughts. Equanimity of temper contributes greatly to the happiness of life, as well as to the preservation of health, by keeping the mind from anxiety and perturbation, and arming us against the calumnies and animosities of human nature. Violent passions, and the excesses they induce, gradually impair and wear away the constitution; whilst the calm and placid state of a temperate mind, and the healthful exercise of the body, preserve the natural functions in full vigour and harmony, and exhilarate the spirits, which are the chief instruments of action. The worst consequences that could possibly result from a strict adherence to this regimen, would be that of exterminating a swarm of locusts, and rendering the discovery of my medicine of less importance to the community.

OF THE CRISIS, OR CRITICAL TURN, OF A DISEASE.

THE Crisis of a Disease is no other than the struggle betwixt nature and the infirmity, which of them shall prevail. If nature at the time of the crisis overcomes the malignity of the disease, it is a sure sign it will be cured; but, if the sickness prevails, it is then a pernicious crisis, and shows sudden alterations for the worse. Every sudden and vehement motion of the disease may be called a crisis; therefore days critical, decretory, and crismal, are all one and the same thing, and import no more than a certain and more sure judgment of the infirmity afflicting, either more powerful, or less vehement, at those times when the true crisis happens; therefore a crisis is to be calculated from that moment of time when the disease first invaded the patient. And on this ground I shall make some observations to prove the truth of what I have now to deliver, and of what I have before so often proved, that I cannot but admire the wonderful providence of God, who disposeth all things by number, weight, and measure, prescribeth to the whole system of nature so immutable a law, that it were as easy for the heaven and the earth to return to their original chaos, as to break and infringe that immutable law, unless the divine will and pleasure alter it miraculously.

We discriminate two sorts of diseases; acute, and chronic. Of acute diseases some are simply acute, others peracute, that is very acute; others again are perperacute, or exceedingly acute. Those that are simply acute are finished in eight, ten, eleven, fourteen, twenty, or twenty-one, days. They are terminated in the time the Moon traceth the twelve celestial signs of the zodiac, viz. in twenty-seven days and eight hours.

Those acute diseases which suffer changes are very fickle; for sometimes they increase, and sometimes they are remitted, according as the Moon meets with the beams of either benefic or baneful planets; and sometimes they change out of acute diseases into chronic; and thus a continued fever may change into an hectic fever, or an intermittant fever into a continual fever; and these diseases terminate in forty days.

Very acute diseases are such as terminate in five, six, seven, or eight, days; amongst which is the disease called peripneumonia, or inflammation of the lungs. Exceedingly acute diseases are such as end in three or four days at farthest, as pestilences, apoplexies, &c.

Chronic diseases follow the motion of the Sun, and it is about ninety days before the first crisis begins to appear; for in that time the Sun comes to the proper quarter of the place he was in at the decumbiture; as appears in hectic fevers, dropies, and the like. But, when he comes to those degrees from the decumbiture which
are

are called indicative, or intercidental, which are both one, or judicial, (as may be seen in the Table,) some alteration will appear, whereby a man may judge of the crisis to come. For the patient will be well, if the Sun be well configured with benign planets; but worse, if in aspect with evil ones; and this rule is infallible, if you consider it from the nativity throughout the whole course of a man's life; for *diseases are the particular attendants of the inequality of the elements in every human being.*

Also a crisis may be perfect, or imperfect. A perfect crisis is when the disease appears plain, and perfectly to be judged of; and this is sometimes hopeful, and sometimes desperate. Hopeful, when there is a great probability of health and recovery; desperate, when there are palpable signs of death. An imperfect crisis is when the disease is changed upon every light occasion; as if Mars be the author of the disease, and in a double-bodied sign; in this case the disease will be variable.

That crisis may be deemed safe, which comes without pernicious aspects; but that is doubtful and dangerous which comes with malignant aspects; what these aspects are, with the significators of every disease, and the mode of ascertaining them, are already explained in my *ILLUSTRATION OF ASTROLOGY*. I have there shown, that to judge of a disease, it is necessary to observe the motion of the Sun, Moon, and lord of the ascendant. With respect to the lord of the ascendant, observe, before you give judgment, what application he makes to any planet, either by conjunction, quartile, or opposition; or, should he apply to more than one planet, look to which of them he approaches nearest, and then count how many degrees of longitude are between them; and, if the disease be acute, then for every degree add a day; but, if chronic, a week, month, or year, according to the situation of Jupiter, Venus, Mercury, or the Moon, at a perfect crisis.

Now the time called critical is always evil, because of the contrariety of the sign the Moon is then in to the sign she was in at the decumbiture, which induceth the contrariety of her nature to the opposite place; therefore at such a time there ariseth a controversy and contest between the disease and nature. The Moon upholds nature in acute diseases; and hence is the reason that a bad crisis will always happen, if she be afflicted upon a critical day by the bodies or evil beams of Saturn or Mars, or by the lord of the eighth house, or by the lord of the fourth house, if he be a malevolent, because he signifies the grave. But, if the Moon at the time of the crisis behold the lord of the ascendant, or be configured with the benefic planets, health ensues, and the malady will be vanquished and overcome in the conflict.

If the disease terminates not upon the first crisis, observe how the Moon will be configured on the second crisis, and judge by the same rules. If it terminates not then, as will sometimes happen, view the third crisis, and judge by that the same

way. If your judgment, supported by reason and the former rules, declare that the disease will not terminate one way or other, neither in health nor death; then examine the face of the heavens at the time the Moon returns to the place she was in at the decumbiture, which is at the end of twenty-seven days, eight hours, and some minutes; and judge according as the Moon shall be then configurated with benefic or malignant planets; for this of necessity terminates all acute diseases; though we may observe that not one in a hundred holds on so long, nor one out of twenty continues half so long.

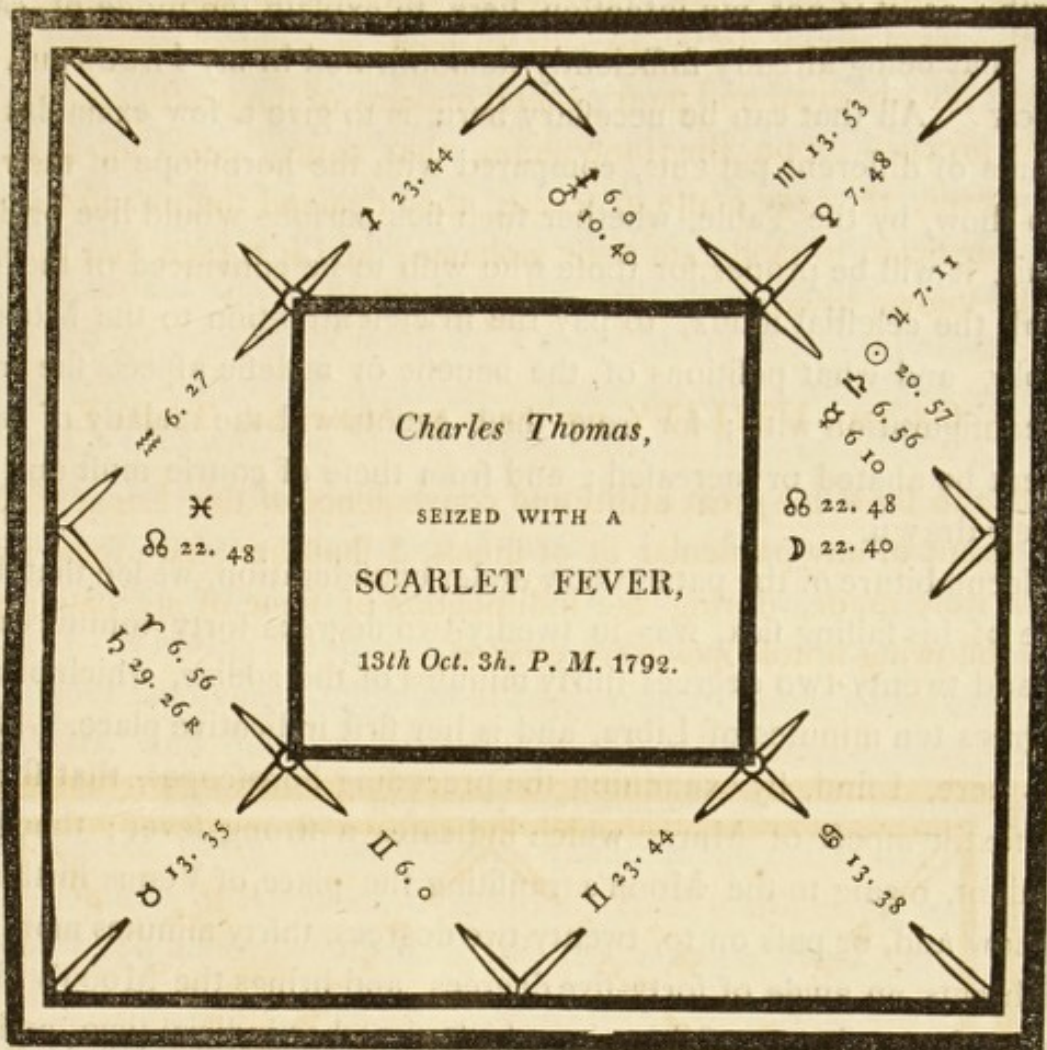
If the acute disease ends not in a month, it is then turned into a chronic disease; and must be judged of by the Sun. The rules for judging chronic diseases by the Sun are similar to those by which we judge of acute diseases by the Moon. Now, for the right distinction and calculation of time to judge of the progress of a disease in this way, observe the following method: See what degree the Moon was in at the decumbiture, by an Ephemeris, and add twenty-two degrees thirty minutes, which is called the indicative time, because it informs the physician the nature of the disease; for upon these indicative days the disease is usually remitted and mitigated. To this indicative time add twenty-two degrees thirty minutes more, and this points out the judicial day, viz. just forty-five degrees from the place of the Moon when the patient fell sick, being the half of a crisis, and manifests, according as the Moon happens to be aspected, whether a good or a bad crisis will ensue. To the judicial day add twenty-two degrees thirty minutes more, and it makes sixty-seven degrees thirty minutes, which produces the second indicative day, as falling between the crisis and judicial day. From this the physician may expect indications how the disease will finally show itself. To this add twenty-two degrees thirty minutes more, and you have the perfect crisis of the disease from the decumbiture, viz. ninety degrees, or one quarter of the zodiac. At this time nature will manifest, according to the planets that are in aspect to the Moon, whether the sick person will have a good or bad crisis; and, adding twenty-two degrees thirty minutes more, it makes the next judicial day, when the Moon approacheth to it; and soon, through the whole twelve signs of the zodiac, and over it again, if the disease terminate not in that time, as will plainly appear by the following Table, which shows when the Moon comes to an indicative or to a judicial day, that is, a femiquartile, or half a crisis; and when to a true quartile, and when to an opposition, which is called a full crisis; and so to all the indicative and judicial days during the sickness, &c.

EXAMPLE.

Suppose the true place of the Moon, at the time a person falls sick, be sixteen degrees of Gemini, which will be found in the fourth column of the following Table,

ble, so that sixteen degrees of Gemini will be the Moon's radical place in the decumbiture. Over against 16 degrees, to the right hand, I find 8 30, and over the head thereof I find ☉; so that, when the Moon came to eight degrees thirty minutes of Cancer, it was the first indicative day, wherein the physician might expect to see how the disease would show itself. Upon every crisis or indicative day, make special observation what planet the Moon is in configuration with; if with a benevolent planet, expect some remissions in the disease; but, if with a malevolent, the contrary effect will follow. Next, on the right hand to 8 30 of ☉, you will find 1 ♀, which shows that, when the Moon comes to the first degree of Leo, she will be in femiquartile to her first place; and this is, as before stated, half a crisis, at which time the disease will more or less manifest itself according to such configurations as the Moon is found to make with the other planets at the time she comes to the first degree of Leo. In the next column on the right hand, you see 23 30, and over it ♁. This points out the indicative day, wherein the physician is enabled further to judge of the increase or decrease of the disease. In the next column you find 16, and over it ☿, which indicates that, when the Moon came to the sixteenth degree of Virgo, there was a true crisis, whereby the disease might be more fully investigated, and a judgment framed according to the aspects the Moon in that degree had to the good or evil planets; for from hence will the patient or physician descry a better or worse crisis, in progressive order. And thus, in the continued line or column, you may run round the face of the Heavens, observing the configurations of the Moon when she comes to those places of the zodiac wherein she makes the indicative, judicial, and critical, days, and what planet or planets she is then in contact with, and whether in the decumbiture they promise good or evil. Besides this, you must observe on what day the Moon, or the lord of the ascendant, transits the cusp of the sixth, seventh, and eighth, houses, and how she is then aspected with the benevolent or malign planets; and observe whether she be combust, or in *via combusta*, which is from the twentieth degree of Gemini to the first of Cancer, in the northern part of the zodiac, and in the southern from the sixth degree of Sagittarius to the sixteenth of the same constellation; and from the twenty-fourth degree of Sagittarius to the fifth degree of Capricorn, or in conjunction, quartile, or opposition, of Saturn, or Mars, or of a combust planet, or of some fixed star of a malignant nature; for in all these cases an indication is given of death, or of long and severe sickness, according to the number of testimonies and astral indications, as expressed in the rules given in my ILLUSTRATION OF ASTROLOGY; but in which the following most valuable Table was omitted.

With respect to moderate or slight diseases, Hippocrates asserted, in the first place, "That contraries, or opposites, are the remedies for each other;" and this maxim he explains by an aphorism; in which he says that evacuations cure those distempers which come from repletion, and repletion those that are caused by evacuation. So heat is destroyed by cold, and cold by heat, &c. In the second place, he asserted, that "physic is an addition of what is wanting, and a subtraction or retrenchment of what is superfluous:" an axiom which is explained by this, viz. that there are some juices or humours, which in particular cases ought to be evacuated, or driven out of the body, or dried up; and some others which ought to be restored to the body, or caused to be produced there again. As to the method to be taken for this addition or retrenchment, he gives this general caution, That you ought to be careful how you fill up, or evacuate, all at once, or too quickly, or too much; and that it is equally dangerous to heat or cool again on a sudden; or rather, you ought not to do it: every thing that runs to an excess being an enemy to nature. In the fourth place, Hippocrates allowed that we ought sometimes to dilate, and sometimes to lock up: to dilate, or open the passages by which the humours are voided naturally, when they are not sufficiently opened, or when they are closed; and, on the contrary, to lock up or straiten the passages that are relaxed, when the juices that pass there ought not to pass, or when they pass in too great quantity. He adds, that we ought sometimes to smooth, and sometimes to make rough; sometimes to harden, and sometimes to soften again; sometimes to make more fine or supple; sometimes to thicken; sometimes to rouse up, and at other times to stupify or take away the sense; all in relation to the solid parts of the body, or to the humours. He gives also this further lesson, That we ought to have regard to the course the humours take, from whence they come, and whither they go; and in consequence of that, when they go where they ought not, that we make them take a turn about, or carry them another way, almost like the turning the course of a river; or, upon other occasions, that we endeavour, if possible to recal, or make the same humours return back again; drawing upward such as have a tendency downward, and drawing downward such as tend upward. We ought also to carry off, by convenient ways, that which is necessary to be carried off; and not let the humours once evacuated enter into the vessels again. Hippocrates gives also the following instruction; That, when we do any thing according to reason, though the success be not answerable, we ought not too easily, or too hastily, to alter the manner of acting, as long as the reasons for it are yet good. But, as this maxim might sometimes prove deceitful, he gives the following as a corrector to it: "We ought (says he) to mind with a great deal of attention what gives ease, and what creates pain: what is easily supported, and what cannot be endured." We ought



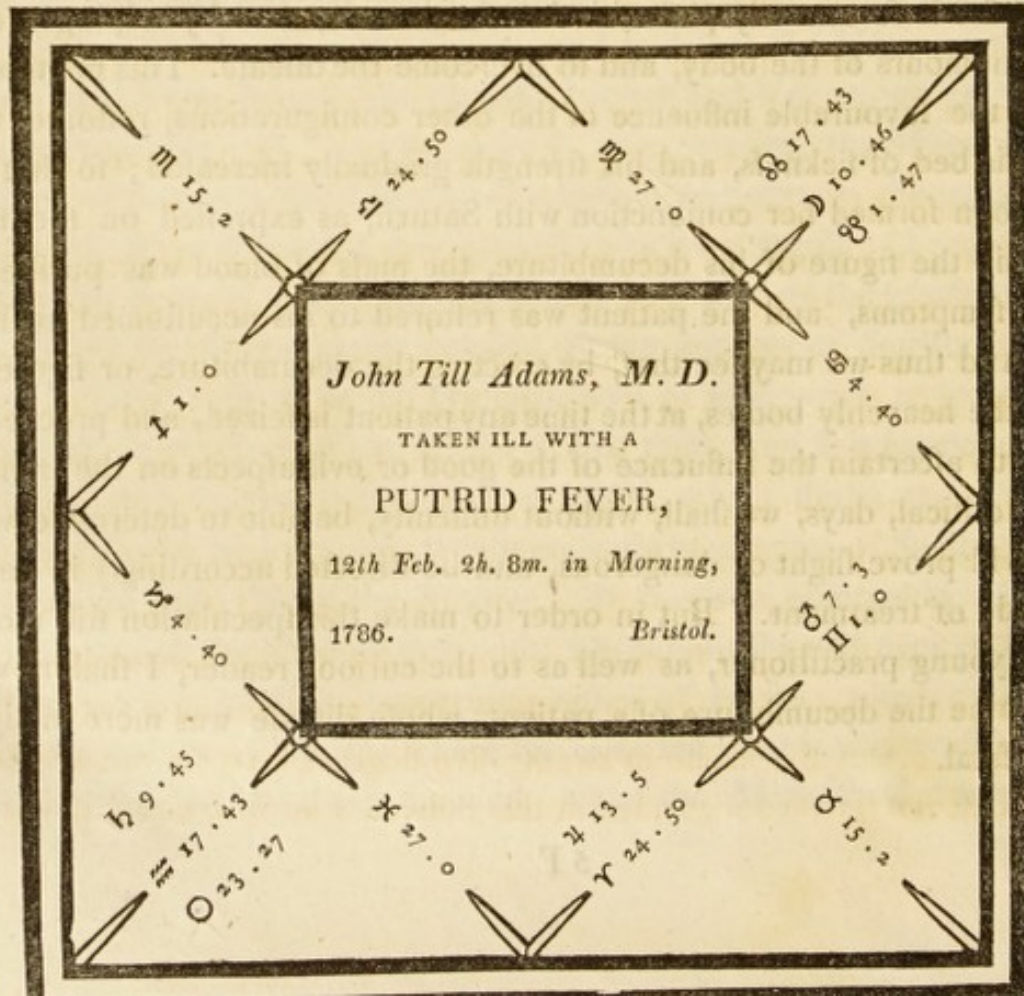
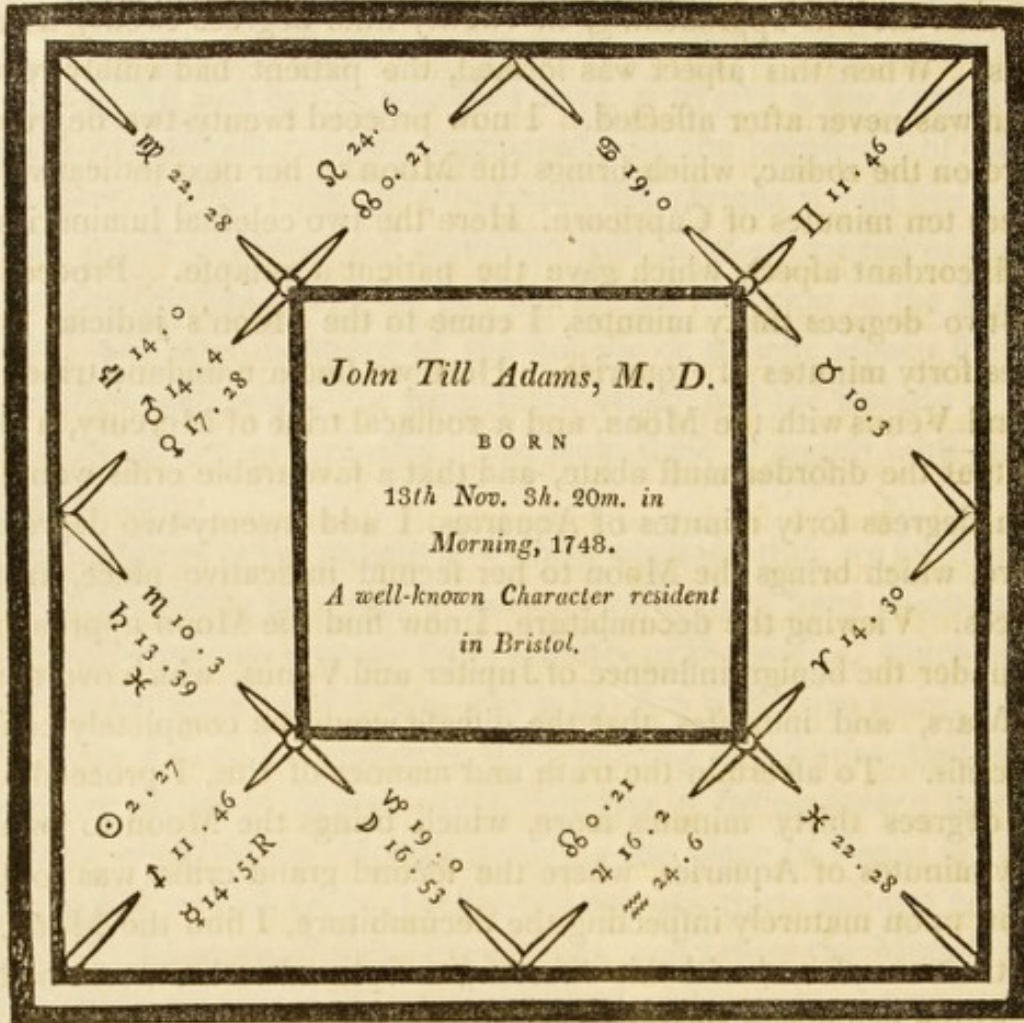
I have placed the horoscope of this patient's nativity before the figure of his decumbiture; in order to show, by way of analogy, that such an indisposition would certainly take place about this time, from the position of the significators, and their particular configurations with the heavenly intelligencers, at the time of his birth. For this reason, the figure of the sick person's nativity should always be inspected where it can be had, because it enables us the better to judge, in many intricate cases, whether the disease will terminate with life or death; for although, in most common maladies, it is possible to determine this question pretty accurately, by the help of the preceding Table, without the radical figure of birth, yet, where that can be had, our judgment will in general be more certain, and often infallible.

In the above figure of the decumbiture of the patient, we find the Moon hath lately transited the place of the Sun and Jupiter in the figure of birth; and that this place is in the fiery triplicity, afflicting the Moon in the radical point with a quartile aspect; at the same time that the Moon and Mars beholding each other with a trine, from fiery signs, at the time of birth, clearly shows that the native would be subject to fevers of the inflammatory kind. But I shall decline making any comments on the temperature of the native, or the designation of his significators at the

time of birth; as it is not my intention here to explain the mode of calculating a nativity, that being already sufficiently demonstrated in my ILLUSTRATION of ASTROLOGY. All that can be necessary here, is to give a few examples from the decumbitures of different patients, compared with the horoscope of their nativity, in order to show, by the Table, whether such sick persons would live or die. And, in doing this, it will be proper for those who wish to be convinced of the truth and existence of the celestial influx, to pay the strictest attention to the Moon's places in the Table, and what positions of the benefic or malefic aspects she transits, or comes in configuration with; for from these events will the malady of each particular patient be abated or increased; and from these of course must our judgment be ultimately drawn.

By the decumbiture of the patient now under consideration, we see that the Moon, at the time of his falling sick, was in twenty-two degrees forty minutes of Virgo. To this I add twenty-two degrees thirty minutes of the zodiac, which brings her to fifteen degrees ten minutes of Libra, and is her first indicative place. At the time she arrives here, I find, by examining the preceding horoscopes, that she is within orbs of a sextile aspect of Mars, which indicates a strong fever; though not extremely ardent, owing to the Moon's transiting the place of Venus in the figure of birth. I now add, or pass on to, twenty-two degrees, thirty minutes more of the zodiac, which cuts an angle of forty-five degrees, and brings the Moon's place to seven degrees, forty minutes of Scorpio, which gives her judicial time, and furnishes the means of directing our judgment whether a severe or favourable crisis would follow. To this end I inspect the figures, and find that the Moon now comes to a conjunction of the two benevolent planets Jupiter and Venus, which alone prognosticates a favourable crisis; and the more so, as at this time the Moon nearly transits the place of Saturn in the horoscope of birth: accordingly, the patient became much better, the fever decreased, and his pulse was more regular. From the Moon's judicial place in Scorpio, I now pass on twenty-two degrees thirty minutes further, which shows her second indicative position, in ten minutes of Sagittarius; where, finding no particular aspect of the principal stars or luminaries, it portended little or no alteration in the state of the disease at this time; and so it happened. I now advance twenty-two degrees thirty minutes more, which shows the place of the Moon on that day to be in twenty-two degrees forty minutes of Sagittarius, where she produced the first crisis of the disorder. It was now observable, that from the last indicative day to the time of this crisis, the patient showed signs of a delirium, and rambled much in his talk, concerning riding of horses; which exactly corresponds with the nature of the sign where the crisis fell; but it was evident he would recover from this, and be much mended, when the Moon formed her trine with Saturn,

Saturn, to which she was approaching, in twenty-nine degrees twenty-six minutes of Sagittarius. When this aspect was formed, the patient had visibly recovered, and the brain was never after affected. I now proceed twenty-two degrees thirty minutes more on the zodiac, which brings the Moon to her next indicative day, in fifteen degrees ten minutes of Capricorn. Here the two celestial luminaries form a quartile, a discordant aspect, which gave the patient a relapse. Proceeding the next twenty-two degrees thirty minutes, I come to the Moon's judicial place, in seven degrees forty minutes of Aquaries. Here we find a mundane trine, formed by Jupiter and Venus with the Moon, and a zodiacal trine of Mercury, a plain demonstration that the disorder must abate, and that a favourable crisis would ensue. To the seven degrees forty minutes of Aquaries, I add twenty-two degrees thirty minutes more, which brings the Moon to her second indicative place, in ten minutes of Pisces. Viewing the decumbiture, I now find the Moon approaches to a trine aspect under the benign influence of Jupiter and Venus, which overcomes the quartile of Mars, and indicates that the disease would be completely conquered by the next crisis. To ascertain the truth and manner of this, I proceed onwards twenty-two degrees thirty minutes more, which brings the Moon to twenty-two degrees forty minutes of Aquaries, where the second grand crisis, was to be produced. Now upon maturely inspecting the decumbiture, I find the Moon, at the time this patient was seized with his disorder, was placed in her north node, and contributed to the evil effects of the other configurations; but at the time of this grand crisis, she is fortunately posited in her south node, thereby helping to depress the vitiated humours of the body, and to overcome the disease. This position, contributing to the favourable influence of the other configurations, restored the patient from his bed of sickness, and his strength gradually increased; so that by the time the Moon formed her conjunction with Saturn, as expressed on the face of the heavens in the figure of his decumbiture, the mass of blood was purified from all feverish symptoms, and the patient was restored to his accustomed health and strength. And thus we may see that, by erecting the decumbiture, or figure of the positions of the heavenly bodies, at the time any patient is seized, and proceeding in this manner to ascertain the influence of the good or evil aspects on the indicative, judicial, and critical, days, we shall, without difficulty, be able to determine whether the disease will prove slight or dangerous, and be directed accordingly in our regimen and mode of treatment. But in order to make this speculation still more obvious to the young practitioner, as well as to the curious reader, I shall now proceed to examine the decumbiture of a patient, whose disease was more malignant, and proved fatal.



These figures I erected while resident in Bristol, at the request of my good friend Dr. Till Adams, who being seized with a malignant fever, accompanied with dangerous symptoms, and being himself a friend to, and an admirer of, the Occult Sciences, was desirous of seeing the result of such an enquiry, and of judging himself, by these means, whether he should live or die.

In considering the sidereal effect of the preceding figures, it is by no means requisite to calculate the genethliacal prognostications of the seven erratics at the time of the native's birth. It is however necessary to notice their principal aspects and positions in the horoscope, in order to determine whether the same positions are transmitted, or similar or adverse aspects formed in the decumbiture, at the time the patient is taken ill; but no further or more minute speculation is required, since we are neither considering the effect of directions, nor the fate of a nativity; but are endeavouring to prove, that, by only observing the position of the heavens at the time the patient is taken ill, the probable termination of the disease might be foretold, and whether it would end in life or death. First, then, we may observe, the Moon is situated in the eighth house, termed by the ancients the house of death, because of its obscurity and position under the earth. Besides this, we find the Moon in opposition to Saturn, who was her dispositor at the time of birth; and from this aspect she forms an opposition with Venus, the lady of the doctor's ascendant; and immediately approaches to an opposition of the Sun, the fountain of life. These are three evil directions by position, and furnish a very unfavourable prospect of the event of the disease. For the Moon, the giver of radical moisture, afflicted by the adverse rays of the Sun, the author of vital heat, fails not to produce such a putrefaction of the animal juices, as to bring on a speedy dissolution of the body. Let us then examine the decumbiture by our Table, and see how and when this fatal event would take place.

At the time the patient fell sick, we find the Moon in ten degrees forty-six minutes of Leo; to which add twenty-two degrees thirty minutes for the first indicative time, which falls in three degrees sixteen minutes of Virgo; and indicates the nature of the disease to be a fever; for the Moon, from this indicative place, beholds the Sun in the radical point with a baneful quartile aspect; and the Moon, according to her own nature, was Saturnine, as departing from a sextile configuration with Saturn in the radix, to a quartile with Venus, lady of the ascendant, and giver of life; and therefore, according to the astral rules of the immortal Ptolemy, this first motion of the Moon from the radical point of the decumbiture indicated evil. I now go forward twenty-two degrees thirty minutes more, for the first judicial day, which places the Moon in twenty-five degrees forty-six minutes of Virgo. Now as the Moon is not configured at this judicial time with either of the planets,
neither

neither by transit in the nativity, nor aspect in the decumbiture ; and her judicial place falling in the twelfth house, the house of affliction ; we cannot draw any favourable judgment from these circumstances ; but, on the contrary, a dangerous crisis is to be expected. To this judicial time, we add twenty-two degrees thirty minutes more, and it brings the Moon sixty-seven degrees from the place she occupied when the patient was seized with the disorder ; and this is her second indicative place, which falls in eighteen degrees sixteen minutes of Libra. Now if we inspect the foregoing horoscopes, we shall find the Moon, in approaching to this point, has just departed from a baneful opposition with Jupiter, which, having the direct opposite effect of a conjunction with that benevolent planet, which represents the heart and vital principle, shows a contaminated or morbid state of the blood and lymph. We likewise perceive the moon is in quartile to her own radical place, transiting at the same time the body of Venus, and making this aspect the harbinger of a fatally-approaching crisis. To determine this fact, I proceed twenty-two degrees thirty minutes further in the zodiac, which brings the Moon to ten degrees forty-six minutes of the sign Scorpio, at which point of time the crisis, or critical day of this patient's disease occurred. Now by inspecting the figures, we shall perceive this crisis is ushered in by such evil configurations of the heavenly bodies, the second causes under nature, as would not only heighten the malady, and put it out of the power of medicine to subdue, but would infallibly terminate in death. In the first place we shall notice, that the moon transits the place of Saturn in the radical point ; secondly, she is configurated in a malefic quartile aspect of Saturn in the decumbiture ; thirdly, she is within orbs of a baneful quartile of Venus, lady of the patient's ascendant ; and fourthly, she is rapidly approaching to a quartile configuration of the Sun, which is inimical to life and motion, without any one friendly aspect of the benefic planet Jupiter intervening, to lessen or repel the malefic influence. Such, therefore, are the testimonies, that under any kind of malady and wherever they occur, infallibly portend the death of the patient ; and they accordingly put an end to the existence of this much-respected man, whose integrity in his profession had gained him universal esteem, and renewed in him the inestimable character of the immortal Culpeper, who, never, with a view to gain, gave two medicines for the cure of an afflicted fellow-creature, when one was sufficient. But death levels all distinctions ; and, in strict conformity with the time and manner pointed out by the above decumbiture, it conducted the soul of this excellent man from an earthly to an heavenly habitation, on the 20th of February, 1786, at the time the Moon formed her quartile aspect with the Sun, which was in eight days from the time he was seized with the fever, and six days after it was foretold by the preceding horoscopes ; from whence, having foreseen the doctor's fate, I composed

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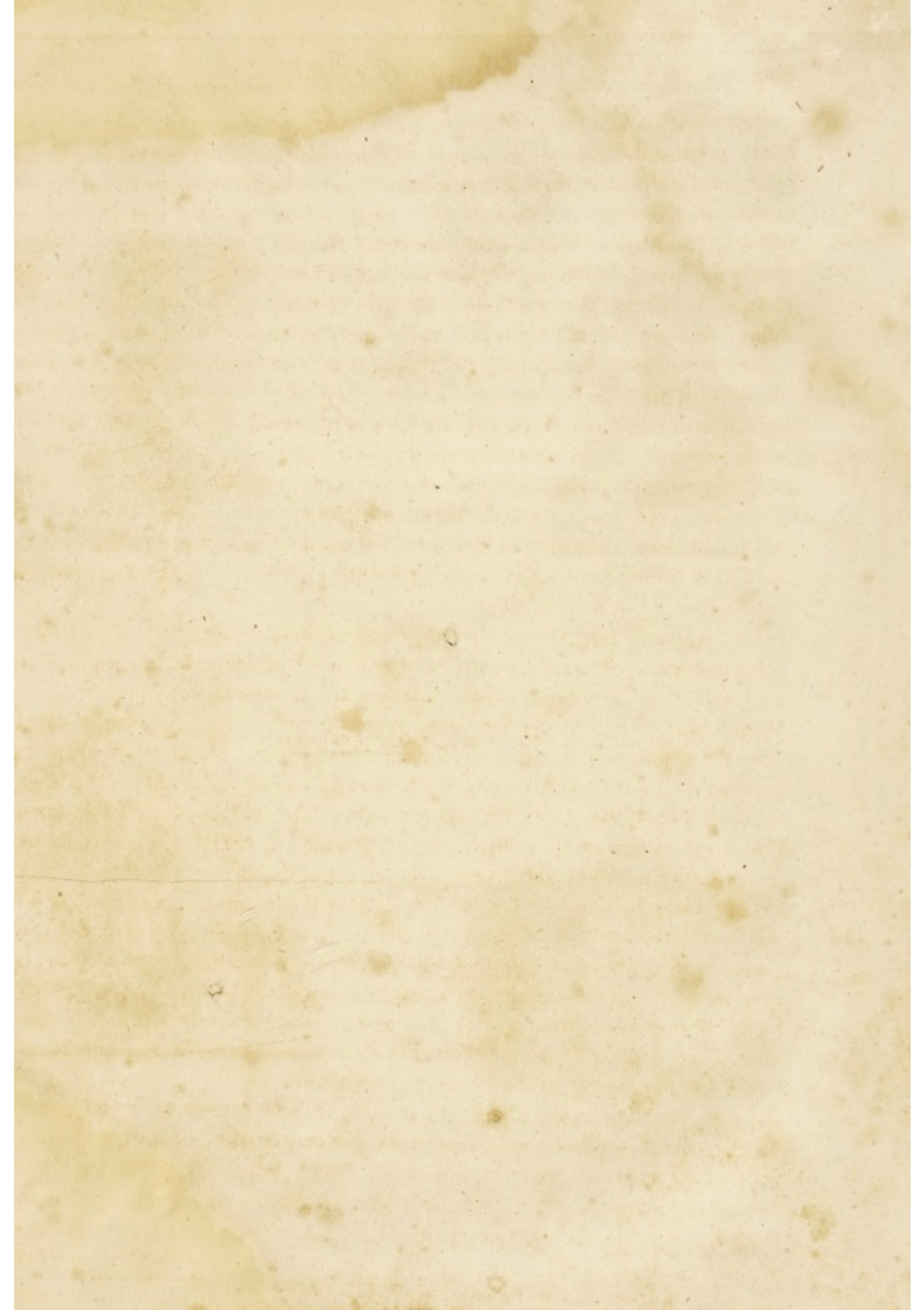
an Elegy on his death, while he was yet alive, which I got printed, and published on the very day he expired; thus manifesting to the world, with the patient's earnest approbation, an incontrovertible instance of the verity of astral prediction.

Having thus far endeavoured to prove the utility of the Lunar Table, by the indisposition and recovery of Charles Thomas, a pupil of Mr. Hall, engraver to his majesty, in the one case; and by the sickness and death of Dr. Till Adams, in the other; I shall now, for the further satisfaction of the reader, prove that it is possible to judge whether a patient will live or die, from the horoscope of the decumbiture only, without knowing or recurring to the horoscope of the patient's nativity, or time of birth.—To this end, the following axiom must ever be remembered: That, if we find, at the time any person is seized with illness, that the Moon is afflicted by more than one planet; and that on the next critical day she forms a congress with the malefic planets Saturn and Mars, either by conjunction, quartile, or opposition, the sick person shall die on the day and hour in which the afflicted Moon comes to the interficient point of the zodiac; as the great Ptolomy declareth in his 16th Aphorism: "We must behold the motion of the Moon as she passeth through the critical, judicial, and mortal, days; for, if she be in them fortunate, it fareth well with the patient; but, if unfortunate, the contrary." I shall exemplify this by the following example.



Being sent for to a person who fell sick on the 10th of April, 1791, and being desirous to know the event of his disease, I examined the face of the heavens at the exact time the patient was seized, viz. at half-past twelve o'clock at noon, when the celestial intelligencers were posited as in the above decumbiture, and which are as follow: The Moon, which in all decumbitures represents the sick person, is situated within the quartile influence of no less than four planets, Saturn, Mars, Mercury, and the Sun; and, as they are all within orbs of a conjunction with each other, it follows that the disease would bear designation of their joint pernicious influx, which, scientifically considered, manifests a fever, with putrefaction of the animal juices, as those skilled in the astral science will quickly see. For the Sun's burning influence, in conjunction with Mars, a hot and violent planet, and Mercury being controvertible in his nature, unites the malefic rays of the Sun and Mars; and, although Saturn is constitutionally cold, yet, being also dry, his cold quality is over-balanced, inasmuch as drought participates of the qualities of heat, being fuel for the fire. Yet the cold quality of Saturn specificates the disease, by showing that it sprung from a cold cause, or deathly chill, extended over the whole circulating system, or mass of blood.

On examining the patient, he informed me that he had drunk a quart of cold water; being overcome with heat and thirst, and in a violent perspiration, whence his blood must have been in a highly-inflamed state. This seems eminently prenoted by the Moon's position in a watery sign, and a moveable one, at the same time in opposition to the four planets above mentioned, in fiery signs. Here, then, we at once perceive the source and malignity of the disease; and finding neither of the benefic stars cast a single ray, either by body or aspect, to the aphetic place, I thence concluded the patient must inevitably die, notwithstanding the Moon was beheld by a sextile configuration of Venus, which strengthened his nature, and showed that he would greatly struggle with the malady. But as the testimonies of evil arising from the joint influence of Saturn, Mars, Mercury, and the Sun, are more and much greater than the contra-support afforded by Venus, I reasonably concluded the patient would die of the disorder, and that it was not in the power of medicine to save him. My next endeavour was to determine the hour of death. With this view I look to the Table, p. 380, for the Moon in Cancer; and, in the fifth column from the left, I find the degree the Moon was in at the time the patient was seized, viz. 7 30; and then, guiding my eye along till I come to the ninth column, I find 7 30 of Libra; now, Libra being opposite to Aries, the malefic planets Saturn and Mars of course send their opposite malignant beams into that sign, Saturn in ten degrees eighteen minutes, and Mars in thirteen degrees twenty-six minutes; I therefore concluded, that, when the Moon came to seven degrees thirty minutes of Libra in the zodiac,



zodiac, the crisis would take place, as may be seen at the top of the fifth column in the Table; and that when the Moon came to ten degrees eighteen minutes, being the opposition of Saturn, a visible change in the patient would take place for the worse; and that when she arrived at the thirteenth degree twenty-six minutes of the same sign, thereby forming the opposition with Mars, the disease would prove mortal, and terminate in death. If, therefore, the duration of the disease be reckoned by the motion of the Moon, we shall find, without any inquiry from the nurse or doctor, that the patient died about half-past four o'clock in the afternoon, on the 17th of April, 1791, at which precise time the critical aspect on which the disease turned was formed. Thus was afforded an incontestible proof of the correctness of my Lunar Table, and of the force and power of the planetary influx on sublunary bodies.

OF THE DIFFERENCE BETWIXT A NATURAL AND VIOLENT DEATH,
exemplified by the FATE of the late KING AND QUEEN OF FRANCE.

WITH a view to teach the curious reader how to distinguish the astral testimonies portending a violent death from those which foreshow our natural dissolution, I shall, by way of example, investigate the particular configurations which prenoted the violent death of the late unfortunate Louis XVI. king of France, and his unhappy consort, Marie-Antoinette of Austria. For this purpose I have annexed a copper-plate engraving of their nativities, with figures of the positions of the celestial intelligencers at their coronation, and on the days of their execution. Whoever has perused my ILLUSTRATION OF ASTROLOGY, will have seen, that in my predictions, published in the year 1786, I foretold the revolution in the French empire, and the dethronement and execution of the French king and queen, six years before it happened; with all the dreadful consequences appertaining thereto, exactly as they have since fallen out; and whoever lives to see the upshot of a few years, will also see every other part of my predictions literally fulfilled. I could even now publish to the world the success and termination of many great events, which all men are anxious to know, though few perhaps would believe, were I at liberty to disclose them. The safety of particular individuals, the well-being of the state, the peace of society, the prosperity of empires, hang upon the issue of a few revolving periods; and, though *wise* the age we live in, yet few would brook the admonitions of a friend, though they should lead to a prosperity and riches—to glory and renown. The uncommon positions of the heavenly bodies, which are the second causes in the secret operations of Nature, are at this time well worthy the attentive consideration of the naturalist and speculative philosopher. Their mundane influence is by no means confined to the nations of Europe, but threatens

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the ruder and more widely-extended realms with the effect of a convulsive stroke. God, in his unbounded favour to the British isles, will overshadow and protect them: and it is not impossible but the day may come, when the humble author of these remarks may be at liberty to amplify and develop the subject in some future publication. In the mean time, let Prussia, and all the smaller German states beware; for the time will soon come, that *Germany shall be no more.**

Louis XVI. was born the 23d of August, 3h. 50m. P. M. 1754. The sign Sagittarius ascended upon the eastern fineter of the horizon, intercepted by Capricorn; wherefore Jupiter and Saturn are the lords of his ascendant, and, with the Moon in the tenth house, represent his person. From the nature and quality of these significators, we may deduce the following inferences: That Saturn being in the ascendant gave the native a wavering and irresolute disposition; the Moon posited in Scorpio gave him a taste for luxury; and Jupiter, being co-significator in the eighth house, in aspect with Mercury, rendered him mild and passive, yet declared that his principal actions shall be attended with disappointment, and produce him much anxiety, vexation, and insult. In the royal hereditary figure of birth, we find four planets occupying the house of death; and as the Moon, giver of life, is disposed of by one of those planets, it is an argument that he would not live to an old age. The precise time of death is only ascertainable by bringing up the several directions of the nativity: and, as the method of doing this is already amply explained in my Illustration of Astrology, we must refer those who choose to work them up, for any assistance they may want, to the rules there laid down. Suffice it here, that we point out those testimonies from the face of the nativity, that are always found to be arguments of a violent death. These are, First, Saturn in the ascendant, posited in a violent sign. Secondly, the Moon, giver of life, configurated with the violent fixed star Chælæ. Thirdly, the lord of the ascendant malevolently conjoined with the lord of the house of death. Fourthly, the two lights of the world depressed in the eighth house. And, fifthly, the Moon elevated in the dignities of an infortune, and Mars, her dispositor, having his fall in a human sign, plainly demonstrate that the native should fall by the hand of man. And this was unhappily verified by his execution, on the 21st day of January, 1793, at twenty-two minutes past ten in the morning; at which time these malefic directions came up, as represented in the figure of his execution, in the preceding plate. At that fatal moment we find the Sun, the light of time, was in his detriment; that Mercury, the significator of

* I presume that the accomplishment of this bold prediction, which the author did not live to see, will be found in the formation of the Confederation of the Rhine, in the suppression of the small states and annihilation of the Germanic circles, and the erection of the kingdoms of Bavaria, Saxony, Wirtemberg, and Westphalia, instead of them; but particularly when Francis II. renounced the title of Emperor of Germany, Aug. 6, 1806. EDITOR.

the French people, occupied the cusp of the tenth house, transiting the place of Saturn, the king's significator, at the time of birth; and that the two malefic planets Saturn and Mars are in reception of each other; and that the Moon, the significator of life, is surrounded with violent fixed stars, in opposition to the benign planet Jupiter, in angles, and in quartile to Mars, her disposer in the horoscope of birth: all which peculiar configurations are so many strong and irresistible arguments of the resolution of the people to proceed to extremities, and of the irrevocable fate of this unfortunate monarch. For, although Jupiter, his co-significator, is observed to send a friendly ray to the aphetic place, yet having no dignities, and being disposed of by Mars, the significator of the convention, this benefic aspect was depressed, and its influence overcome, by the redundancy of a malefic influx. This admirably points out the struggles of Dumourier, in the hope of being able to preserve the life of the king; but his endeavours were quickly borne down by the violence of the leading faction, and there was not a man to be found who had courage enough to second his heroic intentions. This also, by the rules of the sidereal science, is clearly prenoted by the circumstance of Mars being the disposer of Jupiter; and that Mars is disposed of by Saturn, the author of pusillanimity and fear. Thus the ascendant of birth shows that want of resolution and intrepidity in the native, which, if exerted in the favourable moment, would have turned the daggers of his enemies towards their own breasts, and have permanently secured himself and his posterity on the throne; and thus the figure of his decumbiture points to the fatal execution of the guillotine, and proves, that although the native sprung from a most illustrious house, having the two superior planets for his significators, and although he was a king at one time beloved and idolized by his people, yet that he was but a man, subject to the severest reverse of fortune, and doomed to as ignominious an end as the vilest of his subjects!

The elegant and accomplished consort of this unfortunate monarch was born on the 2d of November, 1755, 7h. 23m. P. M. as expressed in the plate. In the figure of her nativity, we find the Moon as lady of the ascendant, rising upon the sign Libra, in the fifth house, the house of pleasure and sexual enjoyment; of which, it is sufficiently evident, she was passionately fond. Mars being posited on the ascendant, in his essential dignities, shows her to have been stately, austere, and proud; yet predicts that she would be unfortunate in her connections, and impatient of controul. This is the more obvious, because Mars, the significator and influencer of her passions, is dignified in her ascendant, though approaching to an opposition of Saturn, lord of the seventh and eighth houses, who is likewise configured in his essential dignities, and, more extraordinary still, is posited in

the exaltation of Mars. This gave her an unconquerable spirit, and strong natural passions, with an insatiable appetite for intrigue, united to an inconstant and arbitrary turn of mind. This is still more strongly demonstrated by the presence of four planets in the fifth house, and two of them aspected in the sign Scorpio. That her reputation would be arraigned by the voice of the multitude, is foretold by the Dragon's Tail being in the tenth house, the house of dignity and honour; and the treachery of her confidants is pointed out by Mercury being in the sixth house, in his detriment, and in opposition to the Part of Fortune. That her consort would be involved in misfortunes, and suffer greatly on her account, is made manifest by Saturn, the significator of the king, being in opposition to Mars; and the Moon, lady of her ascendant, in baneful quartile to both the infortunes. Indeed there never was a nativity yet made public, wherein the infortunes were so mischievously configured, or wherein the general significators so conspicuously denoted individual misfortune and universal rage. But I shall pass over, for the present, any further remarks on the unfortunate designation of the significators in this nativity, and notice them no further than as they point out the testimonies of a violent and premature death. These are: First, the Sun and Venus, configured with a violent fixed star, in a violent sign. Secondly, Mars ascending to the violent fixed star Hercules; and the sign ascending being of a violent nature. Thirdly, the lord of the eighth house, the house of death, afflicting the Moon in the apothetic place. Fourthly, the lord of the sixth house afflicting the Moon, the lady of the ascendant and significator of life, with a malefic quartile ray, the harbinger of violence, and the presage of death.

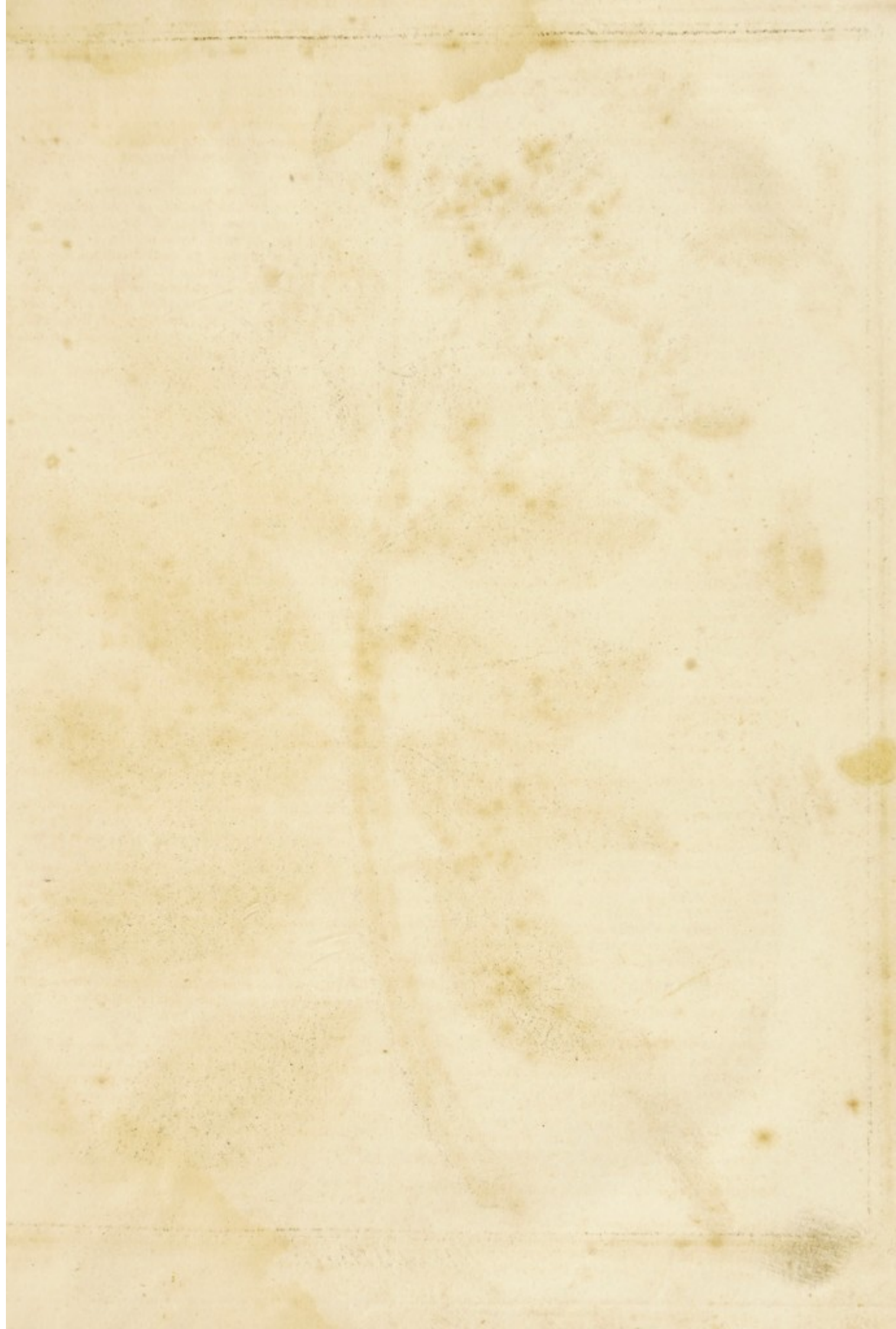
Thus we may observe, that one of the principal luminaries is afflicted by both the infortunes, and the other is posited in a violent sign, denoting a violent death. Again, the lord of the eighth house, a malevolent planet, afflicted by the quartile rays of an infortune by nature, is another presage of untimely death. Also the lady of the ascendant in a violent sign, banefully configured with the infortunes, and the dispositor of the luminaries in a violent sign, is an irrefragable proof of an approaching untimely death. Now, the Moon, who is lady of the ascendant, having her fall in the human sign, portends a violent death by the hand of man; and, if we examine the face of the heavens at the time of her execution, we shall find her death proceeded from the violence of an usurped power, occupying the seat of justice; for the Moon, elevated in her ascendant at the time of birth, is most remarkably configured in the fall of the sun at the time of her execution; and that same sign culminating on the cusp of the tenth house, the house of justice, and the Sun being posited there in his fall, in conjunction with Mercury, most aptly describes

cribes the manner of the native's death. Mercury, who is the natural significator of the French people, being in his essential dignities, elevated, and in reception of Venus, lady thereof; and Mars beholding Jupiter with a quartile ray, posited in the twelfth house, and lord of the ascendant of death; and the Moon, lady of ascendant of birth, being within orbs of an opposition of Mars and Venus, who have their fall in the house of dignity and honour: all tend to foreshow that royalty was for a time to be destroyed in France; as is most wonderfully prenoted in the horoscope of the coronation. And what is very remarkable, at the time of the French monarch's death, the Sun, who is king among the planets, was posited in his own detriment, or in that peculiar point of the heavens which is opposed to his own house; and at the time of the unfortunate queen's execution, the Sun was in his fall, without a single dignity to support him, as is most clearly evinced by the horoscopes in the preceding plate; so that we may say, the stars in their courses fought against this illustrious pair, as they fought against Sifera of old; and thus we may perceive, that the most valiant and the most courageous are not proof against the shafts of fate; but that the noblest, and most gloriously clad, whether in honour, glory, or renown, are but like the offspring of plants, which have their springing up, their flowering, and their fragrant maturity; until, plucked by a rude hand, they wither, fade, and die.

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Dodd del.

Jesuits Bark.

Prattest sculp.

APPENDIX

TO

CULPEPER'S BRITISH HERBAL.

HAVING given a minute description of the plants and herbs contained in Culpeper's British Herbal, with their medical properties and effects, I shall proceed to an investigation of some foreign trees, plants, and herbs, that are now in general use amongst us. And first, of the

PERUVIAN OR JESUITS' BARK. CINCHONA.

CORTEX PERUVIANUS, called also *quinquina*, *kinkinna*, *quina-quina*, *pulvis patrum*, and popularly the *Jesuits' Bark*, is the bark of a tree, growing in the West-Indies, called by the Spaniards *palo de calenturas*, q. d. fever-wood; by reason of its extraordinary virtue in removing all kinds of intermittent fevers and agues. The Indians commonly call it the *fuddling-tree*, from the property it has of intoxicating fishes, when either its wood or bark is beaten, and steeped in the water where they are. The tree that yields this noble specific, is only found in Peru, in the province of San Francisco de Quito, or Quito, near the city of Loxa; though some say it is also found in that of Potofi; and F. Labat in the island of Guadaloupe. The bark, while on the tree, is streaked, of a whitish yellow without-side, and a pale tan-colour within.

The Spaniards distinguish four sorts of this precious bark, viz. the *cascarilla colorada*, or reddish bark; *amarylla*, or yellowish; *crespilla*, or curling; and *blanca*, or whitish. The *colorada* and *amarylla* are reckoned the best; the *crespilla*, is the pro-

duce of the same sort of tree, only growing in a colder climate, which impairs the quality of the bark, and renders it whitish on the outside, and cinnamon-coloured within, and unfit for medicinal use. As to the *blanca*, it is procured from another species of the tree of a much larger trunk, the leaves of a lighter green colour, and the bark of a very thick spongy substance, whitish on the outside; being withal so tough, as to require the force of an axe to slice it from the tree. When first cut down, it is as bitter as the best sort, and has then the same virtue in the cure of intermitting fevers; but when dry, and kept any length of time, it grows insipid, and good for nothing. In reality, both sorts are found to have much surer and quicker effects when green than when dry, so that the Europeans only come in for the second-rate virtues: what is worse, the bad sort is in great plenty, and the good is very scarce, and hard to come at: for which reason, with a little of the fine bark sent yearly to Panama, for Europe, large quantities of the worst sort are usually mixed.

The *amarylla*, or small bark, which curls up like sticks of cinnamon, and which in England is much esteemed, as being supposed to be taken from the branches of the tree, and therefore more efficacious in the cure of fevers, is only the bark of the younger trees; which, being very thin, curls in this manner. For the bark of the branches is never gathered; it would not compensate the charge of cutting. The season of cutting the bark is in August, the only settled dry time in the country. After a tree has been barked, it requires eighteen or twenty years for a good bark to grow again. Mr. Arrot, a Scotch surgeon, who had gathered the bark in the place where it grows, is of opinion, that the gathering the better sort of bark will soon be at end, or at least very much reduced, partly by reason of its distance from any inhabited place, and the impenetrability of the woods where it grows, and partly by the want of Indians to cut it, whose race, through the cruelties of the Spaniards, is likely to be totally extinct.

The most accurate account we have ever received of the tree which produces the *quinquina*, or true Peruvian bark, is from M. de la Condamine, who, in travelling through some parts of America, chose the route of Loxa, where the finest bark is gathered, and where the greatest number of the trees is found; and, taking instructions from M. de Jussieu, informed himself concerning it. The *quinquina-tree* never grows in the plains; it is a constant inhabitant of the mountains, and is easily known from the trees among which it stands by its erect growth, and its height when of any considerable age, as it always carries its head above the rest, and also by its size. The trees are never found in clumps or clusters together, but always separate or single among other kinds. It is very rare, however, to find any large ones at this time on the mountain where the bark is gathered, the great demand for it having

made them bark all the trees, and these having all perished by it; for the old trees never recover the barking, though the young ones frequently do.—The bark is now gathered at all times, if the weather be dry. When the bark is taken off, it is laid in the sun till it is perfectly dry: the omitting this circumstance, and packing up the bark while moist, have occasioned it often to become mouldy, and spoil; and the merchants have attributed this to the taking it off in the wrong time of the moon, when it was wholly owing to its being put into the skin while too moist.

The leaves of the quinquina-tree stand on pedicles of about half an inch long: they are very smooth and glossy, and of a beautiful green; but somewhat paler on the under side than the upper. They are perfectly smooth at the edges, and are of an oblong figure, pointed at the end, and rounded at that part which joins to the stalk. They are from two and a half to three inches in length, and from an inch and a half to two inches in breadth. The middle rib of the leaf is rounded on the upper side, and is usually of a reddish colour, especially towards the pedicle; and the whole leaf often becomes red, when perfectly mature. All the small branches towards the top of the tree terminate in one or more clusters of flowers, which, before they are open, resemble in shape and colour those of the common lavender. When these open, they change their colour: each stalk that sustains one of these clusters arises from the ala of one of the leaves, and divides into many small branches, each terminated by a cup divided into five parts, which sustains a flower resembling that of the hyacinth. It is composed of a pipe of three quarters of an inch long, which at the end is divided into five, and sometimes into six, segments. These are of a beautiful deep red within, and are serrated round the edges in a very elegant manner. From the bottom of the tube of the flower there arises a white pistil, terminated by a long green head; this rises above the level of the segments of the flower, and is surrounded by five stamens, which sustain apices of a pale yellow colour: these remain hid within the flowers. The tube is of a dirty red, and is covered with a sort of whitish down. When the flower is fallen, the cup swells in the middle into the form of an olive, which by degrees grows into a fruit divided into two cells, which in drying becomes shorter, and the whole fruit rounder than its natural condition.

This fruit finally opens longitudinally into two capsules, separated by a membranaceous septum, and coated by a thin yellowish skin; the seeds are of a reddish colour, and in shape are flattish, and, as it were, foliaceous; they are not more than the twentieth part of an inch in diameter, and are thickest in the middle, becoming thinner at each side. The plantula seminalis lies in the very centre of the seed, between two pellicles: these seeds are fastened in the manner of so many scales to a placenta of an oblong figure, pointed at the two extremities, so as somewhat to resemble

semble a feed of the common oat, but that it is longer and flatter. This is joined to the septum, and has on that part a longitudinal furrow ; but on the other side is convex, and somewhat rough all over. Mem. Acad. Scienc. Par. 1738. By this description it appears, that they were very ignorant of the nature and characters of this tree, who, when it was first introduced among us, called it a species of sebesten.

The use of this febrifuge seems to have been very long known to the natives, probably as early as 1500 ; and their manner of taking it was by pounding the bark, laying it to infuse in water, and drinking the infusion ; their hatred to the Spaniards, their conquerors, made them keep it a long time secret from them ; and, when the thing became known among the inhabitants of Loxa, it still remained a secret to the rest of the world, and its great value was never generally known till the year 1653 ; when the lady of the viceroy of Peru, the Countess de Chinchon, being long ill of an intermitting fever, which would give way to none of the known remedies, the corregidor of Loxa sent to the viceroy a quantity of the quinquina bark, which he assured him would cure the lady, though all other means had failed. Upon this the corregidor was sent for to Lima, and, after having given the medicine to many other persons with safety and success, the lady at length took it, and was cured. She immediately on this sent for a large quantity of the bark, had it powdered, and herself dispersed it to those who had occasion for it ; whence it obtained the name of the *Countess's powder* : but this lady, being soon tired of the office, gave it in charge to the Jesuits ; and, they continuing to give it to the sick with the same success, it then was called the *Jesuit's powder*. These reverend fathers soon found means to send a quantity of it to Cardinal Lugo, who dispersed it with the same success at Rome ; and after him the apothecary to the college gave it gratis to the poor with the same good effects, under the name of the Jesuits', or the Cardinal's powder. Afterwards the better sort were made to pay its weight in silver for it, to defray the expenses of its importation, while the poor still had it gratis. Louis XIV. at that time dauphin of France, was cured by it of a fever, which had not given way to other medicines. When the Count and Countess of Chinchon returned to Spain, their physician, Juan de Vaga, who brought a great quantity of it over with him, sold it at a considerable price ; and, soon after this, large quantities were sent over by the galleons : but, the great demands from Europe causing the inhabitants of Loxa to adulterate it with other barks, it had like to have lost part of its just praise. The quinquina trees are found at this time on all the chain of mountains adjoining to Cajanuma, and in many other parts of America.

When bark was first introduced, it is said to have been sold for about eight shillings sterling the dose ; which great price, with the little effects found from it, by reason

reason of their ignorance of the manner of preparing and prescribing it, occasioned its being difused, till about the year 1679, when Mr. Talbot, an English practitioner in phyfic, brought it into vogue again, by the great number of cures wrought about the court and city of Paris with this powder, prepared after his manner; the secret whereof was soon after made public by the munificence of Louis XIV. who rewarded Talbot for the difcovery with 5000 crowns. The preparation is about two ounces of the cortex in powder, digested in a fand-heat, with about a quart of red wine: after digestion, the wine must be poured off, and two or three ounces given every three or four hours between the paroxyfms, till the intention is answered.

The quinquina is fold either in bark or in powder: those who buy it in the bark must choofe it very dry and compact; fuch as has never been moistened, and which will break close and smooth, is friable between the teeth, is easily pulverized, and yields a powder of a pale cinnamon-colour. It has a musty kind of smell, and yet fo much of the aromatic as not to be difagreeable. The inferior kinds, when broken, appear woody, and, on chewing, separate into fibres. The female bark is considerably thicker, whiter on the outside, redder within, and weaker in smell and taste, than the former, and much inferior in medicinal virtue. The small fine quilled barks, shagreened without and reddish within, of a bitter musty taste, are the most esteemed. The powder must be well sifted, and care be taken to buy it of persons that may be trusted; it being very easy to sophisticate it, and difficult to find out the fraud. The red bark, lately brought into reputation by the experiments of the ingenious Dr. Saunders, possesses the virtues of the common bark in a much higher degree. A quantity of it was introduced to London, as part of the cargo of a Spanish ship from Lima, taken by an English frigate in 1779, and carried into Lisbon. Whether this is the bark of the trunk of full-grown trees, the branches, or young trees yielding the pale bark, or whether the trees be of different species, is not yet accurately determined. In the province of Santa-Fe, there have been lately discovered two kinds of cinchona; one of which is the red bark of Peru, and the other, one of the white species.

The cortex is a bitter, absorbent, and astringent, or styptic: from its bitterness, M. Reneaume observes, it becomes fit to soften four acrimonious juices; for a sour and a bitter make a sweet. Again, as an absorbent, it blunts the points of acids, and prevents their action; and, of consequence, preserves the fluidity of the juices, which acids would coagulate. As a styptic, it must have earthy parts to absorb ferofities, by which the parts, before moistened and relaxed, will contract themselves; and, by this means, the cortex augments the spring and tension of the fibres. As a bitter, it warms; and it facilitates perspiration by warming and augmenting

the fluidity of the juices. Its primary operation is that of strengthening the solids. On these properties it is that its medical uses are founded. Its chief operation is in curing of agues, and intermitting fevers; for which purpose it is applied in all ages, and most constitutions. It produces this effect better than any other medicine of the same intention, in the ratio of 365 to 1. It is usual to give a gentle emetic of ipecacuanha before the exhibition of the cortex: by thus preparing the passages, the cortex has not only more success, but also is not subject to cause those indispositions, viz. swelling in the belly, nausea, &c. which often arise when such preparation is neglected. The cortex must never be exhibited in the paroxysm of an ague, or intermitting fever; but given in such a quantity, at times, between the paroxysms, as to prevent a return of the fit. The cortex exhibited in continual fevers, is held dangerous; and care must be taken, that the remission of a continual fever be not mistaken for its intermission, which happens at particular or stated times. The cortex is given several ways, viz. in powder, in form of electuary, extract, bolus, infusion, tincture, &c. When the stomach will bear it, the preparation in very fine powder is the most useful and agreeable.

If the bark take downward, Venice treacle, diascordium, conserve of roses, terra Japonica, doses of laudanum, &c. must be added to its preparations. When there happens to be an obstruction of the menses from the exhibition of the cortex, or to prevent it, it is advisable to add to its preparations black hellebore, æthiops mineral, cinnabar, &c. The cortex is often used for young children in agues, by way of clyster; and also applied to the wrists, and soles of the feet, wrought up in a stiff mass, with turpentine, Venice treacle, &c. which usually answers the purpose. John Helvetius, physician to the King of France, above sixty years ago, wrote a book entirely upon the subject of curing agues by giving the cortex clyster-wise; in which he pretends, that this is a more safe, and no less certain, than when it is given by the mouth. Dr. Cockburn in his Treatise of Sea Diseases, asserts the contrary: he alleges, that the cortex given inwardly is as safe, and much more certain and expeditious; and notes, that we know how to remedy all the inconveniences the cortex may occasion. Dr. Sydenham, and after him Mr. Reneaume and others, have prescribed the cortex with success, in melancholic and hysterical affections, commonly called vapours.

The virtues of this medicine are at this time sufficiently known; but the largeness of its dose in the common forms of powder, or infusion in wine, or in water, are great disadvantages; and our common methods of giving it in the extract or resin, as we prepare them, not certain, nor without inconvenience. Mr. Geoffroy has attempted a method of giving the bark in all its efficacy, without its ill taste, and in
one

one third of the usual dose, by means of its dry extract; twenty-four grains of which, it is asserted, contain the whole efficacy of a dram of the choicest bark in powder. Hence it appears very evident, that when we take the bark in substance, it is only about a third part of what we are forced to swallow that can be of any use to us; and that the same portion is all we can expect in the virtues of any decoction or infusion of it. *Mem. Acad. Sci. Par.* 1758.

Wine, which is a liquor partly aqueous, partly saline, and partly spirituous, is a menstruum much more proper to extract the virtues of the bark than mere water, as it is much more able to dissolve the juices or sap condensed and inspissated in the bark of the tree; and for this reason a strong infusion of bark in this menstruum remains clear, and keeps the resin suspended when cold; in which respect it differs from the infusion in boiling water when cooled, as the resin precipitates itself. Thus it is the fire alone which can suspend the resin in a watery infusion of the bark; and in a vinous one, the spirituous and inflammable part of the liquor does the same thing; and as the resin of the bark, which there is great reason to believe possesses all the virtues of that medicine, is wholly precipitated from watery infusions when cold, it has been said there can be but very little dependence placed on the common clear infusions in this menstruum: the remaining taste in these infusions is only a faint bitterness, which arises from the gummy and saline parts of the dried juices of the bark: the whole concrete, which alone possesses the virtue of the medicine, being of the nature of those bodies properly called *gum resins*, which are but very imperfectly soluble in water, and of which wine is the proper solvent. It has been found, that cold water, acting more gradually than boiling water, extracts both the gummy and resinous principles of bark. And infusions made by macerating one ounce of bark in fine powder, in eight or twelve of water, without heat, for twenty-four (or even twelve) hours, have been successfully administered in doses (of the clear liquor) of two or three ounces. It is a common opinion, that bark in substance is more effectual than any preparation of it. *Lewis, Mat. Med.*

Peruvian bark has been found very effectual in preventing colds. The method in which it was used, in a case mentioned in the Philosophical Transactions, was, after due preparation by bleeding or purging, to take two ounces of it every spring and fall. By this method, an habitual taking of cold, and a consequent sore throat, was cured. *Phil. Transf.* No. 478. p. 3.

The antiseptic power of the bark has been abundantly evinced, and we have many accounts of its great effects in the cure of gangrenes and mortifications. See *Med. Eff. Edinb.* vol. iii. art. 5. We have also several accounts of the good effects of this medicine in ulcers and the small pox, and also in scrophulous complaints.

The bark probably in cafes of this kind throws off by fermentation a quantity of fubtile vapour or fixed air, which is fufficient to faturate the acrimonious matter; and, even when the putrefaction has made farther advances, larger quantities of this medicine will difcharge more of the antifeptic vapour, which, reaching the blood, will reftore its confiftence, and correct its fharpnefs. Macbride's Effays, edit. 3, p. 140, &c. The bark has alfo been applied, in conjunction with other medicines, to the cure of periodical head-achs, hyfterical, hypochondriacal, vertiginous, and epileptic, complaints. And it is a very ufeul medicine in weaknefs of the ftomach, uterine fluxes, and fundry chronical difeafes proceeding from a laxity and debility of the fibres.

Many instances are recorded by medical writers of the jaundice, dropfy, afthma, and all the train of nervous diforders, brought on in a furprifing fhort time after an injudicious adminiftration of the bark: among others, the curious may confult the *Med. Eff. Edinb.* vol. iv. art. 24. The Peruvian bark is difcovered to be effectual in the cure of mortifications from an internal caufe. The hiftory of this difcovery is: In 1715, Mr. Rufhworth, furgeon in Northampton, gave it to a patient labouring under a mortification; and, having afterwards other proofs of its good effects in this difeafe, communicated his difcovery in 1731. Mr. Amyand foon tried it in fuch cafes, and found it fuccefsful in feven. Mr. John Douglas confirmed this by the hiftory of a patient of his, which he publifhed in 1732; and Mr. Shipton foon after related his fuccefs by this medicine to the Royal Society. Mr. Rufhworth and Mr. Amyand confirmed its ufe in mortifications from an internal caufe; the former thinks it is not proper in all cafes of that kind, particularly where there is no intermiffion in the fever. Mr. Douglas feems to think it will fucceed in all mortifications. All thefe three gentlemen gave half a dram for a dofe every fourth hour. Mr. Shipton increafed the dofe of two fcruples, and gave it while the fever continued. He propofed to have it tried in nomæ, phagedenæ, herpes, or other chironion ulcers.

Some call the gentian-root the European quinquina, becaufe good againft intermitting fevers. The fea-fide beech of Jamaica, or *Cinchona Carribæa* of Linnæus, is a fpecies of the Jefuits' bark, produced in Jamaica and the Carribee iflands, which, together with its virtues, has been accurately defcribed by Dr. Wright, who found it very efficacious in the dangerous remittent fevers of the Weft Indies; and it has been lately adminiftered in London in intermittents, in which it has effected a cure as completely as the Peruvian bark. *Phil. Tranf.* vol. lxxvii. 504. *Med. Com.* vol. v. p. 398. part 2.



Dodd del.

The Bread Fruit Tree.

Prallent sculp.

BREAD-FRUIT TREE. *ARTOCARPUS*.

THIS tree is called *artocarpus*, (from *αρος*, bread, and *καρπος*, fruit;) and is a genus of the monandria order, belonging to the monœcia class, of plants. It has a cylindric amentum or catkin, which thickens gradually, and is covered with flowers; the male and female in a different amentum. In the male, the calyx is two-valved, and the corolla is wanting. In the female, there is no calyx nor corolla; the stylus is one, and the drupa is many-celled.

Though this tree has been mentioned by many voyagers, particularly by Dampier, by Rumphius, and by Lord Anson, yet very little notice seems to have been taken of it till the return of Captain Willis from the South Seas, and since that time by others who have touched at Otaheite, and some other countries in the East-Indies. Captain Dampier relates, that in Guam, one of the Ladrone islands, "there is a certain fruit called the bread-fruit, growing on a tree as big as our large apple-trees, with dark leaves. The fruit is round, and grows on the boughs like apples, of the bigness of a good penny loaf; when ripe, it turns yellow, soft, and sweet: but the natives take it green, and bake it in an oven till the rind is black; this they scrape off and eat the inside, which is soft and white, like the inside of new-baked bread, having neither seed nor stone; but, if it is kept above twenty-four hours, it is harsh. As this fruit is in season eight months in the year, the natives feed upon no other sort of bread during that time. They told us that all the Ladrone islands had plenty of it. I never heard of it in any other place."

Rumphius, after describing the tree, observes, that "the fruit is shaped like a heart, and increases to the size of a child's head. Its surface or rind is thick, green, and covered every-where with warts of a quadrangular or hexagonal figure, like cut diamonds, but without points. The more flat and smooth these warts are, the fewer seeds are contained in the fruit, and the greater is the quantity of pith, and that of a more glutinous nature. The internal part of the rind, or peel, consists of a fleshy substance, full of twisted fibres, which have the appearance of fine wool; these adhere to, and in some measure form, it. The fleshy part of this fruit becomes softer towards the middle, where there is a small cavity formed without any nuts or seeds, except in one species, which has but a small number; and this sort is not good, unless it is baked or prepared some other way; but, if the outward rind be taken off, and the fibrous flesh dried, and afterwards boiled with meat, as we do cabbage, it has then the taste of artichoke-bottoms. The inhabitants of Amboyna dress it in the liquor of cocoa-nuts; but they prefer it roasted on coals till the outward part or peel is burnt. They afterwards cut it into pieces, and eat it with the milk of the cocoa-nut.

Some people make fritters of it, or fry it in oil; and others, as the Sumatrians, dry the internal soft part, and keep it to use instead of bread with other food. It affords a great deal of nourishment, and is very satisfying; therefore proper for hard-working people; and, being of a gentle astringent quality, is good for persons of a laxative habit of body.

“It is more nourishing boiled in our manner, with fat meat, than roasted on coals. The milky juice which distils from the trunk, boiled with the cocoa-nut oil, makes a very strong bird lime. This tree is to be found on the eastern parts of Sumatra, and in the Malay language is called *foccus* and *focum capas*. It grows likewise about the town of Bantam, in Java, and in Ballega and Madura; and is known there by the name of *focum*.”

In Anson's voyage we are informed, “that the *rima*, or bread-fruit tree, is common in all the Ladrone islands, and some of the Philippines. It is somewhat larger than our apple-tree, and bears a broad dark-coloured leaf with five indentures on each side. The fruit hangs on boughs like apples, and is of the size of a penny-loaf, with a thick tough rind, which when full ripe turns yellow. The natives gather it before it is quite ripe, and bake it till the crust is pretty black; then they rasp it, and there remains a pretty loaf, with a tender yellow crust, and the crumb of it is soft and sweet as a new-baked roll: it is without any seeds or stones. This fruit the inhabitants enjoy for about seven months; during which they never eat any other kind of bread: but they are obliged to bake it every day; for, when it grows a little stale, it becomes harsh and husky, somewhat like the potatoe bread made in the west of England. There is, however, a remedy for this; which is cutting the loaf into slices when it is new, and drying it in the sun, by which it is changed into the pleafantest rusk that can be eaten.”

Captain Cook, in his voyage, observes, that this fruit not only serves as a substitute for bread among the inhabitants of Otaheite and the neighbouring islands, but also, variously dressed, composes the principal part of their food. It grows on a tree that is about the size of a middling oak; its leaves are frequently a foot and a half long, of an oblong shape, deeply sinuated like those of the fig-tree, which they resemble in colour and consistence, and in the exuding of a milky juice upon being broken. The fruit is about the size and shape of a new-born child's head; and the surface is reticulated, not much unlike a truffle; it is covered with a thin skin, and has a core about as big as the handle of a small knife. The eatable part lies between the skin and the core; it is as white as snow, and somewhat of the consistence of new bread; it must be roasted before it is eaten, being first divided into three or four parts; its taste is insipid, with a slight sweetness somewhat resembling that of the
crumb

crumb of wheaten bread mixed with a Jerufalem artichoke. This fruit is also cooked in a kind of oven, which renders it soft, and something like a boiled potatoe; not quite so farinaceous as a good one, but more so than those of the middling sort. Of the bread-fruit they also make three dishes, by putting either water or the milk of the cocoa-nut to it, then beating it to a paste with a stone pestle, and afterwards mixing it with ripe plantains, bananas, or the four paste which they call mahie.

The *mahie*, which is likewise made to serve as a succedaneum for ripe bread-fruit before the season comes on, is thus made: The fruit of the bread tree is gathered just before it is perfectly ripe; and, being laid in heaps, is closely covered with leaves: in this state it undergoes a fermentation, and becomes disagreeably sweet: the core is then taken out entire, which is done by gently pulling out the stalk, and the rest of the fruit is thrown into a hole which is dug for that purpose generally in the houses, and neatly lined in the bottom and sides with grass; the whole is then covered with leaves and heavy stones laid upon them; in this state it undergoes a second fermentation, and becomes sour, after which it will suffer no change for many months. It is taken out of the hole, as it is wanted for use; and, being made into balls, it is wrapped up into leaves and baked: after it is dressed, it will keep five or six weeks. It is eaten both cold and hot; and the natives seldom make a meal without it, though to Europeans the taste is as disagreeable as that of a pickled olive generally is the first time it is eaten. The fruit itself is in season eight months in the year, and the mahie supplies the inhabitants during the other four.

To procure this principle article of their food (the bread-fruit) costs these happy people no trouble or labour, except climbing up a tree. The tree which produces it, does not indeed grow spontaneously; but, if a man plants ten of them in his lifetime, which he may do in about an hour, he will as completely fulfil his duty to his own and future generations as the native of our less temperate climate can do by ploughing in the cold of winter, and reaping in the summer's heat, as often as these seasons return; even if, after he has procured bread for his present household, he should convert a surplus into money, and lay it up for his children.

There are two species of *artocarpus*, viz. the *incisus*, with gashed leaves: and the *integrifolia*, with entire leaves. There is also said to be another distinction, into that which bears fruit with stones or seeds, and that in which the fruit has none. The parts of fructification of that tree which bears the fruit without stones are defective. The amentum, or catkin, which contains the male parts, never expands. The styli, or female part of the fruit, are likewise deficient. From which it follows that there can be no stones or seeds, and therefore that this tree can be propagated only by suckers or layers: although it is abundantly evident that it must originally have

have proceeded from the feed-bearing bread-fruit tree. Instances of this kind we sometimes find in European fruits; such as the barberry, and the Corinthian grape from Zant, commonly called currants, which can therefore be increased only by layers and cuttings. Dr. Solander was assured by the oldest inhabitants of Otaheite and the adjoining islands, that they well remember there was formerly plenty of the feed-bearing bread-fruit; but they had been neglected upon account of the preference given to the bread-fruit without feeds, which they propagate by suckers.

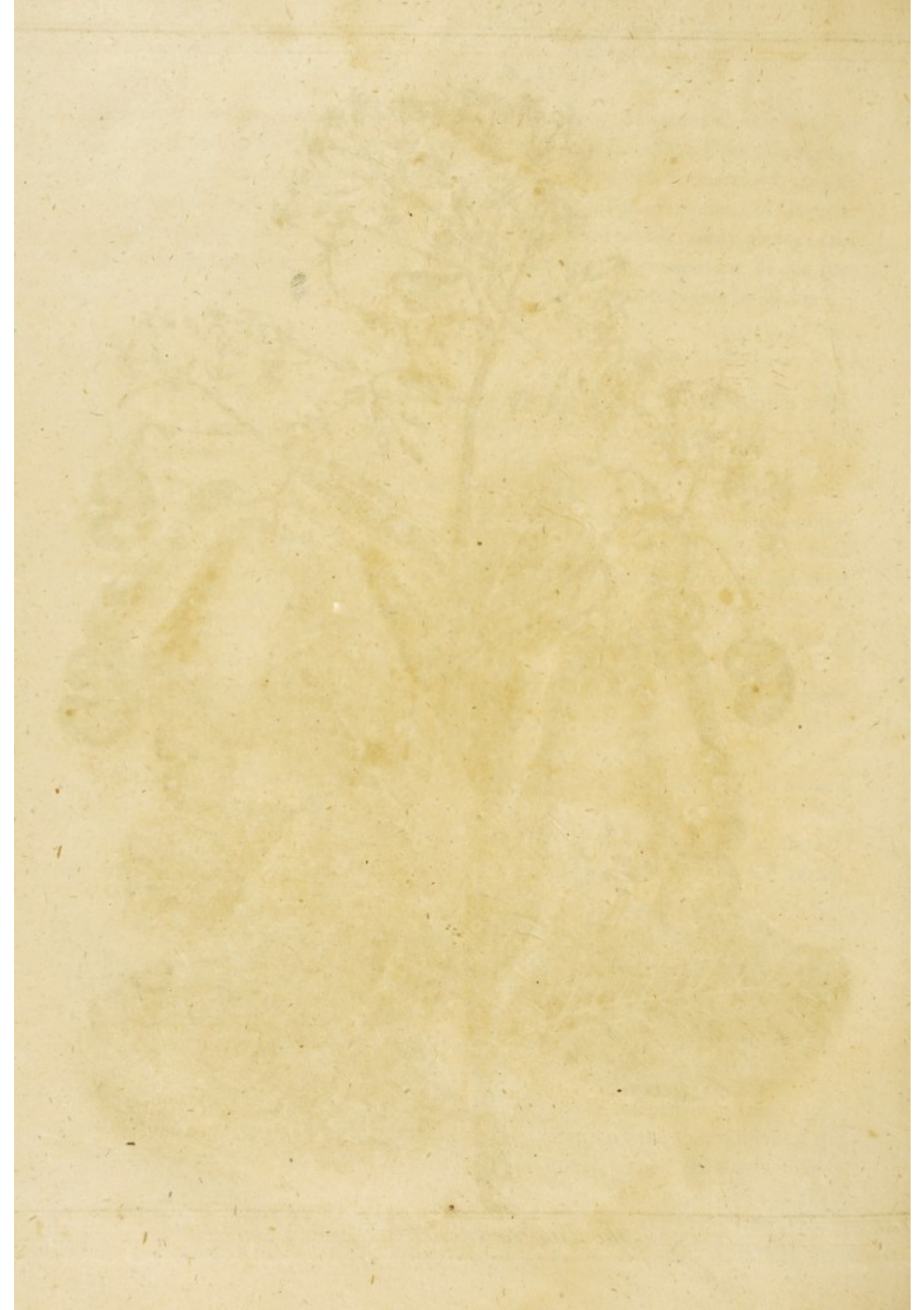
CASHEW-NUT TREE. ANACARDIUM.

ANACARDIUM, the cashew-nut tree, is a genus of the monogynia order, belonging to the decandria class, of plants; and in the natural method ranking under the twelfth order, holoraceæ. The characters are: The calyx is divided into five parts, the divisions ovate and deciduous; the corolla consists of five reflected petals, twice the length of the calyx; the stamina consist of ten capillary filaments shorter than the calyx, one of them castrated; the antheræ are small and roundish; the pistil has a roundish germen; the stylus is subulated, inflected, and the length of the corolla; the stigma oblique: there is no pericarpium; the receptaculum is very large and fleshy; the seed is a large kidney-shaped nut, placed above the receptaculum.

Of this only one species is as yet known to the botanists, viz. the occidentale. It grows naturally in the West Indies, and arrives at the height of 20 feet in those places of which it is a native; but cannot be preserved in Britain without the greatest difficulty. The fruit of this tree is as large as an orange; and is full of an acid juice, which is frequently used in making punch. To the apex of this fruit grows a nut, of the shape and size of a hare's kidney, but much larger at the end which is next the fruit than at the other. The shell is very hard; and the kernel, which is sweet and pleasant, is covered with a thin film. Between this and the shell is lodged a thick, blackish, inflammable, liquor, of such a caustic nature in the fresh nuts, that, if the lips chance to touch it, blisters will immediately follow. The kernels are eaten raw, roasted, or pickled. The caustic liquor just mentioned is esteemed an excellent cosmetic with the West-India young ladies, but they must certainly suffer a great deal of pain in its application; and, as fond as our British females are of a beautiful face, it is highly probable they would never submit to be flayed alive to obtain one. When any of the former fancy themselves too much tanned by the scorching rays of the sun, they gently scrape off the thin outside of the shell, and then rub their faces all over with the stone. Their faces immediately
swell



The Cashew Nut Tree.







del. del.

Canella Alba.

Dr. J. S.

swell and grow black: and the skin, being poisoned by the caustic oil above-mentioned, will in the space of five or six days come entirely off in large flakes, so that they cannot appear in public in less than a fortnight, by which time the new skin looks as fair as that of a new-born child. The negroes in Brasil cure themselves effectually of disorders in the stomach by eating of the yellow fruit of this tree; the juice of which, being acid, cuts the thick tough humours which obstructed the free circulation of the blood, and thus removes the complaint. This cure, however, is not voluntary: for their masters, the Portuguese, deny them any other sustenance; and letting them loose to the woods, where the cashew-nuts grow in great abundance, leave it in their option to perish by famine, or sustain themselves with this fruit. The milky juice of this tree will stain linen of a good black, which cannot be washed out.

This plant is easily raised from the nuts, which should be planted each in a separate pot filled with light sandy earth, and plunged into a good hot-bed of tanners' bark; they must also be kept from moisture till the plants come up, otherwise the nuts are apt to rot. If the nuts are fresh, the plants will come up in about a month; and in two months more they will be four or five inches high, with large leaves: from which quick progress many people have been deceived, imagining they would continue the like quick growth afterwards; but, with all the care that can be taken, they never exceed the height of two feet and a half, and for the most part scarcely half as much. The Indians eat the nuts slightly roasted, dipped in water or wine, and sprinkled with salt, as a provocative to venery, to which they are found a most remarkable stimulus. The juice will stop a diarrhoea, and cure a diabetes; and the oil is used by painters to give their colours a lasting black, and to preserve wood from putrefaction.

CANELLA ALBA, OR WHITE CINNAMON.

THE canella is a genus of the monogynia order, belonging to the dodecandria class, of plants; and in the natural method ranking under the twelfth order, holoraceæ. The calyx is three-lobed; the petals are five; the antheræ sixteen, growing to an urceolated or bladder-shaped nectarium; and the fruit is a tricocular berry, with two seeds. There is but one species, the *alba*; which grows usually about twenty feet high, and eight or ten inches in thickness, in the thick woods of most of the Bahama islands. The leaves are narrow at the stalk, growing wider at their ends, which are broad and rounding, having a middle rib only; they are very smooth, and of a light shining green. In May and June the flowers, which are pentapetalous, come forth in clusters at the ends of the branches: they are red, and very fragrant; and are succeeded by round berries, of the size of large pease, green, and when

ripe (which is in February) purple, containing two shining black seeds, flat on one side, otherwise not unlike in shape to a kidney-bean: these seeds in the berry are enveloped in a slimy mucilage. The whole plant is very aromatic, the bark particularly, being more used in distilling, and in greater esteem, in the more northern parts of the world than in Britain.

The bark is the *canella alba* of the shops. It is brought to us rolled up into long quills, thicker than cinnamon, and both outwardly and inwardly of a whitish colour, lightly inclining to yellow. Infusions of it in water are of a yellowish colour, and smell of the canella; but they are rather bitter than aromatic. Tinctures in rectified spirit have the warmth of the bark, but little of its smell. Proof-spirit dissolves the aromatic as well as the bitter matter of the canella, and is therefore the best menstruum.

The canella is the interior bark freed from an outward thin rough one, and dried in the shade. The shops distinguish two sorts of canella, differing in the length and thickness of the quills: they are both the bark of the same tree; the thicker being taken from the trunk, and the thinner from the branches. This bark is a warm pungent aromatic, though not of the most agreeable kind; nor are any of the preparations of it very grateful.

Canella alba is often employed where a warm stimulant to the stomach is necessary, and as a corrector of other articles. It is now, however, little used in compositions by the London College; the only officinal formula which it enters being the *pulvis aloeticus*: but with the Edinburgh College it is an ingredient in the *tinctura amara*, *vinum amarum*, *vinum rhei*, &c. It is useful as covering the taste of some other articles.—This bark has been confounded with that called winter's bark, which belongs to a very different tree.

COFFEE-TREE. *COFFEA*.

THE coffee-tree is supposed to be a native of Arabia Felix. It seldom rises more than sixteen or eighteen feet in height; the main stem grows upright, and is covered with a light-brown bark; the branches are produced horizontally and opposite, crossing each other at every joint; so that every side of the tree is fully garnished with them, and they form a sort of pyramid. The leaves also stand opposite; and, when fully grown, are about four or five inches long, and two broad in the middle, decreasing toward each end; the borders are waved, and the surface is of a lucid green. The flowers are produced in clusters at the root of the leaves, fitting close to the branches; they are tubulous, and spread open at the top, where they are divided into five parts; they are of a pure white, and have a very grateful odour, but are of short duration. The fruit, which is the only useful part, resembles a cherry.

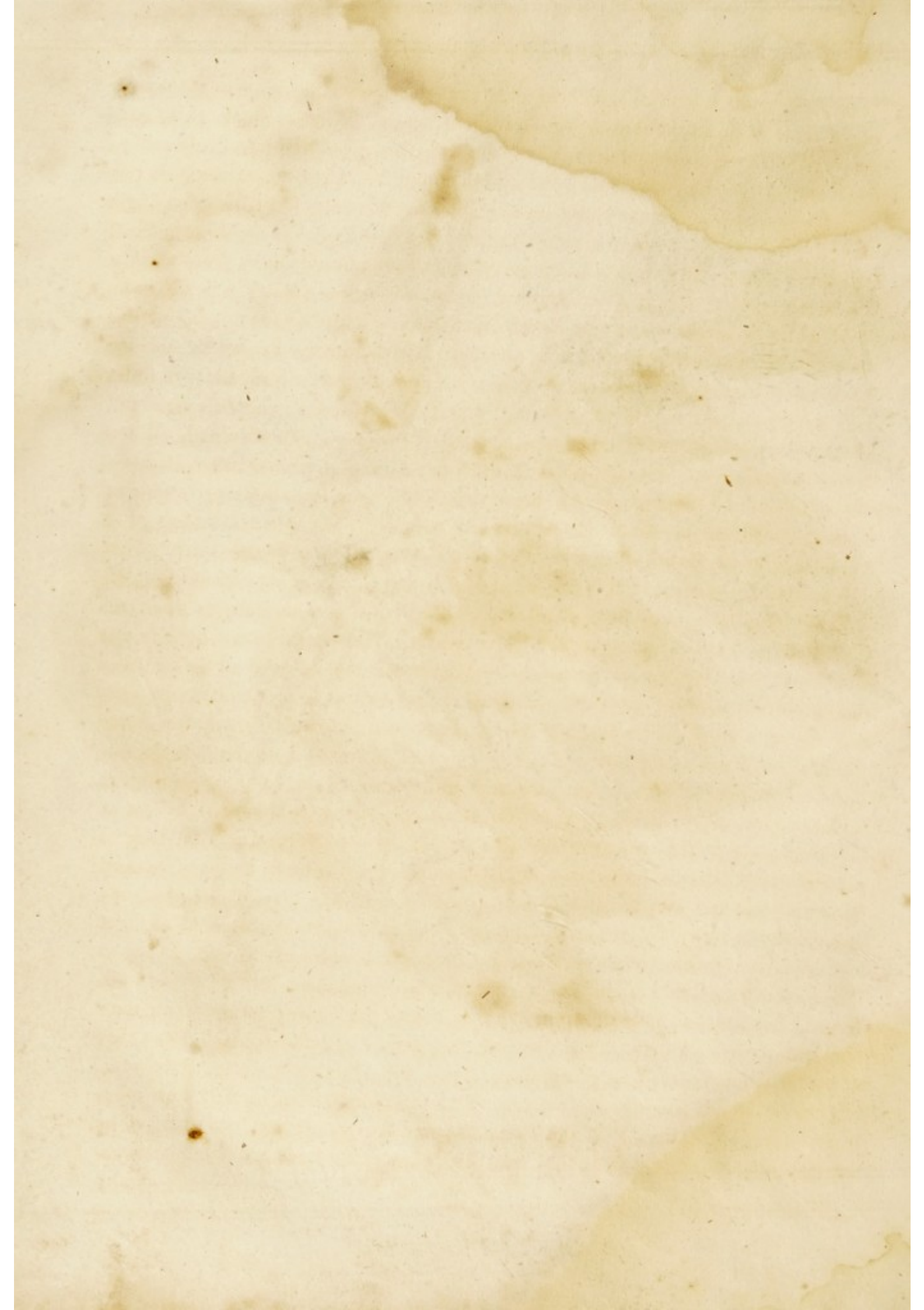
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The Coffee Tree.

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It grows in clusters, and is ranged along the branches under the axillæ of the leaves, of the same green as the laurel, but something longer. When it comes to be of a deep red, it is gathered for the mill, in order to be manufactured into those coffee-beans now so generally known. The mill is composed of two wooden rollers furnished with iron plates eighteen inches long, and ten or twelve in diameter. These moveable rollers are made to approach a third which is fixed, and which they call the chops. Above the rollers is a hopper, in which they put the coffee, from whence it falls between the rollers and the chops, where it is stripped of its first skin, and divided into two parts, as may be seen by the forms of it after it has undergone this operation; being flat on the one side and round on the other. From this machine it falls into a brass sieve, where the skin drops between the wires, while the fruit slides over them into baskets placed ready to receive it: it is then thrown into a vessel full of water, where it soaks for one night, and is afterwards thoroughly washed. When the whole is finished, and well dried, it is put into another machine called the peeling-mill. This is a wooden grinder, turned vertically upon its trendle by a mule or a horse. In passing over the coffee it takes off the parchment, which is nothing but a thin skin that detaches itself from the berry in proportion as it grows dry. The parchment being removed, it is taken out of this mill to be put into another, which is called the winnowing-mill. This machine is provided with four pieces of tin fixed upon an axle, which is turned by a slave with considerable force; and the wind that is made by the motion of these plates clears the coffee of all the pellicles that are mixed with it. It is afterwards put upon a table, where the broken berries, and any filth that may remain among them, are separated by negroes; after which the coffee is fit for sale. The coffee-tree is cultivated in Arabia, Persia, the East-Indies, the Isle of Bourbon, and several parts of America. It is also raised in botanic gardens in many parts of Europe. Prince Eugene's garden at Vienna produced more coffee than was sufficient for his own consumption. It delights particularly in hills and mountains, where its root is almost always dry, and its head frequently watered with gentle showers. It prefers a western aspect, and ploughed ground without any appearance of grass. The plants should be placed at eight feet distance from each other, and in holes twelve or fifteen inches deep. If left to themselves, they would rise to the height of sixteen or eighteen feet, as already observed; but they are generally stunted to five, for the conveniency of gathering their fruit with the greater ease. Thus dwarfed, they extend their branches so, that they cover the whole spot round about them. They begin to yield fruit the third year, but are not in full bearing till the fifth. With the same infirmities that most other trees are subject to, these are likewise in danger of being destroyed by a worm or by the scorching rays of the sun. The hills where the coffee-trees are found have general y

nerally a gravelly or chalky bottom. In the last, it languishes for some time and then dies: in the former, its roots, which seldom fail of striking between stones, obtain nourishment, and keep the tree alive and fruitful for thirty years. This is nearly the period for plants of the coffee-tree. The proprietor, at the end of this period, not only finds himself without trees, but has his land so reduced, that it is not fit for any kind of culture; and, unless he is so situated, that he can break up a spot of virgin land, to make himself amends for that which is totally exhausted by the coffee-trees, his loss is irreparable.

The coffee produced in Arabia is found so greatly to excel that raised in the American plantations or elsewhere, that the cultivation of the tree is now but seldom practised in any of the British colonies. Large plantations of this kind were formerly made in some of them; and it was proposed to the parliament to give a proper encouragement for cultivating this commodity there, so as to enable the planters to undersell the importers from Arabia. Accordingly there was an abatement of the duty payable on all coffee imported from our colonies in America, which at that time was supposed to be sufficient encouragement for this kind of commerce; but the inferiority of the American coffee to the Arabian almost ruined the project. The late Mr. Miller proposed some improvements in the method of cultivation. According to him, the trees are planted in too moist a soil, and the berries are gathered too soon. They ought, he says, to be permitted to remain on the trees till their skins are shrivelled, and they fall from the trees when shaken. This will indeed greatly diminish their weight, but the value of the commodity will thereby be increased to more than double of that which is gathered sooner. In Arabia, they always shake the berries off the trees, spreading cloths to receive them, and only take such as readily fall at each time. Another cause may be the method of drying the berries. They are, he observes, very apt to imbibe moisture, or the flavour of any thing placed near them. A bottle of rum placed in a closet in which a canister of coffee-berries closely stopped was standing on a shelf at a considerable distance, in a few days so impregnated the berries as to render them very disagreeable: the same has also happened by a bottle of spirit of wine standing in the same closet with coffee and tea, both which were in a few days spoiled by it. Some years ago, a coffee-ship from India had a few bags of pepper put on-board, the flavour of which was imbibed by the coffee, and the whole cargo spoiled. For these reasons, Mr. Miller directs that coffee-berries should never be brought over in ships freighted with rum, nor laid to dry in the houses where sugars are boiled or rum distilled. When they are fully ripe, they should be shaken off while the trees are perfectly dry, and spread upon cloths in the sun, carrying them every evening under cover, to prevent the dews or rain from falling on them. When perfectly dry, they should

have

have their outer skins beaten off, and then be carefully packed up in cloths or bags three or four times double.

The coffee-tree, as we have already observed, is sometimes cultivated in European gardens: but for this it requires the assistance of a stove. It makes a fine appearance at all seasons of the year (being an evergreen), but especially when in flower, and when the berries are red, which is generally in the winter, so that they continue a long time in that state. It is propagated from the berries: but they must be planted immediately when gathered from the tree, for they lose their vegetative quality in a very short time: when they have been sent abroad, they have constantly failed in those that have been a fortnight on their journey; so that, where these trees are desired, the young plants must be sent, if it be at any distance from the place where they grow. The fresh berries may be planted in small pots, and plunged into a hot-bed of tanner's bark. If the bed be of a proper temperature, the young plants will appear in a month or five weeks time; and in six weeks more will be ready for transplanting into several pots. During summer, they must be frequently watered; but not in too great plenty, otherwise the roots will be apt to rot. The first sign of the plants being disordered is their leaves sweating out a clammy juice; after which they are over-run with insects, that cannot be destroyed till the plants have recovered their health; so that, on the first appearance of these insects, the trees should be removed into fresh earth, and all possible care taken to recover them. The disorders incident to them, generally proceed either from their having been put into large pots, or from the earth about them being too stiff or over-watered. The most proper soil for them is that of a kitchen-garden, which is naturally loose, and not subject to bind, especially if it has constantly been well wrought and dunged.

Explanation of the Plate.

a, represents the flower, cut open to show the situation of the five filaments, with their summits lying upon them.

b, the flower-cup, with its four small indentations, inclosing the germen, or embryo seed-vessel; from the middle of which arises the style, terminated by the two reflexed spongy tops.

c, the fruit entire; marked at the top with a puncture, like a navel.

d, the fruit open, to show that it consists of two seeds; which are surrounded by the pulp.

e, the fruit cut horizontally, to show the seeds as they are placed erect, with their flat sides together.

f, one of the seeds taken out, with the membrane or parchment upon it.

g, the same, with the parchment torn open, to give a view of the seed.

h, the seed without the parchment.

The origin of coffee as a common drink is not well known. Some ascribe it to the prior of a monastery; who, being informed by a goat-herd, that his cattle sometimes browsing on the tree would awake and caper all night, became curious to prove its virtue: accordingly, he first tried it on his monks, to prevent their sleeping at matins. Others, from Sehehabeddin, refer the first use of coffee to the Persians: from whom it was learned in the 15th century by Gemaleddin, mufti of Aden, a city near the mouth of the Red Sea; and who, having tried its virtues himself, and found that it dissipated the fumes which oppressed the head, inspired joy, opened the bowels, and prevented sleep, without being incommoded by it, recommended it first to his dervises, with whom he used to spend the night in prayer. Their example brought coffee into vogue at Aden; the professors of the law for study, artificers to work, travellers to walk in the night, in fine, every body at Aden drank coffee. Hence it passed to Mecca; where first the devotees, then the rest of the people, took it. From Arabia Felix it passed to Cairo. In 1511, Kahie Beg prohibited it, from a persuasion that it inebriated, and inclined to things forbidden. But Sultan Caufou soon after took off the prohibition; and coffee advanced from Egypt to Syria and Constantinople. Thevenot, the traveller, was the first who brought it into France; and a Greek servant, named Pasqua, brought into England by Mr. Daniel Edwards, a Turkey merchant, in 1652, to make his coffee, first set up the profession of coffee-man, and introduced the drink into this island.

In the year 1714, the magistrates of Amsterdam, in order to pay a compliment to Louis XIV. king of France, presented to him an elegant plant of this rare tree, carefully and judiciously packed up to go by water, and defended from the weather by a curious machine covered with glass. The plant was about five feet high, an inch in diameter in the stem, and was in full foliage, with both green and ripe fruit. It was viewed in the river, with great attention and curiosity, by several members of the Academy of Sciences, and was afterwards carried to the royal garden at Marly, under the care of Monsieur de Jussieu, the king's professor of botany; who had, the year before, written a memoir, printed in the History of the Academy of Sciences of Paris, describing the characters of this genus, together with an elegant figure of it, taken from a smaller plant, which he had received that year from Mynheer Pancras, burgomaster of Amsterdam, and director of the botanical garden there.

In 1718, the Dutch colony at Surinam began first to plant coffee; and, in 1723, Monsieur de la Motte Aignon, governor of Cayenne, having business at Surinam, contrived, by an artifice, to bring away a plant from thence, which, in the year 1725, had produced many thousands.

In 1727, the French, perceiving that this acquisition might be of great advantage in their colonies, conveyed to Martinico some of the plants; from whence it most probably spread to the neighbouring islands; for, in the year 1732, it was cultivated in Jamaica, and an act passed to encourage its growth in that island.—Thus was laid the foundation of a most extensive and beneficial trade to the European settlements in the West-Indies.

The preparation of coffee consists in roasting, or giving it a just degree of torrefaction, on an earthen or metalline plate, till it has acquired a brownish hue equally deep on all sides. It is then ground in a mill, as much as serves the present occasion. A proper quantity of water is next boiled, and the ground coffee put into it. After it has just boiled, it is taken from the fire, and, the decoction having stood a while to settle and fine, they pour or decant it into dishes. The ordinary method of roasting coffee amongst us is in a tin cylindrical box full of holes, through the middle whereof runs a spit: under this is a femicular hearth, whereon is a large charcoal-fire: by help of a jack the spit turns swift, and so roasts the berry; being now and then taken up to be shaken. When the oil rises, and it is grown of a dark-brown colour, it is emptied into two receivers made with large hoops whose bottoms are iron plates: there the coffee is shaken, and left till almost cold; and, if it looks bright and oily, it is a sign it is well done.

Very different accounts have been given of the medicinal qualities of this berry. To determine its real effects on the human body, Dr. Percival has made several experiments, the result of which he gives in the following words: “From these observations we may infer, that coffee is slightly astringent, and antiseptic; that it moderates alimentary fermentation, and is powerfully sedative. Its action on the nervous system probably depends on the oil it contains; which receives its flavour, and is rendered mildly empyreumatic, by the process of roasting. Neumann obtained by distillation from one pound of coffee, five ounces five drams and a half of water, six ounces and half a dram of thick fetid oil, and four ounces and two drams of a caput mortuum. And it is well known, that rye, torrefied with a few almonds, which furnish the necessary proportion of oil, is now frequently employed as a substitute for these berries.

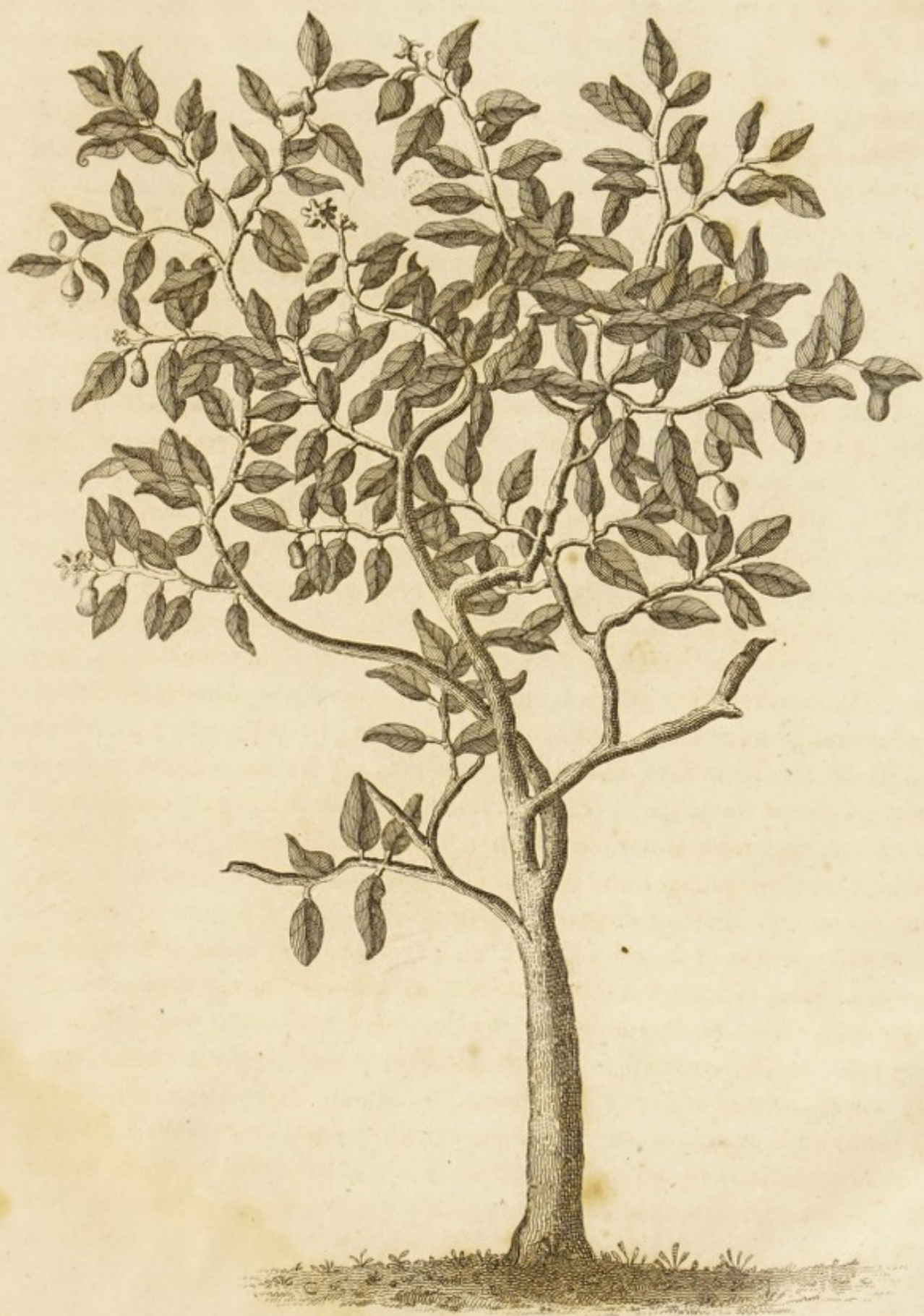
“The medicinal qualities of coffee seem to be derived from the grateful sensation which it produces in the stomach, and from the sedative powers it exerts on the *vis vitæ*. Hence it assists digestion, and relieves the head-ach; and is taken in large quantities, with peculiar propriety, by the Turks and Arabians; because it counteracts the narcotic effects of opium, to the use of which those nations are much addicted.

“In delicate habits, it often occasions watchfulness, tremors, and many of those complaints which are denominated nervous. It has been even suspected of producing palsies; and, from my own observation, I should apprehend not entirely without foundation. Slare affirms, that he became paralytic by the too liberal use of coffee, and that his disorder was removed by abstinence from that liquor.

“The following curious and important observation is extracted from a letter with which I was honoured by Sir John Pringle, in April 1773: ‘On reading your section concerning coffee, one quality occurred to me which I had observed of that liquor, confirming what you have said of its sedative virtues. It is the best abater of the paroxysm of the periodic asthma that I have seen. The coffee ought to be of the best Mocco, newly burnt, and made very strong immediately after grinding it. I have commonly ordered an ounce for one dish; which is to be repeated fresh after the interval of a quarter or half an hour; and which I direct to be taken without milk or sugar. The medicine in general is mentioned by Musgrave, in his treatise *De Arthritide anomala*; but I first heard of it from a physician in this place, who, having once practised in Litchfield, had been informed by the old people of that place, that Sir John Floyer, during the latter years of his life, kept free from, or at least lived easy under, his asthma, from the use of very strong coffee. This discovery, it seems, he made after the publication of his book upon that disease.’ Since the receipt of that letter, I have frequently directed coffee in the asthma with great success.”

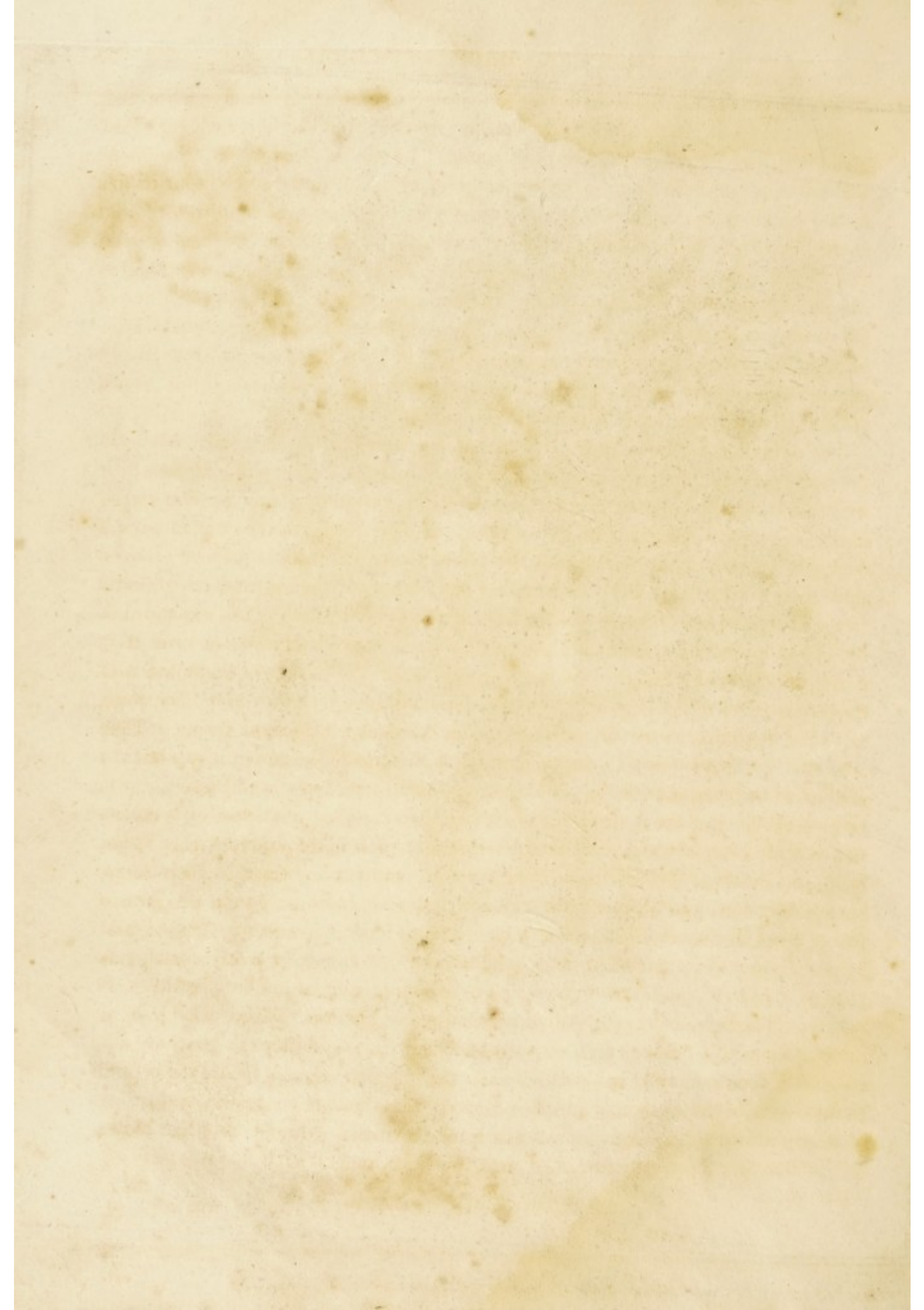
FORBIDDEN-FRUIT TREE. CITRUS MEDICA.

THE forbidden-fruit tree, in trunk, leaves, and flowers, very much resembles the common orange-tree; but the fruit, when ripe, is larger and longer than the biggest orange. It has somewhat the taste of a shaddock; but far exceeds that, as well as the best orange, in its delicious taste and flavour. They are elegant ever-greens, rising in this country from about five to ten feet in height; forming full and handsome heads, closely garnished with beautiful large leaves all the year round, and putting forth a profusion of sweet flowers in spring and early in summer; which even in this climate are often succeeded by abundance of fruit that sometimes arrive at tolerable perfection. Though all the varieties were originally obtained by seed, yet the only certain method of continuing the approved varieties is by budding or inarching them on stocks raised from seed to a proper size. As the young trees, however, are brought in plenty from abroad, this method is never practised in this country: but, for curiosity, it may be done by those who are so inclined, in the following manner: Early in the spring procure some kernels, which may be had in plenty from rotten fruits, or others that are properly ripened. Sow the kernels in



Citrus or Forbidden Fruit Tree.

W. G. S. del.



March, in pots of rich light earth half an inch deep, and plunge them in a hot-bed, under frames and glasses. Dung or tan may be used, but the latter is preferable, giving air, and frequent sprinklings of water. In two or three weeks, the plants will come up; and, in six or eight weeks more, they will be advanced four or five inches or more in height. You must now give them more air and water; and about the middle of June harden them to the full air, in which let them remain till October; then move them into the green-house, to stand till the spring; and in March or April plant them singly in small pots, being careful to shake them out of the seed-pots with their roots entire. They must be watered immediately after planting, and the watering must be occasionally repeated. After this they are to be treated as woody exotics of the green-house; and in a year or two the largest of those designed for stocks will be fit for budding.

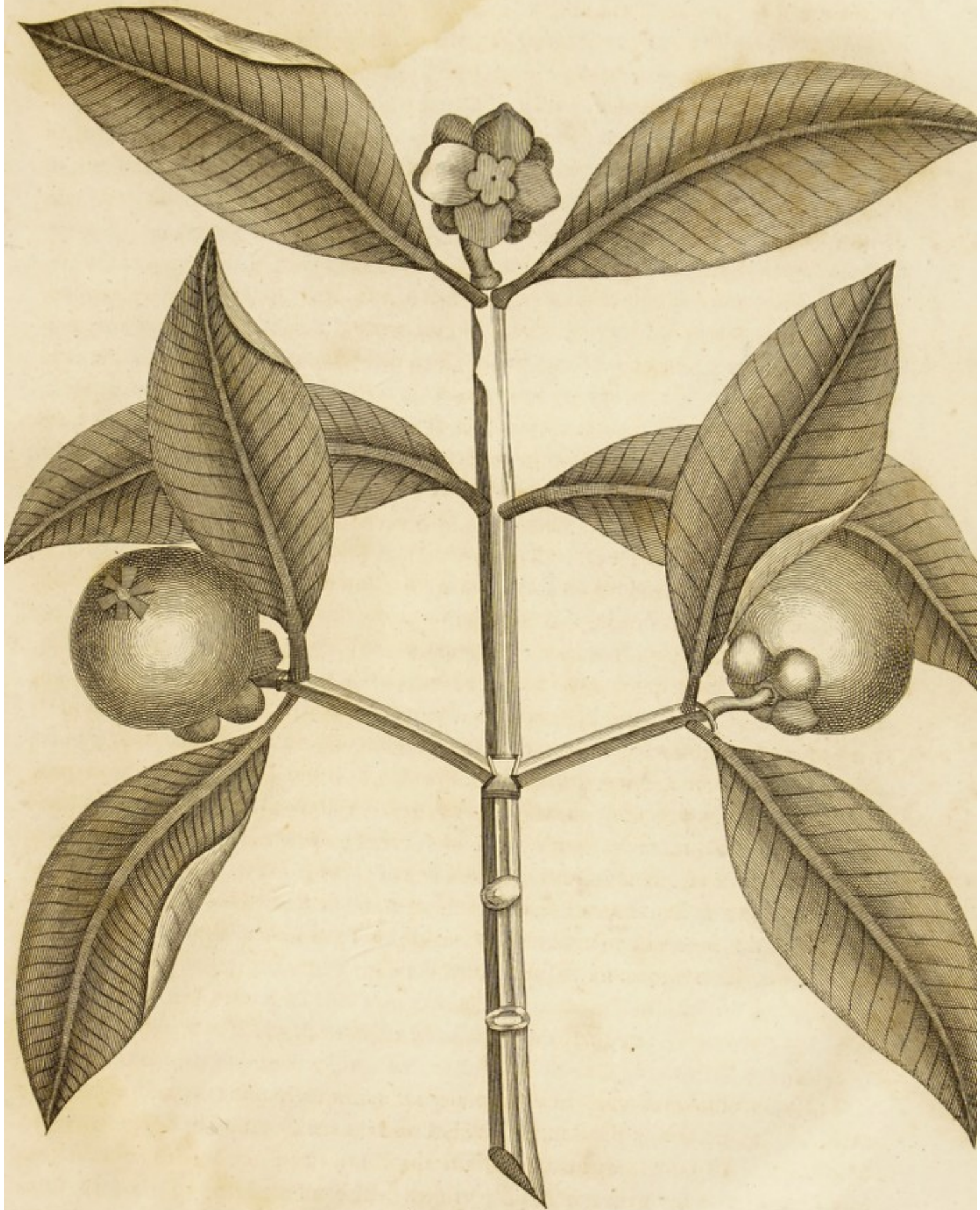
The operation for budding is performed in the month of August, and is done in the common way; only the buds must be taken from trees of a good kind that bear well. As soon as the operation is finished, the pots with their plants must be placed in the green-house, or in a glass-case; or, where there is the convenience of a spare bark-pit, where the heat of the bark is almost exhausted, the pots may be plunged therein for two or three weeks. In either case, however, the air must be admitted freely by opening the front glasses; allowing also a slight shade of mats in the middle of hot sunshine days, and supplying them with water every two or three days during this kind of weather. In three or four weeks the buds will be united with the stock; when it will be proper to loosen the bandages, that they may have room to swell; the buds, however, will all remain dormant till the next spring. They may also be propagated by inarching, which is done in the common way; but the method of budding is found to produce much handsomer trees, and therefore is to be preferred. But the most cheap and expeditious method of procuring a collection of these kinds of trees, is by having recourse to such as are imported from Spain, Italy, and Portugal. These come over in chests, without any earth to their roots, having their roots and heads a little trimmed: they are commonly from one inch to two or three in diameter in the stem; from two to four or five feet in height: and by the assistance of a bark-bed, they readily take root and grow freely, forming as good trees in two years as could be raised here by inarching or budding in fifteen or twenty. They are sold in the Italian warehouses in London. Their price is from three shillings to a guinea each, according to their size; and they are generally advertised as soon as they arrive, which is early in the spring, and the sooner the better. In the choice of these trees, it must be observed, that they are commonly budded at such height in the stem as to form heads from about two to four or five feet high; and, as they are frequently furnished with two buds, one on each side of the stem,

these should be chosen preferably to others; as they will form the most regular heads. Preparatory to their planting, they must be placed for a day or two in tubs of water to plump their bark and roots; after this they must be washed and cleaned, their branches trimmed to half a foot long, and the roots freed from diseased parts, and all the small dried fibres. Then they are to be planted in pots filled with light rich earth; and plunged in a tan-bed, where they are to remain for three or four months; after which they are to be trained to the open air, but will not bear it longer than from the end of May till the middle or end of October.

Sometimes these trees, instead of being kept in pots or tubs, are planted in the full ground; and, where this can be done, it is by far the most eligible method. Where this is intended, there must be frames erected for the support of glass and other covers, to defend the plants during inclement weather; and in this situation the trees generally shoot strong, produce large fruit, and may be trained either as wall or standard trees. A south wall, in a dry situation, is proper for training them as wall-trees; against which may be erected wooden frame-work sloping, either fixed or moveable, for the support of glass frames for winter; likewise, for the greater protection of the trees in severe frosts, there may be a fire-place with a flue or two carried along a low wall in the fronts and ends. To have the trees as standards, a more capacious and lofty glass-case should be erected against the wall, in the manner of a hot-house, but higher; in this one or two rows may be planted, suffering them to run up as standards, with only some necessary pruning just to preserve their regularity. In some places there are lofty moveable glass-cases, so that two or three rows of trees are planted in a conspicuous part of the pleasure-ground. In winter the frame is put over them, and in summer wholly taken away. The flowering and fruit-setting season of all the sorts of citrus is in June and July. They are often greatly loaded with blossoms; and, when these stand very thick, it is proper to thin them a little, taking off the smallest. It is also to be observed, that, as the trees continue blowing and setting their fruit for three months, when a full crop of fruit is set, it is of benefit to the trees and fruit to gather off the superabundant blossoms as they are produced, though some permit them to remain on account of their appearance.

GARCINIA, OR MANGOSTAN.

THE *Garcinia* is a genus of the monogynia order, belonging to the dodecandria class, of plants; and in the natural method ranking under the 18th order, bicornes. The calyx is tetraphyllous inferior; there are four petals; the berries are octospermous, and crowned with a shield-like stigma. The mangostana, which is the principal



The Garcinia mangostana.

London, Published as the act directs April 2 1789. by J. Wilks.



cipal species, is a tree of great elegance, and producing the most pleasant fruit of any yet known.

This tree has been very accurately described by Dr. Garcin, in honour of whom, as its most accurate describer, Linnæus gave it the name *Garcinia* in the 35th volume of the Philosophical Transactions. It grows, he informs us, seventeen or eighteen feet high, "with a straight taper stem like a fir," having a regular tuft in form of an oblong cone, composed of many branches and twigs, spreading out equally on all sides, without leaving any hollow. Its leaves, he observes, are oblong, pointed at both ends, entire, smooth, of a shining green on the upper-side, and of an olive on the back. Its flower is composed of four petals, almost round, or a little pointed: their colour resembles that of a rose, only deeper and less lively. The calyx of this flower is of one piece, expanded, and cut into four lobes. The two upper lobes are something larger than the lower ones; they are greenish on the outside, and of a fine deep red within: the red of the upper ones is more lively than that of the lower ones. This calyx incloses all the parts of the flower; it is supported by a pedicle, which is green, and constantly comes out of the end of a twig above the last pair of leaves. The fruit is round, of the size of a small orange, from an inch and a half to two inches in diameter. The body of this fruit is a capsule of one cavity, composed of a thick rind a little like that of a pomegranate, but softer, thicker, and fuller of juice. Its thickness is commonly a quarter of an inch. Its outer colour is of a dark-brown purple, mixed with a little grey and dark-green. The inside of the peel is of a rose colour, and its juice is purple. Last of all, this skin is of a styptic or astringent taste, like that of a pomegranate, nor does it stick to the fruit it contains. The inside of this fruit is a furrowed globe, divided into segments, much like those of an orange, but unequal in size, which do not adhere to each other. The number of these segments is always equal to that of the rays of the top which covers the fruit. The fewer there are of these segments, the bigger they are. There are often in the same fruit segments as big again as any of those that are on the side of them. These segments are white, a little transparent, fleshy, membranous, full of juice like cherries or raspberries, of a taste of strawberries and grapes together. Each of the segments incloses a seed of the figure and size of an almond stripped of its shell, having a protuberance on one of its sides. These seeds are covered with two small skins, the outermost of which serves for a basis to the filaments and membranes of which the pulp is composed. The substance of these seeds comes very near to that of chestnuts, as to their consistency, colour, and astringent quality.

"This tree (according to our author) originally grows in the Molucca islands, where it is called mangostan; but has been transplanted from thence to the islands
of

of Java and Malacca, at which last place it thrives very well. Its tuft is so fine, so regular, so equal, and the appearance of its leaves so beautiful, that it is at present looked upon at Batavia as the most proper for adorning a garden, and affording an agreeable shade. There are few seeds, however, (he observes,) to be met with in this fruit that are good for planting, most part of them being abortive.—He concludes his description by mentioning, that one may eat a great deal of this fruit without any inconvenience; and that it is the only one which sick people may be allowed to eat without any scruple.

Other writers concur in their praises of this fruit. Rumphius observes, that the mangostan is universally acknowledged to be the best and wholesomest fruit that grows in India; that its flesh is juicy, white, almost transparent, and of as delicate and agreeable a flavour as the richest grapes; the taste and smell being so grateful, that it is scarcely possible to be cloyed with eating it.—He adds, that, when sick people have no relish for any other food, they generally eat this with great delight; but, should they refuse it, their recovery is no longer expected. “It is remarkable (says he) that the mangostan is given with safety in almost every disorder. The dried bark is used with success in the dysentery and tenesmus; and an infusion of it is esteemed a good gargle for a sore mouth or ulcers in the throat. The Chinese dyers use this bark for the ground or basis of a black colour, in order to fix it the firmer.”

According to Captain Cook, in his Voyage round the World, vol. iii. p. 737, the *Garcinia mangostana* of Linnæus is peculiar to the East-Indies. It is about the size of the crab-apple, and of a deep red-wine colour. On the top of it is the figure of five or six small triangles joined in a circle; and at the bottom several hollow green leaves, which are remains of the blossom. When they are to be eaten, the skin, or rather flesh, must be taken off; under which are found six or seven white kernels, placed in a circular order; and the pulp with which these are enveloped is the fruit, than which nothing can be more delicious. It is a happy mixture of the tart and the sweet, which is no less wholesome than pleasant; and, as well as the sweet orange, is allowed in any quantity to those who are afflicted with a fever either of the putrid or inflammatory kind.

MANCHINEEL-TREE. HIPPOMANE.

THIS is a genus of the adelphia order, belonging to the monœcia class, of plants; and in the natural method ranking under the 38th order, tricoccæ. The male has an amentum and bifid perianthium, without any corolla; the female perianthium is trifid; there is no corolla: the stigma is tripartite; and the plum or capsule tricoccus.

Species. 1. The mancinella with oval sawed leaves is a native of all the West-India islands. It has a smooth brownish bark; the trunk divides upwards into ma-

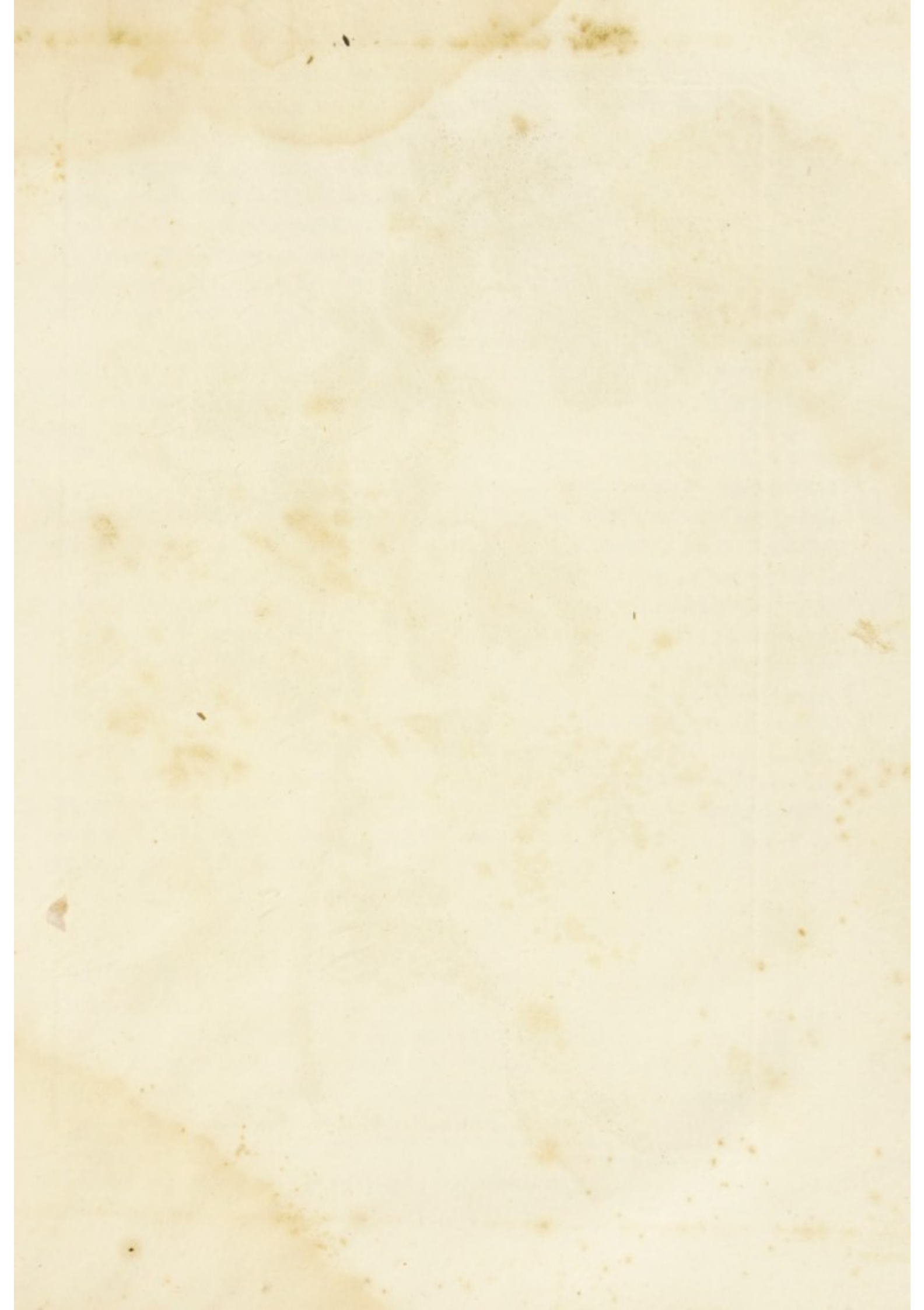


W. Todd delin

The Manchined Tree.

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J. Hbte. delin.

The Surinam Marsh Mallows.

J. Puff. sculp.

ny branches, garnished with oblong leaves about three inches long. The flowers come out in short spikes at the end of the branches, but make no great appearance, and are succeeded by fruit of the same shape and size with a golden pippin. The tree grows to the size of a large oak. 2. The biglandulosa, with oblong bay leaves, is a native of South America; and grows to as large a size as the first, from which it differs mostly in the shape of its leaves. 3. The spinosa, with holly-leaves, is a native of Campeachy, and seldom rises above twenty feet high; the leaves greatly resemble those of the common holly, and are set with sharp prickles at the end of each indenture. They are of a lucid green, and continue all the year.

Culture. These plants, being natives of very warm climates, cannot be preserved in this country without a stove; nor can they by any means be made to rise above five or six feet high even with that assistance. They are propagated by seeds; but must have very little moisture, or they will certainly be killed by it.

Properties. These trees have a very poisonous quality, abounding with an acrid milky juice of a highly caustic nature. Strangers are often tempted to eat the fruit of the first species; the consequences of which are, an inflammation of the mouth and throat, pains in the stomach, &c. which are very dangerous, unless remedies are speedily applied. The wood is much esteemed for making cabinets, book-cases, &c. being very durable, taking a fine polish, and not being liable to become worm-eaten: but, as the trees abound with a milky caustic juice already mentioned, fires are made round their trunks to burn out this juice; otherwise those who fell the trees would be in danger of losing their sight by the juice flying in their eyes. This juice raises blisters on the skin wherever it falls, turns linen black, and makes it fall out in holes. It is also dangerous to work the wood after it is sawn out; for, if any of the saw-dust happens to get into the eyes of the workmen, it causes inflammations and the loss of sight for some time; to prevent which, they generally cover their faces with fine lawn during the time of working the wood. It is with the juice of this tree that the Indians used to poison their arrows.

MARSH-MALLOW OF SURINAM. *ALTHÆA.*

THIS plant is called at Surinam *okkerum*, and is an elegant species of the marsh-mallow, so well known to botanists. It grows about six feet high, and bears double flowers, some of which are yellow and white, and others red.—If the fruit be cut, a milky liquor drops out, clammy and in the form of threads; which they boil and make a drink of in America, being famous for internal bruises, and for most diseases of the stomach and bowels.

Besides this, there are three other species of the marsh-mallow, which I shall here describe. 1. The officinalis, or common marsh-mallow, is a native of Britain, and

has a perennial root, and an annual stalk, which perishes every autumn. The stalks grow erect to the height of four or five feet. These are garnished with leaves, which are hoary, soft to the touch, and placed alternately on the branches. The flowers come out from under the wings of the leaves, like the mallow, and are of a purplish white. 2. The *hirsuta*, or hairy marsh-mallow, is a native of Spain and Portugal. It is a low plant, whose branches trail on the ground, unless they are supported by stakes. The leaves and stalks are beset with strong hairs; the flowers come out like those of the common sort, but are smaller, and have purplish bottoms. 3. The *cannabina*, or shrubby marsh-mallow, is a native of Hungary and Istria. It has a woody stem, which rises to the height of four or five feet: and puts out many side-branches. The flowers come out in the same manner as in the others, but are of a deeper red colour. This sort seldom flowers the first year, unless the summer proves warm: but when the plants live through the winter, they will flower early in the following summer, and produce good seeds.

Culture. Though the *officinalis* is found naturally in salt marshes, it will thrive when transplanted into any soil, or in any situation; however, it will always grow larger in a moist than in a dry soil. It may be propagated either by parting the roots in autumn when the stalks decay, or by sowing the seeds in the spring. If the seeds of the second species are sown in April, the plants will flower in July, and carry ripe seed in September. They ought to be sown in the places where they are to remain, as the roots shoot deep in the ground: so that, unless the plants are removed very young, they seldom survive it. The seeds of the *cannabina* ought also to be sown where the plants are to remain, for the reason just now given. They should have a sheltered situation and a dry soil, otherwise they will not live through the winter. Indeed they seldom continue in this country above two years, with all the care that can be taken of them.

Medicinal Uses. The *officinalis* is the only species used in medicine. The whole plant, especially the root, abounds with a mild mucilage. It has the general virtues of an emollient medicine; and proves serviceable in a thin acrimonious state of the juices, and where the natural mucus of the intestines is abraded. It is chiefly recommended in sharp defluxions upon the lungs, hoarsenesses, dysenteries; and likewise in nephritic and calculous complaints; not, as some have supposed, that this medicine has any peculiar power of dissolving or expelling the calculus; but as, by lubricating and relaxing the vessels, it procures a more free and easy passage. The root is sometimes employed externally for softening and maturing hard tumours; chewed, it is said to give ease in difficult dentition of children.

This root gave name to an officinal syrup, decoction, and ointment; and was likewise an ingredient in the compound powder of gum tragacanth and the oil and plaster of mucilages. But of all these formulæ the syrup alone is now retained.



1 The Mandrake, 2 Mimosa cinerea, 3 Mimosa non descript.

P. de La Roche del.

MANDRAKE. *ATROPA.*

THE fruit of this plant has been much recommended in cases of barrenness. Its fresh root is a violent purge, the dose being from ten grains to twenty in substance, and from half a dram to a dram in infusion. It has been found to do service in hysteric complaints; but must be used with great caution, otherwise it will bring on convulsions, and many other mischievous symptoms. It has also a narcotic quality. At present only the fresh leaves are sometimes used in anodyne and emollient cataplasms and fomentations. It used to be an ingredient in one of the old officinal unguents; but both that and the plant itself are now rejected from our pharmacopœias. It still however retains a place in the foreign ones, and may perhaps be considered as deserving farther attention.

Naturalists tell strange stories of this plant: but, setting aside its soporiferous virtue, the modern botanists will scarcely warrant any of them, nor even that human figure ordinarily ascribed to its roots, especially since the discovery of the artifice of charlatans in fashioning it, to surprize the credulity of the people. The figure given in the annexed plate, fig. 1. however, was taken from a genuine root.

Moses informs us (Gen. xxx. 14.) that Reuben, the son of Leah, being in the field, happened to find mandrakes, which he brought home to his mother. Rachael had a mind to them, and obtained them from Leah, upon condition that she should consent that Jacob should be Leah's bedfellow the night following. The term *dudaim*, here made use of by Moses, is one of those words of which the Jews at this day do not understand the true signification. Some translate it violets, others lilies, or jessamine. Junius calls it agreeable flowers; Codurquus makes it truffle, or mushroom; and Calmet will have it to be the citron. Those that would support the translation of mandrakes plead, that Rachael being barren, and having a great desire to conceive, coveted Leah's mandrakes, it may be presumed, with a view to its prolific virtues. The ancients have given to mandrakes the name of the apples of love, and to Venus the name of Mandragoritis; and the Emperor Julian, in his epistle to Calixenes, says, that he drinks the juice of mandrakes to excite amorous inclinations.

MIMOSA, OR SENSITIVE PLANT,

IS a genus of the polygamia order, belonging to the monœcia class, of plants; and in the natural method ranking under the thirty-third order, Lomentaceæ. The hermaphrodite calyx is quinquefid; the corolla quinquefid; there are five or more stamens, one pistil, and a legume: the male calyx is quinquefid; the corolla quinquefid; with five, ten, or more, stamens. The name *mimosa* signifies "mimic;"

and

and is given to this genus on account of the sensibility of the leaves, which, by their motion, mimic or imitate, as it were, the motion of animals. To this genus Linnæus joins many of the acacias; and it comprises near 60 different species, all natives of warm climates. Of the sorts cultivated here in our stoves, &c. some are of the shrub and tree kind, and two or three are herbaceous perennials and annuals. The sensitive kinds are exceedingly curious plants in the very singular circumstance of their leaves receding rapidly from the touch, and running up close together; and in some sorts the footstalks and all are affected, so as instantly to fall downward as if fastened by hinges, which last are called *humble sensitives*. They have all winged leaves, each wing consisting of many small pinnæ. In the *Systema Vegetabilium*, this genus, including the *Mimosas* properly so called, and the *Acacias*, is divided into several sections, distinguished by the figure, situation, and arrangement, of the leaves; as, simple, simply-pinnated, bigeminous and tergeminous, conjugate and pinnated, doubly pinnated. The following are the most remarkable

Species, with their properties. 1. The *sensitiva*, or common sensitive humble plant, rises with an under-shrubby prickly stem, branching six or eight feet high, armed with crooked spines; conjugated pinnated leaves, with bijugated lobes or wings, having the inner ones the least, each leaf on a long footstalk; and at the sides and ends of the branches many purple flowers in roundish heads; succeeded by broad flat jointed pods, in radiated clusters.—This is somewhat of the humble sensitive kind; the leaves, footstalks and all, receding from the touch, though not with such facility as in some of the following sorts.

2. The *pudica*, or bashful humble plant, rises with an under-shrubby declinated prickly stem, branching two or three feet around, armed with hairy spines; pinnated digitated leaves, each leaf being of five or more long folioles, attached by their base to a long footstalk, and spread out above like the fingers of a hand; and at the sides and ends of the branches roundish heads of greenish white flowers, succeeded by small jointed prickly pods.—This is truly of the humble sensitive kind; for by the least touch the leaves instantly recede, contract, close, and together with the footstalk quickly decline downward, as if ashamed at the approach of the hand.

3. The *pernambucana*, or slothful mimosa, has under-shrubby procumbent unarmed stems, branching two or three feet round; bipinnated leaves, of three or four pair of short winged foliola; and at the axillas drooping spikes of pentandrous flowers, the lower ones castrated.—This species recedes very slowly from the touch, only contracting its pinnæ a little when smartly touched; hence the name *slothful mimosa*.

4. The *asperata*, or Panama sensitive-plant. Of this curious species, which has been well described by Dr. Browne (but not figured), there is a good figure in the

Reliquiæ Houftonianæ, published by Sir Joseph Banks. It grows in moist places, and by the sides of rivulets, in the parishes of St. James and Hanover, Jamaica. It seldom rises above three feet in height; but its slender branches extend considerably on the neighbouring bushes. It is armed with crooked sharp spines so thickly set on the trunk, branches, and leaves, that there is no touching it with safety. But the plant has a beautiful appearance; the flowers are yellow and globular, growing at the extremity of the branches. The pods are hairy, brown, and jointed; each containing a small, flat, and brown, seed. The leaves are numerous, small, and winged: next to those of the *pudica*, they are the most irritable; contracting with the least touch, and remaining so for several minutes after. This species would form a good hedge or fence round a garden; and, by being trimmed now and then, may be easily kept from spreading too much.

5. The *punctata*, or punctated sensitive mimosa, rises with a shrubby upright taper spotted unarmed stem, branching erectly five or six feet high; bipinnated leaves, of four or five pair of long winged folioles, having each about twenty pair of pinnæ; and at the axillas and termination of the branches, oblong spikes of yellowish decandrous flowers, the inferior ones castrated; succeeded above by oblong seed-pods. This sort, though naturally shrubby and perennial in its native soil, yet in this country sometimes decays in winter. It is only sensitive in the foliola, but quick in the motion.

6. The *viva*, lively mimosa, or smallest sensitive weed, has many creeping roots, and spreads itself so as to cover large spots of ground. It rises at most to two inches, has winged leaves, with numerous small pinnæ. The flower is globular, of a blueish colour, and grows in clusters from the axillæ: these are followed by little short hairy pods, containing smooth shining seeds. This is the most sensible of all the mimosas, the *pudica* not excepted. By running a stick over the plant, a person may write his name, and it will remain visible for ten minutes.

7. The *quadrivalvis*, perennial or quadrivalve humble mimosa, has herbaceous slender quadrangular prickly stems, branching and spreading all around, armed with recurved spines; bipinnated leaves of two or three pair of winged lobes, having each many pinnæ; and at the axillas globular heads of purple flowers, succeeded by quadrivalvular pods. This is of the humble sensitive kind, both leaves and footstalks receding from the touch.

8. The *plena*, annual or double-flowered sensitive mimosa, rises with an herbaceous erect round unarmed stem, closely branching and spreading every way, three or four feet high; bipinnated leaves of four or five pair of winged lobes, of many pairs of pinnæ; and at the axillas and termination of the branches spikes of yellow

pentandrous flowers, the lower ones double; succeeded by short broad pods. This annual is only sensitive in the foliola, but extremely sensible of the touch or air.

9. The *cornigera*, or horned Mexican mimosa, commonly called great horned acacia, has a shrubby upright deformed stem, branching irregularly, armed with very large horn-like white spines, by pairs, connated at the base; bipinnated leaves thinly placed; and flowers growing in spikes. This species is esteemed a curiosity for the oddity of its large spines, resembling the horns of animals, and which are often variously wreathed, twisted, and contorted.

10. The *farnesiana*, or fragrant acacia, grows in woodlands and waste lands in most parts of Jamaica; rising to twenty-five or thirty feet, with suitable thickness. The bark of the trunk is brown and scaly, the branches are alternate. It is adorned with bipinnated leaves of a bright-green colour; and yellow globular flowers from the axillæ, of a fragrant smell. The pods are about three inches long, and half an inch broad: they are of a light-brown colour, smooth, compressed, and contain five or six smooth flat seeds. Formerly the flowers of this tree were used as an ingredient in the *theriaca andromachi* of the old dispensaries. The tree is sometimes planted for a hedge or fence round inclosures; and the timber, though small, is useful in rural economy.

11. The *arborea*, or wild tamarind-tree, is common in all the woodlands, and especially near where settlements have been made in Jamaica. It rises to a considerable height, and is proportionally thick. The timber is excellent, and serves many purposes in rural economy: it is of the colour of cedar, pretty hard, and takes a good polish. The leaves are numerous; the flowers globular and white. The pods are about a foot in length, of a fine scarlet colour; when they are ripe they open and become twisted. The seeds then appear; they are oblong, smooth, of a shining black, and quite soft. On the whole, from the leaves, flowers, and pods, this tree exhibits a singular and beautiful contrast. With us this plant is raised in hot-houses; but it appears, that with a little pains it may be made to grow in the open air. A good sizeable tree of this sort grew in the garden of the late Dr. William Pitcairn, at Islington.

12. The *latifolia*, shag-bark, or white wild tamarind. This excellent timber-tree is very common in Jamaica, and rises to a moderate height and good thickness. The trunk is rough and scaly: the leaves are numerous, of a rhomboidal figure, and yellowish cast. The flower-spikes are from the axillæ; their colour is yellow. The seed-vessels are flat, jointed, and twisted. The seeds are of the bigness of a vetch, white, and finely streaked with blue. Of this tree there is a variety which some botanists call *serpentina*. The chief difference is in the leaves, which are smaller, and of a shining dark green.

13. The *lebeck*, or ebony-tree. This is a native of the East-Indies, but raised from seeds in Jamaica and St. Vincent's. It is figured, though not accurately, by Plukenet, tab. 331. fig. 1. To what height this tree grows, we cannot yet say; but it must be of a considerable thickness, if it be the ebony we have in use here. Time will soon determine this, as the few plants in the islands are reared with great care by Dr. Dancer, in Jamaica, and Mr. Alexander Anderson in St. Vincent's.

14, 15. The *cinerea* and *pinnata*, cashew-bushes. These species are common about Kingston and Spanish-Town, Jamaica, and rise by slender trunks to about twenty feet. See the Plate, fig. 2.

Dr. Roxburgh of Madras, amongst a number of useful discoveries, has found the lac-insect on this species of mimosa. We have seen the native gum-lac on one of the small twigs, and a specimen of the plant in the collection of a gentleman. The plant is a variety of the *cinerea*, and appears rather to be the *pinnata*, Linn. It is to be hoped, that in a short time the useful insect just mentioned may be transported from Asia to the West-Indies, where this gum, or rather wax, may be also produced.

16. The *scandens*, or climbing mimosa; (*Gigalobium scandens*, Browne's Jam. p. 362. *Phaseolus maximus perennis*, Sloane's Jam. 68. *Perim Kaku-valli*, Rheede's Mal. viii. t. 32, 3, 4.) This species of mimosa is frequent in all the upland valleys and woodlands on the north side of Jamaica. It climbs up the tallest trees, and spreads itself in every direction by means of its *cirrhi*, or clasps, so as to form a complete arbour, and to cover the space of an English acre from one root. This circumstance has a bad effect on the trees or bushes so shaded. Light, air, and rain, (so necessary for all plants,) being shut out, the leaves drop off, the tree gradually rots, and the limbs fall down by the weight of this parasite.

The roots of this plant run superficially under the ground or herbage. The trunk is seldom thicker than a man's thigh, and sends off many branches, with numerous shining green leaves, each of which terminates in a tendril or clasper, that serves to fasten it to trees or bushes. The flower-spikes are from the axillæ: they are slender, and the florets on them small and numerous. The pod is perhaps the largest and longest of any in the world; being sometimes eight or nine feet in length, five inches broad, jointed, and containing ten or fifteen seeds. These seeds are brown, shining, flattened, and very hard, and called *cacoons*. They are the same mentioned in the Phil. Trans. N° 222, p. 298, by Sir Hans Sloane, as being thrown ashore on the Hebrides and Orkneys. This happens in the following manner: The seeds, or beans, fall into the rivers, and are conveyed to the sea; the trade-winds carry them westward till they fall into the gulf-stream, which forces them northward along the coast of America and Bahama-islands; as the winds blow frequent and strong from America, these seeds are driven to the eastward, till at length they are
thrown

thrown ashore, and left by the tide, as aforesaid. This bean, after being long soaked in water, is boiled and eaten by some negroes; but, in general, there seems to be no other use made of it than as a sort of snuff-box.

17. The *catechu*, according to Mr. Ker, grows only to twelve feet in height, and to one foot in diameter; it is covered with a thick rough brown bark, and towards the top divides into many close branches: the leaves are bipinnated, or doubly winged, and are placed alternately upon the younger branches: the partial pinnæ are nearly two inches long, and are commonly from fifteen to thirty pair, having small glands inserted between the pinnæ: each wing is usually furnished with about forty pair of pinnulæ or linear lobes, beset with short hairs: the spines are short, recurved, and placed in pairs at the base of each leaf: the flowers are hermaphrodite and male, and stand in close spikes, which arise from the axillæ of the leaves, and are four or five inches long: the calyx is tubular, hairy, and divides at the limb into five oval pointed segments: the corolla is monopetalous, whitish, and of the same form as the calyx, but twice its length: the filaments are numerous, capillary, double the length of the corolla, adhering at the base of the germen, and crowned with roundish antheræ: the germen is oval, and supports a slender style, which is of the length of the filaments, and terminated by a simple stigma: the fruit, or pod, is lance-shaped, brown, smooth, compressed, with an undulated thin margin; it contains six or eight roundish flattened seeds, which produce a nauseous odour when chewed. From this tree, which grows plentifully on the mountainous parts of Hindoostan, where it flowers in June, is produced the officinal drug long known in Europe by the name of *terra japonica*.

18. The *Nilotica*, or true Egyptian acacia, rises to a greater height than the preceding: the bark of the trunk is smooth, and of a grey colour; that of the branches has commonly a purplish tinge: the leaves are bipinnated, and placed alternately; the partial pinnæ are opposite, furnished with a small gland between the outermost pair, and beset with numerous pairs of narrow elliptical pinnulæ, or leaflets; the spines are long, white, spreading, and proceed from each side of the base of the leaves: the flowers are hermaphrodite and male; they assume a globular shape, and stand four or five together upon slender peduncles, which arise from the axillæ of the leaves: the calyx is small, bell-shaped, and divided at the mouth into five minute teeth: the corolla consists of five narrow yellowish segments: the filaments are numerous, capillary, and furnished with roundish yellow antheræ; the germen is conical, and supports a slender style, crowned with a simple stigma: the fruit is a long pod, resembling that of the lupin, and contains many flattish brown seeds. It is a native of Arabia and Egypt, and flowers in July.

Although

Although the *Mimosa Nilotica* grows in great abundance over the vast extent of Africa, yet gum arabic is produced chiefly by those trees which are situated near the equatorial regions; and we are told that in Lower Egypt the solar heat is never sufficiently intense for this purpose. The gum exudes in a liquid state from the bark of the trunk and branches of the tree, in a similar manner to the gum which is often produced upon the cherry-trees, &c. in this country; and by exposure to the air it soon acquires solidity and hardness. In Senegal the gum begins to flow when the tree first opens its flowers; and continues during the rainy season till the month of December, when it is collected for the first time. Another collection of the gum is made in the month of March, from incisions in the bark, which the extreme dryness of the air at that time is said to render necessary. Gum arabic is now usually imported into England from Barbary; not packed up in skins, which was the practice in Egypt and Arabia, but in large casks, or hogheads. The common appearance of this gum is well known: and the various figures which it assumes seem to depend upon a variety of accidental circumstances attending its transudation and concretion. Gum arabic of a pale yellowish colour is most esteemed; on the contrary, those pieces which are large, rough, of a roundish figure, and of a brownish or reddish hue, are found to be less pure, and are said to be produced from a different species of mimosa, (*M. Senegal*;) but the Arabian and Egyptian gum is commonly intermixed with pieces of this kind, similar to that which comes from the coast of Africa near the river Senegal.

Gum arabic does not admit of solution by spirit or oil; but in twice its quantity of water it dissolves into a mucilaginous fluid, of the consistence of a thick syrup; and in this state answers many useful purposes, by rendering oily, resinous, and pinguous, substances, miscible with water. The glutinous quality of gum arabic occasions it to be preferred to most other gums and mucilaginous substances, as a demulcent in coughs, hoarsenesses, and other catarrhal affections, in order to obtund irritating acrimonious humours, and to supply the loss of abraded mucus. It has been very generally employed in cases of ardor urinæ and strangury; but it is the opinion of Dr. Cullen, "that even this mucilage, as an internal demulcent, can be of no service beyond the alimentary canal."

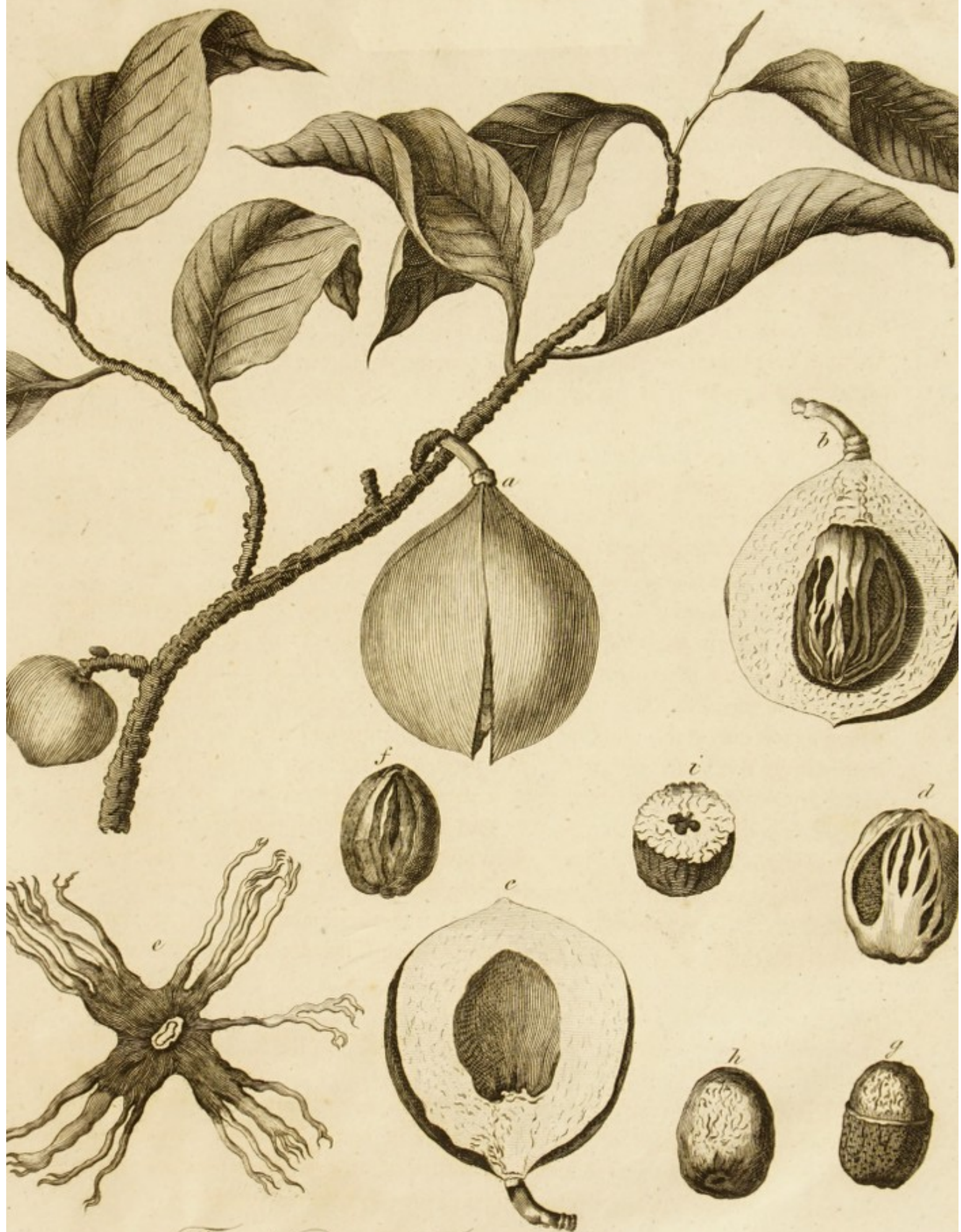
19. The *Senegal* is a native of Guinea, and was some time ago introduced into Jamaica. Dr Wright tells us, he saw both this and the *Nilotica*, of the size of a cherry-tree, growing at Dr. Paterfon's, in the parish of Hanover, Jamaica. The flowers are globular and fragrant. The pods are brown, and of the size of a goose-quill. The tree, on being wounded, exudes gum arabic, though in less quantity, and less transparent, than that of the shops, which is obtained from the *Nilotica* above described. There are above sixty other species.

On the annexed Plate, at fig. 3. is delineated a non-descript species of an uncommon size, mentioned by Mr. Paterfon in his Travels among the Hottentots, but not particularly described. Like several other Mimofas, it produces gum, which is considered by the natives as a peculiarly delicate species of food: the leaves and lower points of the branches seem to constitute the principal aliment of the camelopardalis; and, from the extent of its boughs, and the smoothness of the trunk, it affords a sufficient defence to a species of gregarious bird against the tribe of serpents and other reptiles which would otherwise destroy its eggs. Mr. Bruce describes two plants which seem referable to this genus; the one named *ergett el dimmo*, the other *ergett el krone*. The former, in our author's opinion, should be named *Mimosa sanguinea*; its name in the Abyssinian language signifying "the bloody ergett," and derived, as he supposes, from its being partly composed of beautiful pink filaments. When the blossoms are fully spread, the upper part of them consists of yellow curled filaments, and the under part of pink filaments of a similar shape. In its unripe state, that part which afterwards becomes pink is of a green colour, and composed of tubercles of a larger size, and more detached, than those which afterwards produce the yellow filaments; the latter being smaller, and closer set together: the leaves are of the double-pinnated kind.

The name of the other species, in the Abyssinian language, signifies *the horned ergett*; which our author supposes to be given it on account of the figure of the pods. The flower very much resembles that of the *Acacia vera* in size and shape, excepting that it is attached to the branch by a strong woody stalk of considerable length, which grows out at the bottom of the branch bearing the leaves, and is sheltered as in a case by the lower part of it. The branches are all covered with short, strong, and sharp-pointed, thorns, having their points inclined backwards towards the root. The pods are covered with a prickly kind of hair, which easily rubs off with the fingers, sticks to them, and gives a very uneasy sensation. They have thirteen divisions; in each of which are three hard, round, and shining, seeds, of a dusky brown colour. Both of these shrubs shut their leaves on the coming on of the violent rains in the wet season, and never fully expand them till the dry season returns.

MYRISTICA, OR NUTMEG-TREE.

THE Myristica, or nutmeg-tree, is a genus of plants belonging to the class dicæcia, order triandria, and of the natural order of lauri. The male calyx is monophyllous, strong, and parted into three laciniæ of an oval shape; in the middle of the receptacle rises a column of the height of the calyx, to the upper part of which the



The Nutmeg-Tree, and its fructification.

Engraved for the Encyclopædia Londinensis, 1788.

antheræ are attached: they vary in number from three to twelve or thirteen. The female calyx and corolla as in the male, on a distinct tree; the germen of an oval shape; the style short, with a bifid stigma, the laciniæ of which are oval and spreading. The fruit is of that sort called *drupa*; it is fleshy, roundish, sometimes unilocular, sometimes bivalved, and bursts when ripe at the side. The seed is enveloped with a fleshy and fatty membranous substance, which divides into filaments; (this in one of the species is the *mace* of the shops.) The seed, or nutmeg, is round or oval shaped, unilocular, and contains a small kernel, variegated on the surface by the fibres running in the form of a screw.

Species. There are five species of this genus according to some authors; but, some of these being only varieties, they may be reduced to three, viz.

1. *Myristica fatua*, or wild nutmeg: this grows in Tobago, and rises to the height of an apple-tree; has oblong, lanceolated, downy, leaves, and hairy fruit: the nutmeg of which is aromatic, but when given inwardly is narcotic, and occasions drunkenness, delirium, and madness, for a time.

2. *Myristica sebifera*, (*Virola sebifera*, Aublet, page 904. tab. 345.) A tree frequent in Guiana, rising to forty or even to sixty feet high; on wounding the trunk of which, a thick acrid red juice runs out. Aublet says nothing of the nutmegs being aromatic; he only observes, that a yellow fat is obtained from them, which serves many œconomical and medical purposes, and that the natives make candles of it.

3. The *Myristica moschata*, or nutmeg, attains the height of thirty feet, producing numerous branches which rise together in stories, and covered with bark which of the trunk is a reddish brown, but that of the young branches is of a bright green colour: the leaves are nearly elliptical, pointed, undulated, obliquely nerved, on the upper side of a bright green, on the under whitish, and stand alternately upon footstalks: the flowers are small, and hang upon slender peduncles, proceeding from the axillæ of the leaves: they are both male and female upon separate trees. M. Schwartz, who has carefully examined this as well as the two first species, preserved in spirits, places them amongst the monadelphia.

The nutmeg has been supposed to be the *comacum* of Theophrastus, but there seems little foundation for this opinion; nor can it with more probability be thought to be the *chrysobalanus* of Galen. Our first knowledge of it was evidently derived from the Arabians; by Avicenna it was called *jiausiban*, or *jausiband*, which signifies "nut of bands." Rumphius both figured and described this tree; but the figure given by him is so imperfect, and the description so confused, that Linnæus, who gave it the generic name *Myristica*, was unable to assign its proper characters. Sonnerat's account of the *muscadier* is still more erroneous; and the younger Linnæus

was unfortunately misled by this author, placing the myristica in the class polyandria, and describing the corolla as consisting of five petals. Thunberg, who examined the flower of the nutmeg, places it in the class monoecia; and, according to his description, the male flower has but one filament, surrounded at the upper part by the antheræ; and as the filaments are short and slender, and the antheræ united, this mistake might easily arise. M. De La Marck informs us, that he received several branches of the myristica, both in flower and fruit, from the Isle of France, where a nutmeg-tree, which was introduced by Monsieur Poivre in 1770, is now very large, and continually producing flowers and fruit. From these branches, which were sent from Monf. Cere, director of the king's garden in that island, Monf. De La Marck has been enabled to describe and figure this and other species of the myristica with tolerable accuracy; as will appear from the annexed plate, of which the following is an explanation:

Fig. *a*. A sprig with fructification. The drupe of the natural size, and bursting open. Fig. *b*. The full grown fruit cut lengthways. Fig. *c*. Another section of the same. Fig. *d*. The nutmeg enveloped with its covering, the mace. Fig. *e*. The fatty membrane, or mace, spread out. Fig. *f*. The nutmeg of its natural size. Fig. *g*. The same with its external tegument removed at one end. Fig. *h*. The same with its outer tegument entirely removed. Fig. *i*. A transverse section of the nutmeg.

The seed or kernels, called *nutmegs*, are well known, as they have been long used both for culinary and medical purposes. Distilled with water, they yield a large quantity of essential oil, resembling in flavour the spice itself; after the distillation, an insipid sebaceous matter is found swimming on the water; the decoction inspissated, gives an extract of an unctuous, very lightly bitterish, taste, and with little or no astringency. Rectified spirit extracts the whole virtue of nutmegs by infusion, and elevates very little of it in distillation; hence the spirituous extract possesses the flavour of the spice in an eminent degree.

Nutmegs, when heated, yield to the press a considerable quantity of limpid yellow oil, which on cooling concretes into a sebaceous consistence. In the shops we meet with three sorts of unctuous substances called *oil of mace*, though really expressed from the nutmeg. The best is brought from the East-Indies in stone jars; this is of a thick consistence, of the colour of mace, and has an agreeable fragrant smell; the second sort, which is paler coloured, and much inferior in quality, comes from Holland in solid masses, generally flat, and of a square figure: the third, which is the worst of all, and usually called *common oil of mace*, is an artificial composition of sebum, palm-oil, and the like, flavoured with a little genuine oil of nutmeg.

Method of gathering and preparing Nutmeg. When the fruit is ripe, the natives ascend the trees, and gather it by pulling the branches to them with long hooks. Some are employed in opening them immediately, and in taking off the green shell or first rind, which is laid together in a heap in the woods, where in time it putrefies. As soon as the putrefaction has taken place, there springs up a kind of mushrooms, called *boleti moschatyni*, of a blackish colour, and much valued by the natives, who consider them as delicate eating. When the nuts are stripped of their first rind, they are carried home, and the mace is carefully taken off with a small knife. The mace, which is of a beautiful red, but afterwards assumes a darkish or reddish colour, is laid to dry in the sun for the space of a day, and then removed to a place less exposed to his rays, where it remains for eight days, that it may soften a little. They afterwards moisten it with sea-water, to prevent it from drying too much, or from losing its oil. They are careful, however, not to employ too much water, lest it should become putrid, and be devoured by worms. It is last of all put into small bags, and squeezed very close.

The nuts, which are still covered with their ligneous shell, are for three days exposed to the sun, and afterwards dried before a fire till they emit a sound when they are shaken; they then beat them with small sticks in order to remove their shell, which flies off in pieces. These nuts are distributed into three parcels: the first of which contains the largest and most beautiful, which are destined to be brought to Europe; the second contains such as are reserved for the use of the inhabitants; and the third contains the smallest, which are irregular or unripe. These are burnt, and part of the rest is employed for procuring oil by pressure. A pound of them commonly gives three ounces of oil, which has the consistence of tallow, and has entirely the taste of nutmeg. Both the nut and mace, when distilled, afford an essential, transparent, and volatile, oil, of an excellent flavour. The nutmegs which have been thus selected would soon corrupt if they were not watered, or rather pickled with lime-water made from calcined shell-fish which they dilute with salt-water till it attain the consistence of fluid pap. Into this mixture they plunge the nutmegs, contained in small baskets, two or three times, till they are completely covered over with the liquor. They are afterwards laid in a heap, where they heat, and lose their superfluous moisture by evaporation. When they have sweated sufficiently, they are then properly prepared, and fit for a sea-voyage.

In the Island of Banda, the fruit of the nutmeg-tree is preserved entire in the following manner: When it is almost ripe, but previous to its opening, it is boiled in water and pierced with a needle. They next lay it in water to soak for ten days, till it has lost its sour and sharp taste. They then boil it gently in a syrup of sugar, to which, if they wish it to be hard, a little lime is added. This operation is repeat-

ed for eight days, and each time the fyrup is renewed. The fruit when thus preserved is put for the last time into a pretty thick fyrup, and is kept in earthen pots closely shut. These nuts are likewise pickled with brine or with vinegar; and, when they intend to eat them, they first steep them in fresh water, and afterwards boil them in fyrup of fugar, &c.

Uses. Nutmegs preserved entire are presented as deserts, and the inhabitants of India sometimes eat them when they drink tea. Some of them use nothing but the pulp; others likewise chew the mace; but they generally throw away the kernel, which is really the nutmeg. Many, who perform sea-voyages to the north, chew this fruit every morning. The medicinal qualities of nutmeg are supposed to be aromatic, anodyne, stomachic, and restringent; and, with a view to the last-mentioned effects, it has been much used in diarrhœas and dysenteries. To many people the aromatic flavour of nutmeg is very agreeable; they however should be cautious not to use it in large quantities, as it is apt to affect the head, and even to manifest an hypnotic power in such a degree as to prove extremely dangerous. Bontius speaks of this as a frequent occurrence in India; and Dr. Cullen relates a remarkable instance of this soporific effect of the nutmeg, which fell under his own observation, and hence concludes, that in apoplectic and paralytic cases this spice may be very improper. He observes, that a person by mistake took two drams or a little more of powdered nutmeg: he felt it warm in his stomach, without any uneasiness; but in about an hour after he had taken it he was seized with a drowsiness, which gradually increased to a complete stupor and insensibility; and not long after he was found fallen from his chair, lying on the floor of his chamber in the state mentioned. Being put to bed, he fell asleep; but, awaking a little from time to time, he was quite delirious; and he thus continued alternately sleeping and delirious for several hours. By degrees, however, both these symptoms diminished; so that in about six hours from the time of taking the nutmeg he was pretty well recovered from both. Although he still complained of head-ach, and some drowsiness, he slept naturally and quietly the following night, and next day was quite in his ordinary health. The officinal preparations of nutmeg are a spirit and essential oil, and the nutmeg in substance roasted, to render it more astringent. Both the spice itself and its essential oil enter several compositions, as the *confectio aromatica*, *spiritus amoniæ com.* &c. Mace possesses qualities similar to those of the nutmeg, but is less astringent, and its oil is supposed to be more volatile and acrid.

Remarks on the Trade of Nutmegs. Nutmeg-trees grow in several islands in the Eastern Ocean. The wood-pigeon of the Moluccas is unintentionally a great planter of these trees, and disseminates them in places where a nation, powerful by its commerce, thinks it for its interest that they should be rooted out and destroyed.

The Dutch, whose unwearied patience can surmount the greatest obstacles, long appropriated to themselves the crop of nutmegs, as well as that of cloves and cinnamon, growing in the islands of Ternate, Ceylon, &c. either by right of conquest or by paying subsidies to the islanders, who find these much more profitable than the former produce of their trees. It is nevertheless true, that they prevailed upon or compelled the inhabitants of the Moluccas to cut down and root out all the clove-trees, which they preserve only in the islands of Amboyna and Ternate, which are in a great measure subject to them. We know for certain, that the Dutch paid 18,000 rix-dollars yearly to the King of Ternate, by way of tribute or gift, in order to recompense him for the loss of his clove-trees in the other Molucca islands; and that they were moreover bound by treaty to take, at three-pence three-farthings a pound, all the cloves brought by the natives of Amboyna to their magazines. They likewise succeeded in destroying the cinnamon every where except in the island of Ceylon. The same was the case with white pepper, &c. so that the trade of the whole of Europe, and of great part of Asia, in this species of commodity, long passed through their hands.

The Dutch had immense and very rich magazines of these precious aromatics, both in India and Europe. They had actually by them the produce of sixteen years, and never supplied their neighbours with the last, but always with the oldest crop: in 1760 they sold what was laid up in 1744. It is commonly said, that, when the Dutch have too great a quantity of cloves, nutmegs, &c. in their magazines, they throw them into the sea; but the fact is, that they get rid of their superfluous aromatics by burning them. On the 10th of June, 1760, M. Bomare saw at Amsterdam, near the admiralty, a fire, the fuel of which was valued at 8,000,000 of livres; and as much was to be burned the day following. The feet of the spectators were bathed in the essential oil of these substances; but no person was allowed to gather any of it, much less to take any of the spices which were in the fire. Some years before, upon a similar occasion, and at the same place, a poor man who had taken up some nutmegs which had rolled out of the fire, was, as M. Bomare was informed, seized and condemned to immediate execution. We will only add, that notwithstanding the jealousy of the Dutch, and the pains they take to preserve the sale of cloves wholly to themselves, they have never been able to prevent their own officers in several parts of India from embezzling and selling considerable quantities of them. M. de Jaucourt informs us, that, in order to defraud the company, they sell them to the vessels of other nations which they meet at sea, and moisten the remainder with water, that they may still have the number of quintals of which their cargo consisted. The quantity sold may amount to ten quintals in one hundred before it can be perceived by the clerks of the magazines at Batavia, where they are received.

We

We are informed by M. Romé de Lisle, that the English draw a great deal of cinnamon, pepper, and cloves, from the islands of Sumatra. The staple for this commodity is at the factory of Bencoolen. We have likewise seen a specimen of pretty good cinnamon raised at Martinico. The French, to prevent the exportation of specie for these aromatic and exotic productions, have attempted to introduce the culture of them into some of their colonies. A great many plants of the clove and nutmeg-tree have been procured, and planted in the Isle of France, the Island of Bourbon, and also at Cayenne, where they have a very promising appearance.

FLOWERING PAVONIS. CÆSALPINIA.

THIS plant grows nine feet in height, and bears most beautiful yellow flowers. The seed steeped in water, and a strong decoction of it given to a woman in labour, greatly facilitates the delivery. For this reason, those Indian slaves who have considered themselves cruelly used by their task-masters in the plantations, take great pains to get at this tree, for the purpose of procuring abortion, which they know it never fails to effect. Those negroes who are brought from Guinea and Angola were the first who were discovered making use of this plant; and while they ate of it, or drank a decoction of its leaves or seeds, they neither conceived nor brought forth children. On being remonstrated with, they said they would sooner die than bring forth children in slavery, who, as they grew up, must undergo the same yoke, and suffer all the cruelties inflicted on their unfortunate parents. Tournefort calls this tree *Poinciana flore pulcherrimo*. It grows in all the warm climates, and is found in many parts of America.

PIMENTO, OR JAMAICA PEPPER TREE. MYRTUS.

THE Jamaica pepper-tree is a species of the myrtle, a genus of the monogynia order, belonging to the icofandria class, of plants; and in the natural method ranking under the 19th order, hesperidææ. The calyx is quinquefid, superior; there are five petals; the berry is dispermous or trispermous. There are twenty-eight species, of which the most remarkable are,

1. The *communis*, or common myrtle-tree, riseth with a shrubby, upright, firm, stem, branching numerously all around into a close full head, rising eight or ten feet high, very closely garnished with oval-lanceolate, entire, mostly opposite, leaves, from half an inch to an inch and a half long, and one broad, on short foot-stalks; and numerous, small, pale, flowers from the axillas, singly on each foot-stalk, having diphyllous involucrum; each flower succeeded by a small, oval, dark-purple, berry.

The



The Flowering Pavonis.

W. G. del.

J. P. sculp.





W. Wood delin
 1 The Pimento, or Jamaica Pepper Tree. 2 The Jamaica Plantain. 3 The Banana Plantain.
J. G. Sculp



The most material varieties are :—Broad-leaved Roman myrtle, with oval, shining, green, leaves, an inch and a half long, and one broad; and which is remarkably floriferous. Gold striped broad-leaved Roman myrtle. Broad-leaved Dutch myrtle, with spear-shaped, sharp-pointed, dark-green, leaves, an inch long, and about three quarters of one broad. Double-flowered Dutch myrtle. Broad-leaved Jews myrtle, having the leaves placed by threes at each joint; by which particular circumstance this species is in universal estimation among the Jews in their religious ceremonies, particularly in decorating their tabernacles; and for which purpose many gardeners about London cultivate it with particular care, to sell to the above people, who are often obliged to purchase it at the rate of sixpence or a shilling for a small branch: for the true sort, having the leaves exactly by threes, is very scarce, and is a curiosity; but by care in its propagation, taking only the perfectly ternate-leaved shoots for cuttings, it may be increased fast enough; and is worth the attention of the curious, and particularly those who raise myrtles for the London markets. Orange-leaved Spanish myrtle, with oval spear-shaped leaves, an inch and a half long or more, and one broad, in clusters round the branches, and resemble the shape and colour of orange-tree leaves. Gold-striped leaved orange myrtle. Common upright Italian myrtle, with its branches and leaves growing more erect; the leaves oval, lanceolate-shaped, acute-pointed, and near an inch long, and half a one broad. Silver-striped upright Italian myrtle. White-berried upright Italian myrtle. Portugal acute-leaved myrtle, with spear-shaped, oval, acute-pointed, leaves, about an inch long. Box-leaved myrtle, with weak branches, small, oval, obtuse, lucid-green, closely-placed, leaves. Striped box-leaved myrtle. Rosemary-leaved myrtle, hath erect branches, small, narrow, lanceolate, acute-pointed, shining, green, very fragrant, leaves. Silver-striped rosemary-leaved myrtle. Thyme-leaved myrtle, with very small closely-placed leaves. Nutmeg-myrtle, with erect branches and leaves; the leaves oval, acute-pointed, and finely scented like a nutmeg. Broad-leaved nutmeg-myrtle. Silver-striped leaved ditto. Cristated or cock's-comb myrtle, frequently called bird's-nest myrtle, hath narrow sharp-pointed leaves, cristated at intervals. These are all beautiful ever-green shrubs of exceeding fragrance; exotics originally of the southern parts of Europe, and of Asia and Africa, and consequently in this country require the shelter of a green-house in winter: all of which, though rather of the small-leaved kind, have their foliage closely placed, remain all the year, and are very floriferous in summer; and, when there is a collection of the different sorts, they afford an agreeable source of variety with each other. They therefore claim universal esteem as principal green-house plants, especially as they are all so easily raised from cuttings, and of such easy culture, as to be attainable in every garden where there is any sort of green-house, or

garden-frames furnished with glasses for protecting them in winter from frost; but some of the broad-leaved sorts are so hardy as to succeed in the full ground, against a south wall and other warm exposures, all the year, by only allowing them shelter of mats occasionally in severe frosty weather; so that a few of these sorts may also be exhibited in a warm situation in the shrubbery: observing, however, that all the sorts are principally to be considered as green-house plants, and a due portion of them must always remain in pots to move to that department in winter.

2. The *Myrtus pimenta*, Jamaica pepper, or all-spice tree, grows above thirty feet in height, and two in circumference; the branches near the top are much divided and thickly beset with leaves, which by their continual verdure always give the tree a beautiful appearance; the bark is very smooth externally, and of a grey colour; the leaves vary in shape and in size, but are commonly about four inches long, veined, pointed, elliptical, of a deep shining-green colour; the flowers are produced in bunches or panicles, and stand upon subdividing or trichotomous stalks, which usually terminate the branches; the calyx is cut into four roundish segments; the petals are also four, white, small, reflex, oval, and placed opposite to each other between the segments of the calyx; the filaments are numerous, longer than the petals, spreading, of a greenish-white colour, and rise from the calyx and upper part of the germen; the antheræ are roundish, and of a pale-yellow colour; the style is smooth, simple, and erect; the stigma is obtuse; the germen becomes a round succulent berry, containing two kidney-shaped flattish seeds. This tree (a branch of which is shown on the Plate at fig. 1.) is a native of New Spain and the West-India islands. In Jamaica it grows very plentifully; and in June, July, and August, puts forth its flowers, which, with every part of the tree, breathe an aromatic fragrance. The berries when ripe are of a dark-purple colour, and full of a sweet pulp, which the birds devour greedily, and, muting the seeds, afterwards propagate these trees in all parts of the woods. It is thought that the seeds, passing through them in this manner, undergo some fermentation, which fits them better for vegetating than those gathered immediately from the tree.

The *pimento* is a most beautiful odoriferous ever-green, and exhibits a fine variety in the stove at all seasons. It was first introduced and cultivated in this country by Mr. Philip Miller in 1739. With respect to flowering, all the varieties of the *Myrtus communis* flower here in July and August, most of which are very floriferous: the broad-leaved Roman kind in particular is often covered with flowers, which in some of the sorts are succeeded here by berries ripening in winter. The *pimento* also flowers in the stove with great beauty and luxuriance. The flowers of most of the sorts are small, but numerous; and are all formed each of five oval petals and many stamina. As all these plants require protection in this country, they must be

kept always in pots, for moving to the proper places of shelter according to their nature; the *Myrtus communis* and varieties to the green-house in winter; the *pimento* and other delicate kinds to the stove, to remain all the year. Therefore let all the sorts be potted in rich light earth; and, as they advance in growth, shift them into larger pots, managing the myrtles as other green-house shrubs, and the stove-kind as other woody exotics of the stove.

Properties, &c. The leaves and flowers of common upright myrtle have an astringent quality, and are used for cleansing the skin, fixing the teeth when loosened by the scurvy, and strengthening the fibres. From the flowers and young tops is drawn a distilled water that is deterfive, astringent, cosmetic, and used in gargles. A decoction of the flowers and leaves is applied in fomentations. The berries have a binding deterfive quality; and the chemical oil obtained from them is excellent for the hair, and used in pomatums and most other external beautifiers of the face and skin. As an internal medicine, these berries have little or no merit.

In the *Dictionnaire portatif d'Histoire Naturelle*, a fact is related, which, if true, tends to show the strongly astringent quality of myrtle. "Myrtle is likewise the base of a pomatum called *pommade de la comtesse*, and well known on account of an extraordinary historical fact. One of those gay youths who flutter about the toilets of the fair happened one day to be left alone in the storehouse of the graces. With eager curiosity he examined the perfumes, the smelling-bottles, the perfumed powder, the essences, and the cosmetics. To give more of the vermilion and greater pliancy to his lips, and to remove some disagreeable eruptions, he lightly spreads with his indiscreet finger the fatal pommade, looks at himself in the glass, and contemplates his beauty with admiration. The lady enters; he wishes to speak, but his lips contracted, and he could only stammer. The lady looked at him with astonishment; at length casting her eyes on the toilet, she discovered by the open pot the cause of the mistake, and enjoyed a hearty laugh at the expense of her admirer, whose confusion announced his indiscretion."

Pimento-berries are chiefly imported into Britain from Jamaica; whence the name *Jamaica pepper*. It is also called *all-spice*, from its taste and flavour being supposed to resemble those of many different spices mixed together. It is one of the staple articles of Jamaica, where the pimento-walks are upon a large scale, some of them covering several acres of ground. When the berries arrive at their full growth, but before they begin to ripen, they are picked from the branches, and exposed to the sun for several days, till they are sufficiently dried; this operation is to be conducted with great care, observing that on the first and second day's exposure they require to be turned very often, and always to be preserved from rain and the evening dews. After this process is completed, which is known by the colour and rattling of the seeds in the berries, they are put up in bags or hogheads for the market. This spice,
which

which was at first brought over for dietetic uses, has been long employed in the shops as a succedaneum to the more costly oriental aromatics: it is moderately warm, of an agreeable flavour, somewhat resembling that of a mixture of cloves, cinnamon, and nutmegs. Distilled with water it yields an elegant essential oil, so ponderous as to sink in the water, in taste moderately pungent, in smell and flavour approaching to oil of cloves, or rather a mixture of cloves and nutmegs. To rectified spirit it imparts by maceration or digestion the whole of its virtue: in distillation it gives over very little to this menstruum, nearly all its active matter remaining concentrated in the inspissated extract. Pimento can scarcely be considered as a medicine: it is, however, an agreeable aromatic, and on this account is not unfrequently employed with different drugs, requiring such a grateful adjunct. Both the Pharmacopœias direct an aqueous and spirituous distillation to be made from these berries, and the Edinburgh College orders also the *oleum essentielle piperis Jamaicensis*.

PLANTAIN-TREE. MUSA.

THE plantain-tree is a genus of the monogynia order, belonging to the hexandria class, of plants; and in the natural method ranking under the eighth order, scitamineæ. The calyx of the male hermaphrodite is a spatha, or sheath; the corolla is dipetalous; the one petal erect and quinque-dentate; the other nectariferous, concave, and shorter; there are six filaments; five of which are perfect; one style; the germen inferior and abortive. The female hermaphrodite has the calyx, corolla, filaments, and pistil, of the male hermaphrodite, with only one filament perfect; the berry is oblong, and three-angled below. The most remarkable species are, the *Musa paradisaica*, or Jamaica plantain; and the *Musa sapientum*, or banana-tree. See the Plate, fig. 2, 3.

The first sort is cultivated in all the islands of the West-Indies, where the fruit serves the Indians for bread; and some of the white people also prefer it to most other things, especially to the yams and cassada-bread. The plant rises with a soft stalk fifteen or twenty feet high; the lower part of the stalk is often as large as a man's thigh, diminishing gradually to the top, where the leaves come out on every side; these are often eight feet long, and from two to three feet broad, with a strong fleshy mid-rib, and a great number of transverse veins running from the mid-rib to the borders. The leaves are thin and tender, so that, where they are exposed to the open air, they are generally torn by the wind; for, as they are large, the wind has great power against them; these leaves come out from the centre of the stalk, and are rolled up at their first appearance; but, when they are advanced above the stalks, they expand and turn backward. As these leaves come up rolled in the manner before-mentioned, their advance upward is so quick, that their growth may almost

be

be discerned by the naked eye; and, if a fine line be drawn across, level with the top of the leaf, in an hour's time the leaf will be near an inch above it. When the plant is grown to its full height, the spikes of flowers will appear in the centre, which is often near four feet in length, and nods on one side. The flowers come out in bunches; those in the lower part of the spike being the largest; the others diminish in their size upward. Each of the bunches is covered with a spathe or sheath of a fine purple colour, which drops off when the flowers open. The upper part of the spike is made up of male or barren flowers, which are not succeeded by fruit, but fall off with their covers. The fruit, or plantain, is about a foot long, and an inch and a half or two inches diameter: it is at first green, but when ripe of a pale-yellow colour. The skin is tough; and within is a soft pulp of a luscious sweet flavour. The spikes of the fruit are often so large as to weigh upwards of forty pounds. The fruit of this sort is generally cut before it is ripe. The green skin is pulled off, and the heart is roasted in a clear fire for a few minutes, and frequently turned: it is then scraped, and served up as bread. Boiled plantains are not so palatable. This tree is cultivated on a very extensive scale in Jamaica; without the fruit of which, Dr. Wright says, the island would scarcely be habitable, as no species of provision could supply its place. Even flour or bread itself would be less agreeable, and less able to support the laborious negro, so as to enable him to do his business or to keep in health. Plantains also fatten horses, cattle, swine, dogs, fowls, and other domestic animals. The leaves, being smooth and soft, are employed as dressings after blisters. The water from the soft trunk is astringent, and employed by some to check diarrhœas. Every other part of the tree is useful in different parts of rural œconomy. The leaves are used for napkins and table-cloths, and are food for hogs.

The second sort differs from the first, in having its stalks marked with dark purple stripes and spots. The fruit is shorter, straighter, and rounder: the pulp is softer, and of a more luscious taste. It is never eaten green; but, when ripe, it is very agreeable, either eaten raw or fried in slices as fritters; and is relished by all ranks of people in the West-Indies. Both the above plants were carried to the West-Indies from the Canary Islands; whither, it is believed, they had been brought from Guinea, where they grow naturally. They are also cultivated in Egypt, and in most other hot countries, where they grow to perfection in about ten months, from their first planting to the ripening of their fruit. When their stalks are cut down, several suckers come up from the root, which in six or eight months will produce fruit; so that, by cutting down the stalks at different times, there is a constant succession of fruit all the year.

In Europe some of these plants are preserved in the gardens of curious persons, who have hot-houses capacious enough for their reception, in many of which they have ripened their fruit very well; but, as they grow very tall, and their leaves are large, they require more room in the stove than most people care to allow them. They are propagated by suckers, which come from the roots of those plants which have fruited; and many times the younger plants, when they are stunted in growth, will also put out suckers.

The fruit of the banana-tree is four or five inches long, of the size and shape of a middling cucumber, and of a high grateful flavour: the leaves are two yards long, and a foot broad in the middle; they join to the top of the body of the tree, and frequently contain in their cavities a great quantity of water, which runs out, upon a small incision being made into the tree, at the junction of the leaves. Bananas grow in great bunches, that weigh a dozen pounds and upwards. The body of the tree is so porous as not to merit the name of wood; the tree is only perennial by its roots, and dies down to the ground every autumn.

When the natives of the West-Indies (says Labat) undertake a voyage, they make provision of a paste of banana; which, in case of need, serves them for nourishment and drink: for this purpose they take ripe bananas; and, having squeezed them through a fine sieve, form the solid fruit into small loaves, which are dried in the sun or in hot ashes, after being previously wrapped up in the leaves of the Indian flowering-reed. When they would make use of this paste, they dissolve it in water, which is very easily done; and the liquor, thereby rendered thick, has an agreeable acid taste imparted to it, which makes it both refreshing and nourishing. The banana is greatly esteemed, and even venerated, by the natives of Madeira, who term it the forbidden fruit, and reckon it a crime almost inexpiable to cut it with a knife; because, after dissection, it exhibits, as they pretend, a similitude of our Saviour's crucifixion; and to cut the fruit open with a knife, is, in their apprehension, to wound his sacred image.

Some authors have imagined, that the banana-tree was that of the leaves of which our first parents made themselves aprons in Paradise. The sacred text, indeed, calls the leaves employed for that purpose *fig-leaves*; and Milton, in a most beautiful but erroneous description, affirms the bearded or Bengal fig to have been the tree alluded to. But, besides that the fruit of the banana is often by the most ancient authors called a fig, its leaves, by reason of their great size and solidity, were much more proper for a veil or covering than those of the Bengal fig, which are seldom above six or eight inches long and three broad. On the other hand, the banana-leaves, being four or five feet long, and proportionally broad, were very likely to be pitched upon in preference to all others; especially as they might be ea-

sily joined, or sewed together, with the numerous thread-like filaments that may, with the utmost facility, be peeled from the body of this tree.

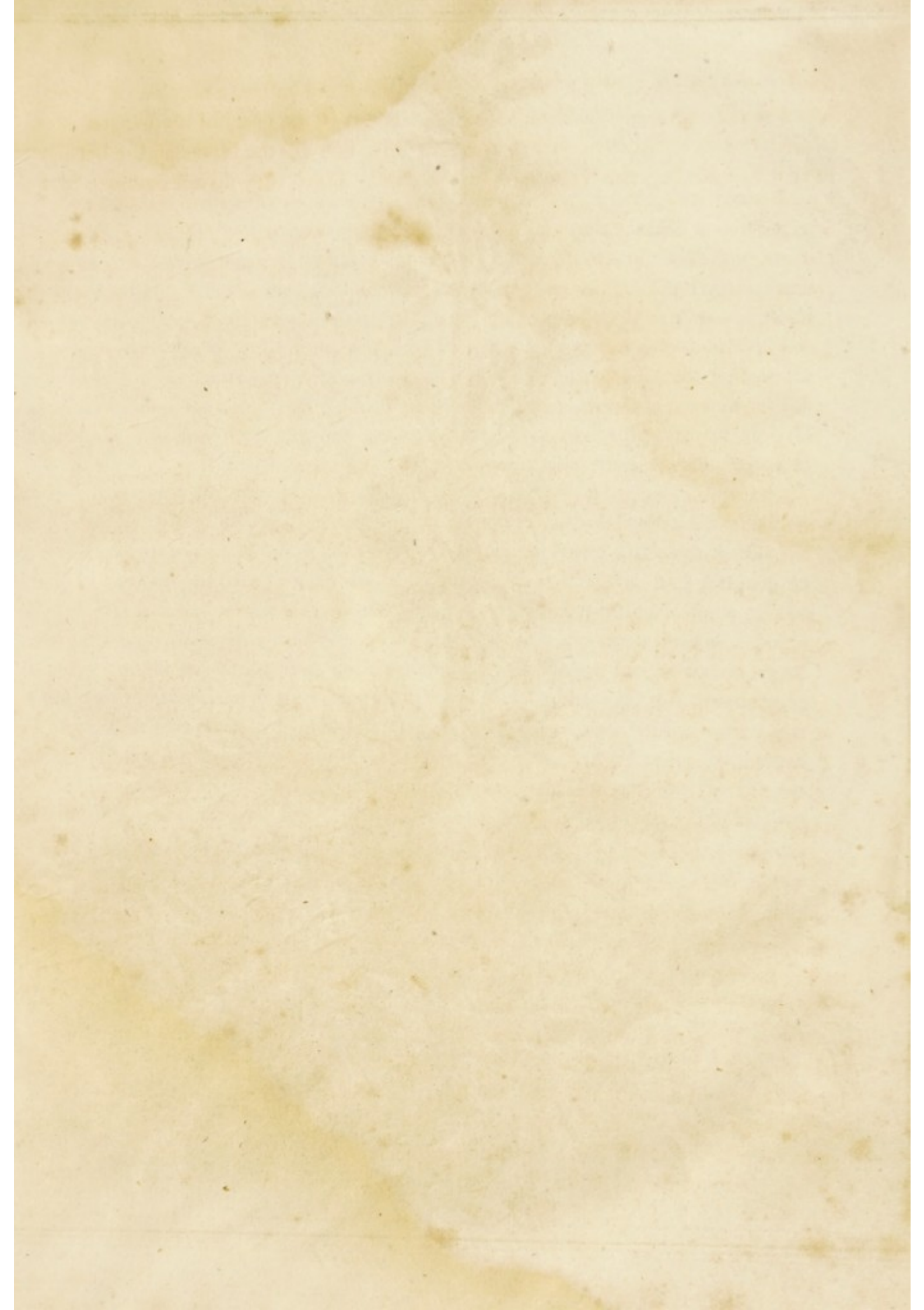
Some have supposed the Abyssinian plant *enfete* to be a species of Musa. It is said to be a native of the province of Narea, where it grows in the great marshes and swamps for which that province is remarkable, owing to the many rivers which originate in that country, and have but a small declivity to the ocean. This plant, as well as the coffee-tree, is said to have been unknown in Abyssinia before the arrival of the Galla, who imported them both along with them. It comes to great perfection about Gondar; but the principal plantations of it are in that part of Maitsha and Gouth, to the west of the Nile, where it is almost the sole food of the Galla who inhabit that country. Maitsha is almost entirely on a dead level; so that the rains stagnate, and prevent the sowing of grain. Were it not for the *enfete*, therefore, the Galla would have scarcely any vegetable food. Mr. Bruce thinks that the *enfete* may have been cultivated in some of the gardens of Egypt about Rosetta, but that it was not a native of the country. He strongly controverts the opinion that this plant is a species of Musa. "It is true (says he), the leaf of the banana resembles that of the *enfete*: it bears figs, and has an excrescence from its trunk, which is terminated by a conical figure, chiefly differing from the *enfete* in size and quantity of parts; but the figs of the banana are of the size and figure of a cucumber, and this is the part which is eaten. This fig is sweet, though mealy, and of a taste highly agreeable. It is supposed to have no seeds, though in fact there are four small black seeds belonging to every fig. But the figs of the *enfete* are not eatable: they are of a soft tender substance, watery; tasteless, and in colour and consistence resembling a rotten apricot: they are of a conical form, crooked a little at the lower end; about an inch and a half in length, and an inch in breadth where thickest. In the inside of these is a large stone half an inch long, of the shape of a bean or cashew-nut, of a dark-brown colour; and this contains a small seed, which is seldom hardened into fruit, but consists only of skin. The long stalk that bears the figs of the *enfete* springs from the centre of the plant, or rather is the body or solid part of the plant itself. Upon this, where it begins to bend, are a parcel of loose leaves; then grows the fig upon the body of the plant without any stalk; after which the top of the stalk is thick set with small leaves, in the midst of which it terminates the flower in the form of an artichoke; whereas in the banana, the flower in form of the artichoke grows at the end of that shoot or stalk which proceeds from the middle of the plant, the upper part of which bears the row of figs. The leaves of the *enfete* are a web of longitudinal fibres closely set together; and they grow from the bottom without stalks: whereas the banana is in form like a tree, and has been mistaken for such. One half of it is divided into a stem, the other is a head formed with
leaves;

leaves; and, in place of the stem that grows out of the enfete, a number of leaves, rolled round together like a truncheon, shoots out of the heart of the banana, and renews the upper as the under leaves fall off: but all the leaves of the banana have a long stalk; this fixes them to the trunk, which they do not embrace by a broad base, or involucre, as the enfete does.

“ But the greatest differences are still remaining. The banana has by some been mistaken for a tree of the palmaceous kind, for no other reason but a kind of similarity in producing the fruit on an excrescence or stalk growing from the heart of the stem; but still the musa is neither woody nor perennial; it bears the fruit but once; and in all these respects it differs from trees of the palmaceous kind, and indeed from all sorts of trees whatever. The enfete, on the contrary, has no naked stem; no part of it is woody: the body of it, for several feet high, is esculent; but no part of the banana-plant can be eaten. As soon as the stalk appears perfect and full of leaves, the body of the plant turns hard and fibrous, and is no longer fit to be eaten: before, it is the best of all vegetables. When boiled, it has the taste of the best new wheat-bread not perfectly baked. When you make use of the enfete for eating, you cut it immediately above the small detached roots, and perhaps a foot or two higher, as the plant is of age. The green must be stripped from the upper part till it becomes white; when soft, like a turnip well boiled, if eaten with milk or butter, it is the best of all food, wholesome, nourishing, and easily digested.”

Our author now proceeds to consider an hieroglyphic sometimes met with in Egypt, viz. the figure of Isis sitting between some branches of the banana-tree, as is supposed, and some handfuls of ears of wheat. You see likewise the hippopotamus ravaging a quantity of the banana-tree. Yet the banana is merely adventitious in Egypt: it is a native of Syria: it does not even exist in the low hot country of Arabia Felix; but chooses some elevation in the mountains where the air is temperate; and is not found in Syria farther to the southward than lat. 34°.

Upon this account Mr. Bruce thinks, that the banana, not being a plant of the country, “ could never have entered into the list of their hieroglyphics; for this reason, it could not figure any thing regular or permanent in the history of Egypt or its climate. I therefore imagine (adds he) that this hieroglyphic was wholly Ethiopian; and that the supposed banana, which, as an adventitious plant, signified nothing in Egypt, was only a representation of the enfete; and that the record in the hieroglyphic of Isis and the enfete-tree was something that happened between harvest, which was about August, and the time that the enfete-tree came in use, which was in October.—The hippopotamus is generally thought to represent a Nile that has been so abundant as to be destructive. When, therefore, we see upon obelisks the hippopotamus destroying the banana, we may suppose it meant that the extraordinary





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Turkey Rhubarb.

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nary inundation had gone so far as not only to destroy the wheat, but also to retard or hurt the growth of the ensete, which was to supply its place."

TURKEY RHUBARB. RHEUM.

RHUBARB is a genus of the class enneandria, order trigynia. Its characters are these: The flower has no empalement; it hath one petal, which is narrow at the base, and impervious; the brim is cut into six parts, which are obtuse, and alternately smaller; it hath nine hair-like stamina inserted in the petal, and of the same length, terminated by oblong summits, which are obtuse; and a short three-cornered germen, with scarcely any style, crowned by three-feathered stigmas, which are reflexed; the germen afterwards becomes a large three-cornered seed, with acute membranaceous borders. Miller reckons four, and Linnæus five, species. The true rhubarb is now sown in many gardens; and may probably succeed so well here in time, as that a sufficient quantity of that valuable drug may be raised to supply our consumption.

The rhubarb with hairy leaves and equal foot-stalks has been generally reckoned the true rhubarb plant, having been produced from the seeds sent from Russia, as those of the true rhubarb, to Jussieu of Paris, Rand at Chelsea, and Linnæus at Upsal. It is a native of China and Siberia, and has been raised in some of our own gardens, where it is found to grow with vigour in the open ground. Some have derived its name from *Rha*, the river called by us *Volga*, and *barbarum*; q. d. "the root found by the *barbarians* on the river *Rha*." However it is necessary to observe, that Dr. Hope received, in 1763, rhubarb-seeds from Russia, which Dr. Mounsey assured him were the seeds of the true rhubarb; and, having sown them in the open ground at Edinburgh, they produced a different species, viz. the *Rheum palmatum Linnæi*, with the leaves deeply cut into pointed segments. He observes that the root of this plant, though taken up too young, and at an improper season, viz. in July, agreed perfectly with the best foreign rhubarb in colour, smell, taste, and purgative quality. See his botanical description and drawing of the plant in *Phil. Transf.* vol. lv. art. 32. Perhaps, says Dr. Lewis, the roots of both species may be of the same quality, and taken promiscuously. The rhaponticum is a different species from either of these. Mr. Bell informs us, in his *Travels*, that the best rhubarb grows in that part of the Eastern Tartary called Mongallia, which serves as a boundary between Russia and China. This plant, he says, does not run and spread itself like docks, but grows in tufts at uncertain distances, as if the seeds had been dropped with design. As the Mongalls do not think it worth cultivating, the marmots, which burrow under the shade of its spreading leaves, and probably feed on its leaves and roots, contribute to its increase, partly by the manure which their dung affords it, and principally by casting up and loosening the earth, into which

the ripe feeds blown by the wind fall, and where they immediately take root. After digging and gathering the rhubarb, the Mongalls cut the large roots into small pieces, in order to make them dry more readily. In the middle of every piece they scoop a hole, through which a cord is drawn, in order to suspend them in a convenient place; and by this practice they destroy some of the best part of the root.

All rhubarb-plants, says Millar, are propagated by feeds, which should be sown in autumn soon after they are ripe, and then the plants will come up the following spring; whereas, if they are sown in the spring, they will not come up till the next spring. The plants should remain where the feeds are sown; and, when they appear in the spring, the ground should be hoed to cut up the weeds, and they should be thinned, like carrots and parsnips, leaving them at the first hoeing six or eight inches asunder, and, at the second hoeing, at the distance of at least a foot and a half. After this the plants will require no other culture but to keep them clean from weeds. In autumn the leaves decay, when the ground should be made clean; and it should also be hoed and cleaned in the spring, when the plants put out their new leaves. In the second year after they come up, the strongest will produce flowers and feeds; and, in the third year, most of them will flower. The roots will remain many years without decaying; and it is said, that the old roots of the true rhubarb are much preferable to the young ones. They delight in a rich soil, not too dry nor too moist, and where there is a good depth for their roots to run down; in such land their leaves will be very large, and their roots will grow to a great size.

Two sorts of rhubarb-roots are met with in the shops. The first is imported from Turkey and Russia, in roundish pieces, freed from the bark, with a hole through the middle of each, externally of a yellow colour, internally variegated with lively reddish streaks. The other, which is less esteemed, comes immediately from the East-Indies in longish pieces, harder, heavier, and more compact, than the foregoing. The first sort, unless kept very dry, is apt to grow mouldy and worm-eaten; the second is less subject to these inconveniences. Some of the more industrious artists are said to fill up the worm-holes with certain mixtures, and to colour the outside of the damaged pieces with powder of the finer sorts of rhubarb, and sometimes with cheaper materials. The marks of the goodness of rhubarb are, the liveliness of its colour when cut; its being firm and solid, but not flinty or hard; its being easily pulverable, and appearing, when powdered, of a fine bright yellow colour; its imparting to the spittle, on being chewed, a deep saffron tinge, and not proving slimy or mucilaginous in the mouth. Its taste is sub-acrid, bitterish, and somewhat styptic; the smell is lightly aromatic.

Rhubarb is a mild cathartic, and commonly considered as one of the safest and most innocent of the substances of this class. Besides its purgative virtue, it has a

mild astringent one, discoverable by the taste, and by its striking an inky blackness with chalybeate solutions; hence it is found to strengthen the tone of the stomach and intestines, to leave the belly costive, and to be one of the most useful purgatives in diarrhœas, dysenteries, and all disorders proceeding from a debility and laxity of the fibres: it is frequently given with a view to this stomachic and corroborating virtue, rather than to its producing any considerable evacuations. It tinges the urine of a high yellow colour. Rhubarb in substance purges more effectually than any preparation of it: the dose is from a scruple to a dram. By roasting it with a gentle heat, till it becomes easily friable, its cathartic power is diminished, and its astringency supposed to be increased. The purgative virtue of rhubarb is extracted more perfectly by water than by rectified spirit; the root remaining after the action of water is almost if not wholly inactive; whereas, after repeated digestion in spirit, it proves still very considerably purgative: when the rhubarb has given out to spirit all that this menstruum can extract, it still imparts a deep colour, as well as a purgative impregnation, to water. A dram of the extract, formed by inspissating the watery infusion, is not more efficacious than a scruple of the root in substance; but half a dram of the extract formed from the spirituous tincture proves moderately purgative, though scarcely more so than an equal quantity of the powder. The spirituous extract dissolves almost wholly in water; and hence the tincture, like the spirituous infusions of most other vegetables, does not turn milky on being mixed with aqueous liquors; of the watery extract scarcely above one fourth is dissolved by rectified spirit, and the part that does not dissolve proves more purgative than that which does. Hence it appears, that rhubarb contains much more gummy or mucilaginous than resinous matter; and its purgative quality seems to reside chiefly in a combination of gummy and saline matter.

Tinctures of this root are drawn in the shops with proof-spirit and with mountain-wine, in the proportion of an ounce of rhubarb to a pint of the menstruum. These preparations, used chiefly as mildly-laxative corroborants, in weakness of the stomach, indigestion, diarrhœas, colicky and other such complaints, are commonly aromatised with a little cardamom-seeds and saffron, as two drams of the former and one of the latter to the above quantity of the root, and thus are formed the *tinctura rhei vinosæ & spirituosæ*. For some purposes, a tincture, called *tinctura rhei dulcis*, is drawn from the rhubarb and cardamom-seeds with proof-spirit, and two ounces of white sugar-candy dissolved in the strained liquor. For others, instead of sweets and aromatics, gentian and snake-root are joined, in the proportion of a dram and a half of the former and a dram of the latter, with the addition of a scruple of cochineal as a colouring ingredient; this last tincture, called *tinctura rhei*

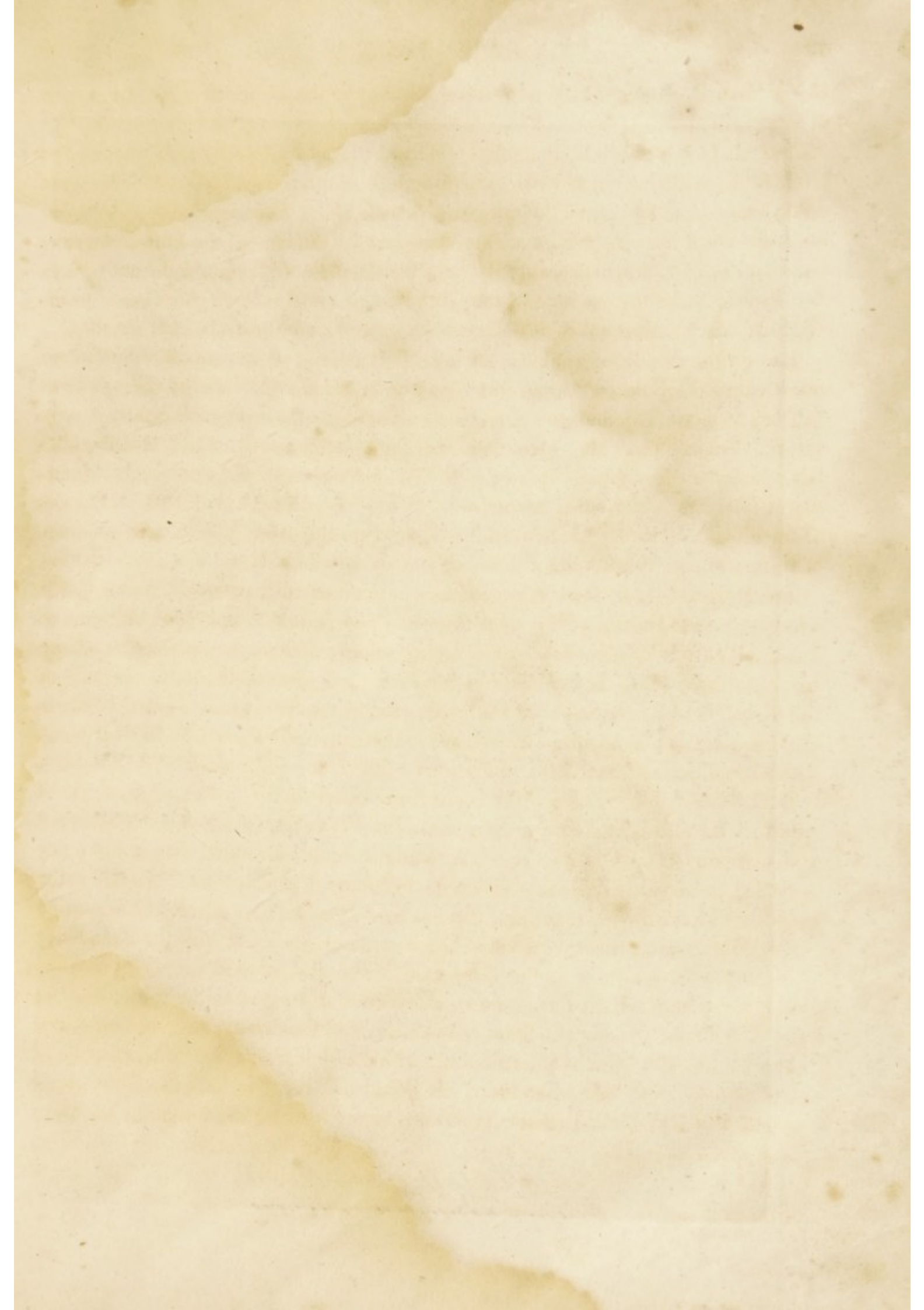
rhet amara, is, in many cases, an useful assistant to the Peruvian bark in the cure of intermittents.

The Turkey rhubarb is generally preferred to the East-India sort, though the latter is more astringent, but has something less of an aromatic flavour. Tinctures made from both, with equal quantities of rectified spirit, have nearly the same taste: on drawing off the menstrua, the extract left by the tincture of the East-India rhubarb proves in taste considerably stronger than the other. They seem both, says Dr. Lewis, to be the produce of the same climate, and roots of the same species of plant, taken up probably at different seasons, or cured in a different manner.

The yellow colour of rhubarb, it is said, is much less destructible than many other vegetable yellows. Aqua-fortis, and other acids which destroy the colour of saffron, turmeric, &c. make no change in that of rhubarb, or at most render it only turbid. Volatile spirits heighten the colour, and incline to red. Fixed alkaline salts have this effect in a greater degree. Mr. Model affirms that a considerable quantity of selenites is contained in rhubarb. In one experiment he obtained six ounces of selenites from four pounds of rhubarb; and, in the other, no less than an ounce of selenites from two ounces and five drams of old rhubarb.

The Indian rhubarb sown in our gardens has this peculiar property, that it yields a fine and clear gum. This is perfectly white and pellucid; and in the months of June and July is so plentiful, that an ounce may sometimes be gathered at a time from one plant of it. It exfudates of itself from all parts of the stalks and ribs of the leaves, and sometimes from the under part of the leaves themselves. It stands in some places in large drops, and in others the stalks, &c. seem only to be covered with a thin layer of it; and the under part of the leaves in some have it in form of twisted wires or long icicles. The plant may always be seen wounded by a sort of caustic in the places where the germen makes its way out, and these may be followed with any pointed instrument through the skin; in some parts of the plant this juice is found to be turned gummy within it, and looks like clear ice. As this is the only known herbaceous plant that yields a true gum like that of trees, it would be worthy observation, whether some of our own plants may not have some tendency of nature to form a juice of the same kind. It would be most proper to look for this in the plants of the same genus, and as nearly related to the rhubarb as we can. The docks, so common about our fields, are of the same genus; and the sorrel shows by its taste, that it is particularly allied to the plant; for both are alike of the dock-kind, and both alike sour. It would be proper to look carefully about the leaves of sorrel a little before it flowers, to see whether any thing like the same gum appears on it.

There





The Indian Poppy.

W. A. Schum.

J. P. G. sculp.

There is yet this farther analogy between this rhubarb and our common sorrel: that the husks of our sorrel, boiled in water, with a little alum, turn it to a fine red colour, and the husks of rhubarb do the same; and both the one and the other often turn red in decaying.

The juice of the roots of this rhubarb, extracted by bruising and steeping it in common water, when the liquor is strained and evaporated, becomes only a clear unflammable gum, and melts in the flame of a candle. This gum, as well as that of the stalks and leaves, is of an insipid taste; and it is observable, that, though the plant naturally yields it in so large a quantity, yet it will not flow from wounds made by art in any part of the plant. Upon the consideration of the insipid taste of this gum, and its solubility in water, we may find some probable conjecture in regard to the different virtues of this plant in purging and binding.

The woody fibres have a strong taste; and, in all probability, are alone endued with the astringent quality. An infusion of rhubarb is known to purge, and a powder of it to bind: the reason is easily seen on this consideration. The water in infusion takes up all this gummy juice, and its other juices, but leaves the fibrous part behind, in consequence of which it ought to purge without binding; but, in case of giving the powder, the juices are in great part evaporated in the drying, and the woody part left almost alone; it therefore purges but little, and proves powerfully astringent.

INDIAN ROCU. MITELLA.

THE rocu is a tree of considerable stature, bearing flowers of a pale red, like the European apple-blossoms. When the flowers fall off, a head of seed follows, of an oblong roundish form, and prickly, like a chestnut. This contains that beautiful red seed, which the Indians break or macerate, and, putting it in water, it sinks to the bottom, converting the fluid into a most elegant transparent red tincture. This tincture they pour off at their leisure, and the sediment which the seeds form at the bottom they suffer to dry in little cakes, with which they paint their naked bodies in various figures, which they esteem a very great ornament.

This tree is the *urucu* of Piso; and Tournefort, having joined it with the two species of *Cortufa Americana*, calls it *Mitella*; for the fruit of this, as well as the *Cortufa Americana*, bursts open and represents the shape of an episcopal mitre; and therefore he entitles it, in his *Institut. Rei Herb.* the *Mitella Americana, maxima tinctoria*.

SPEEDWELL. VERONICA.

THE flower of speedwell has a permanent empalement, cut into five acute segments, and one tubulous-petal the length of the empalement; the brim is cut into four oval plain segments which spread open, and two stamina which are terminated by oblong summits; it has a compressed germen, supporting a slender declining style, crowned by a single stigma; the germen becomes a compressed heart-shaped capsule, with two cells filled with roundish seeds.

The common male speedwell is also called Paul's betony; brook-lime is also a species of the speedwell. Some authors make thirty-five species.

This herb is in great esteem among the Germans in disorders of the breast, both catarrhus and ulcerous, and for purifying the blood and humours. Infusions of the leaves, which are not unpalatable, are drunk as tea, and are found to operate sensibly by urine. It is frequently used as an ingredient in antiscorbutic and deobstruent compositions.

STARRY ANISEED. ILLICIUM.

WE meet with an account of the starry aniseed, together with a figure of it, taken from Clusius, in Parkinson's Theatre of Plants, p. 1569. where he observes, that some branches of it, with the husks and seeds only, without leaves or blossoms, were brought into England by Sir Thomas Cavendish, in Queen Elizabeth's time, from the Philippine Islands, where he met with it in his voyage round the world. These branches were given to Mr. Morgan, the queen's apothecary, and to Mr. James Garrat, of whom Clusius received them.

Monsieur Geoffroy, in his Materia Medica, translated in 1736 by Dr. G. Douglas, p. 322, calls it *Anisum Sinense, semen badian, & fructus stellatus*, and says it is highly esteemed in China, and all over the east; that it is used to cure any bad taste in the mouth, as a preservative against the effects of bad air, and also for the stone and gravel; and that the Indians likewise steep this fruit in water, and afterwards ferment the infusion, and thus make a vinous liquor; that the Dutch in the East-Indies, as well as the natives, mix this fruit with their tea and sherbet.

Kæmpfer in his Amœnitates Exoticæ, p. 880, calls it *somø*, or *skinimi*; and has given us a very good figure of a branch of it, with the leaves, flowers, and fruit. He found it in Japan; and says that the Japanese and Chinese esteem it a sacred tree; that they offer it to their idols, and burn the bark of it, as a perfume, on their altars; and lay the branches upon the graves of the dead, as an offering to the ghosts of their pious departed friends; and that the public watchmen use the powder of this aromatic bark strewed in small winding grooves or little channels, on



The Starry Aniseed.



some ashes in a box secured from the weather, for the following purpose: This powder, being lighted at one end, burns slowly on; and, being come to certain marked distances, and so sparkling through the grooves, they strike a bell, and by means of this time-keeper proclaim the hours of the night to the public. And lastly, that it has the remarkable property of rendering the poison of the bladder-fish (*Tetrodon hispidus*, Linn. Syft. Nat.) more virulent, as many have experienced, that have used violent means to destroy themselves.

We are indebted for the first discovery of this curious American tree to a negro servant of William Clifton, Esq. chief justice of West Florida, who was sent to collect specimens of all the rarer plants by his master, in April 1765. After this, in the latter end of January, 1766, Mr. John Bartram, the king's botanist for the Floridas, discovered it on the banks of the river St. John, in East Florida, as appears from his description of it, and the drawing of a seed-vessel, with some of the leaves, which he sent to Peter Collinson, Esq. Mr. Bartram's description of it is as follows: "Near here my son found a lovely sweet tree, with leaves like the sweet bay, which smelled like saffrafras, and produced a very strange kind of seed-pod; but all the seed was shed, the severe frost had not hurt it: some of them grew near twenty feet high, a charming bright ever-green aromatic."

This observation of Mr. Bartram, relating to its bearing a severe frost, may afford a useful hint in the cultivation of this tree, especially as I am convinced, from repeated accounts of the weather in West Florida, that the frost is much more intense there, from whence those plants were brought, than in East Florida; so that the experiment is well worth making with one of them, to see how far it will stand the severity of our winters. Should it succeed, it would be a very great acquisition to our gardeners, and be highly ornamental to our plantations of ever-greens.

The medicinal properties of this tree are certainly worth enquiring into. The leaves afford a most agreeable bitter. A sprig of it set to putrify in a phial of water, the bark soon became full of a clear mucilage. The young blossoms, put into water with a small quantity of tartar *per deliquium*, from a dark-reddish colour became a light-brown; but, from the same proportion of oil of vitriol in water, they turned to a fine carmine colour, which stained the paper of a fine red. This points out its astringent quality.

Many persons think this plant not really a different species from the oriental one. The seed-vessels from China, however, which are to be seen in collections of the Materia Medica, especially among foreigners, smell very disagreeably of aniseed: whereas the seed-vessel of the Floridanum is agreeably aromatic, as are the leaves and young branches. The flower, according to Kæmpfer, is of a yellowish white, and looks at a distance like a narcissus: the present species has a
flower

flower of a dark-red colour. Kæmpfer reckons the number of petals sixteen, and the rays or feed-veffels eight: the number of petals in ours is from twenty-one to twenty-feven, and the feed-veffel twelve or thirteen that ripen. In respect to the form and growth of the tree, they are much the fame; for instance, they both grow to the fize of a cherry-tree; their leaves are of an oblong oval fhape, pointed at both ends, fleshy, with few veins, growing alternately, and in tufts, at the ends of the small branches.

Linnæus, who takes his characters of the *Illicium anisatum* from Kæmpfer, places it among the dodecandria polygynia. But I am perfuaded, that, from the following characters, this must be of the polyandria polygynia, and should stand next to the Magnolia.

Characters of the Illicium Floridanum, or Florida Starry Aniseed Tree.

CALYX. The perianthium, or flower-cup, confifts commonly of five little membraneous and coloured leaves, that soon fall off; they are of a concave, oblong, oval, form, pointed at the ends. Sometimes we meet with only four little leaves, fometimes fix, in the flower-cup. Kæmpfer obferved four in his.

COROLLA. The flower confifts of many petals (from twenty-one to twenty-feven), which are lanceolated: thefe are of three fizes, and equal numbers in each circle, the outward ones are long, (about an inch,) concave, obtufe, and fpreading open. The next are a little fhorter and narrower; and the innermoft are ftill fhorter, much narrower, and very fharp-pointed: but are not nectaria, as Linnæus fupposes.

STAMINA. The filaments are many, (about thirty,) very fhort and flat, placed over one another, furrounding the germina, or embryo feed-veffels. Thefe fupport as many antheræ, or fummits, which are erect, oblong, and emarginated, or having a fmall indenture at top, with a cell on each fide full of farina, of a globular form when they are magnified.

PISTILLUM, or female organ. The germina, or embryo feed-veffels, are twenty or more in number, placed in a circular order above the receptacle of the flower: they are compressed, erect, and ending in fo many fharp-pointed, ftyles, bending outwards at the top. The ftigmata, or openings on the top of the ftyles, are downy, and placed lengthways along the upper part of each ftyle.

PERICARPIUM, or feed-veffel, confifts of twelve, oftener thirteen, little pods, or capfules, that ripen. Thefe are of a compressed oval fhape, and a hard leather-like fubftance, with two valves to each, and are difpofed edgeways in a circular order, like fo many rays of a ftar.

SEMINA. The feeds are fmooth and fhining, of an oval fhape, a little compressed, and appear obliquely cut off at the bafe. There is one feed in each capfule.

SUGAR MAPLE TREE. ACER.

An Account of the Sugar-Maple Tree of the United States, and of the Methods of obtaining Sugar from it, together with Observations upon the Advantages, both public and private, of this Sugar: in a Letter to Thomas Jefferson, Esq. Secretary (afterwards President) of the United States, and one of the Vice-Presidents of the American Philosophical Society; by Benjamin Rush, Professor of the Institutes, and of Clinical Medicine in the University of Philadelphia.

THE subject of this excellent paper seems at first sight more particularly to relate to the United States; but it may, and we hope will, very essentially affect the general state of the world, by increasing the supply of an article, of which the uses are yet, on account of its high price, but imperfectly known. If the monopoly of the West-India islands, where alone the wasteful culture by slaves, in the absence of the owner, can be supported, should be gradually diminished, and at last abolished, by a plentiful produce of sugar from the maple, humanity would no longer suffer, the article would find its true level, and every nation would be more or less benefited.

The *Acer saccharinum* of Linnæus, or sugar maple tree, grows in great quantities in the western countries of all the middle states of the American union. It is as tall as the oak, and from two to three feet in diameter; puts forth a white blossom in the spring, before any appearance of leaves: its small branches afford sustenance for cattle, and its ashes afford a large quantity of excellent pot-ash. Twenty years are required for it to attain its full growth. Tapping does not injure it; but, on the contrary, it affords more syrup and of a better quality, the oftener it is tapped. A single tree has not only survived, but flourished, after tapping, for forty years. Five or six pounds of sugar are usually afforded by the sap of one tree—though there are instances of the quantity exceeding twenty pounds. The sugar is separated from the sap either by freezing, by spontaneous evaporation, or by boiling. The latter method is the most used. Dr. Rush describes the process, which is simple, and practised without any difficulty by the farmers.

From frequent trials of this sugar, it does not appear to be in any respect inferior to that of the West-Indies. It is prepared at a time of the year when neither insects nor the pollen of plants exist to vitiate it, as is the case with common sugar. From calculations grounded on existing facts, it is ascertained, that America is now capable of producing one eighth more than its own consumption; that is, on the whole, about 135,000,000 pounds, which in the country may be valued at fifteen pounds weight for one dollar. Dr. Rush mentions many other benefits his country may derive from this invaluable tree; and concludes his paper with an account of some of the advantages of sugar to mankind, not merely as commonly considered to be a luxury, but as an excellent, wholesome, and nourishing, article of food.

TEA-TREE. *THEA*.

THE tea-tree, *thea* in botany, is the name of a genus of the class polyandria, order monogynia, the characters of which are these: The cup is a very small, plane, permanent, perianthium, divided into five or six roundish, obtuse, leaves; the flower consists of six or nine large, roundish, concave, and equal, petals; the stamina are numerous filaments, about two hundred, and are very slender, capillary, and shorter than the flower; the antheræ are simple; the germen of the pistil is globose and trigonal; the style is subulated, and of the length of the stamina; the stigma is simple; the fruit is a capsule, formed of three globular bodies growing together; it contains three cells, and opens into three parts at the top. The seeds are single, globose, and internally angulated.

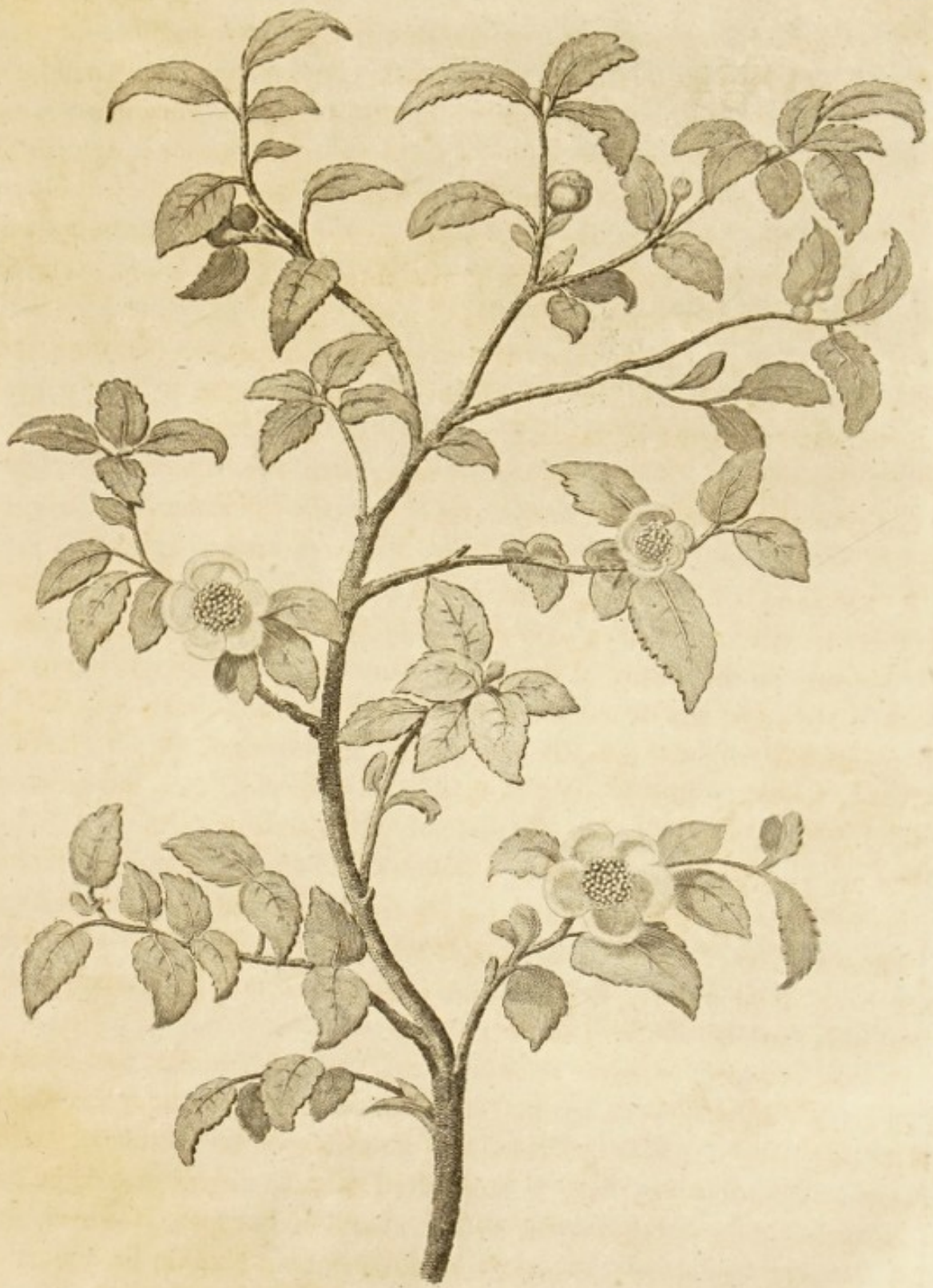
From an original drawing taken of the tree when in its flowering state, it appears, that the tea-tree, as Mr. Miller first observed, belongs to the order of trigynia; and Linnæus was led to the mistake of placing it in that of monogynia, by not having had any opportunity of examining any other than dried specimens of this shrub. Of this genus Linnæus enumerates two species: viz. the Bohea Tea, having flowers with six petals; and the Green Tea, having flowers with nine petals.

Dr. Lettsom, in his botanical description of the tea-plant, thinks it most probable that there is only one species, and that the difference between the green and bohea teas depends on the nature of the soil, culture, age, and the manner of drying the leaves. He adds, that it has even been observed, that a green-tea tree, planted in the bohea country, will produce bohea, and on the contrary; and that on his examining several hundred flowers, brought both from the bohea and green tea countries, their botanical characters have always appeared uniform.

We are principally indebted to Kæmpfer, Le Compte, and Du Halde, for an authentic history of the culture of this exotic shrub, and the manner of preparing or curing its leaves. The particulars of greatest importance that have been recited have been judiciously collected, and the subject farther illustrated with additional observations, by Dr. Lettsom.

The tea-tree thrives best in valleys at the foot of mountains, and upon the banks of rivers, where it enjoys a southern exposure to the sun; though it endures considerable variations of heat and cold, as it flourishes in the northern clime of Pekin, as well as about Canton; and it is observed that the degree of cold at Pekin is as severe in winter as in some of the northern parts of Europe. However, the best tea grows in a mild temperate climate, the country about Nankin producing better tea than either Pekin or Canton, betwixt which places it is situated.

The



The Tea Tree.

Engel del.

Barth sculp.

The root resembles that of the peach-tree; the leaves are green, longish at the point, and pretty narrow, an inch and a half long, and jagged all round. The flower is much like that of the wild rose, but smaller. The fruit is of different forms, sometimes round, sometimes long, sometimes triangular, and of the ordinary size of a bean, containing two or three seeds, of a mouse-colour, including each a kernel. These are the seeds by which the plant propagated: a number from six to twelve or fifteen being promiscuously put into one hole, four or five inches deep, at certain distances from each other. The seeds vegetate without any other care, though the more industrious annually remove the weeds and manure the land. The leaves which succeed are not fit to be plucked before the third year's growth, at which period they are plentiful, and in their prime.

In about seven years the shrub rises to a man's height; and, as it then bears few leaves, and grows slowly, it is cut down to the stem, which occasions an exuberance of fresh shoots and leaves the succeeding summer; some, indeed, defer cutting them till they are of ten years growth. In Japan, the tea-tree is cultivated round the borders of the fields, without regard to the soil; but, as the Chinese export considerable quantities of tea, they plant whole fields with it.

The best time to gather the leaves of tea, is while they are yet small, young, and juicy; and the different periods in which they are gathered are particularly described by Kæmpfer. They are plucked carefully one by one; and, notwithstanding the seeming tediousness of this operation, the labourers are able to gather from four to ten or fifteen pounds each in one day. The tea-trees that yield often the finest leaves grow on the steep declivities of hills, where it is dangerous, and in some cases impracticable, to collect them. The Chinese are said to vanquish this difficulty by a singular contrivance: the large monkeys which inhabit these cliffs are irritated, and in revenge they break off the branches, and throw them down, so that the leaves are thus obtained.

The buildings, or drying-houses, that are erected for curing tea, contain from five to ten or twenty small furnaces, about three feet high, each having at the top a large flat iron pan. There is also a long low table covered with mats, on which the leaves are laid, and rolled by workmen, who sit round it. The iron pan being heated to a certain degree by a little fire made in the furnace underneath, a few pounds of the fresh-gathered leaves are put upon the pan; the fresh and juicy leaves crack when they touch the pan, and it is the business of the operator to shift them as quick as possible with his bare hands, till they become too hot to be easily endured. At this instant he takes off the leaves with a kind of shovel resembling a fan, and pours them on the mats before the rollers, who, taking small quantities at a time, roll them in the palms of their hands in one direction, while others are fanning them,

that they may cool the more speedily, and retain their curl the longer. This process is repeated two or three times, or oftener, before the tea is put into the stores, in order that all the moisture of the leaves may be thoroughly dissipated, and their curl more completely preserved. On every repetition the pan is less heated, and the operation performed more slowly and cautiously. The tea is then separated into the different kinds, and deposited in the store for domestic use or exportation.

The Chinese know nothing of imperial tea, flower of tea, and many other names, which in Europe serve to distinguish the goodness and the price of this fashionable commodity; but, besides the common tea, they distinguish two other kinds, viz. the *voui* and *soumlo*, which are reserved for people of the first quality, and those who are sick. We have two principal kinds of tea in Europe: viz.

Green tea, which is the common tea of the Chinese, &c. F. le Compte calls it *ling-tea*, and says it is gathered from the plant in April. It is held very digestive and a little astringent; it gives a palish-green tincture to water, and its leaves are much twisted. The second is,

Bohea tea, which is the *voui-tea*, *bou-tcha*, of the Chinese. F. le Compte makes this only differ from the green tea by its being gathered a month before it, viz. in March, while in the bud; and hence the smallness of the leaves, as well as the depth of the tincture it gives to the water. Others take it for the tea of some particular province; the soil being found to make an alteration in the properties of the tea, as much as the season of gathering it. It is all bought at Nankin, and thence brought into Europe.

As to the differences in colour and flavour peculiar to these two kinds, and to their varieties, Dr. Lettsom thinks that there is reason to suspect that they are, in some measure, adventitious, or produced by art. He has been informed by intelligent persons, who have resided some time at Canton, that the tea about that city affords very little smell while growing. The same is observed of the tea-plants now in England, and also of the dried specimens from China. We are not, however, as he observes, to conclude from hence, that art alone conveys to teas, when cured, the smell peculiar to each kind; for our vegetable grasses, for instance, have little or no smell till they are dried and made into hay.

As to the opinion that the green tea owes its verdure to an efflorescence acquired from the plates of copper on which it is supposed to be cured or dried, he shows that there is no foundation for this suspicion. The infusions of the finest imperial and bloom teas undergo no change on the affusion of a volatile alkali, which would detect the minutest portion of copper contained in them, by turning the liquors blue. The fine green colour of these teas, with as little reason, hath been attributed to green copperas; as this metallic salt would, on its being dissolved in water, immedi-
ately

ately act on the astringent matter of the leaves, and convert the infusion into ink, as happens when a chalybeate water has been employed in the making of tea.

On the whole Dr. Lettsom thinks it not improbable, that some green dye, prepared from vegetable substances, is employed in the colouring of the leaves of the green teas. And Neumann suspects, that the brown colour and the flavour of the bohea sorts are introduced by art. Both the green and bohea teas have an agreeable smell, and a slightly-bitterish subastringent taste; with solution of chalybeate vitriol, they strike an inky blackness. They give out their smell and taste both to watery and spirituous menstrua; to water, the green sorts communicate their own green tincture, and the bohea their brown; but to a rectified spirit they both impart a fine deep green. The extracts, obtained by gently drawing off the menstrua from the filtered tinctures, are very considerably astringent, and not a little ungrateful; but the spirituous most so.

Savary also speaks of a sort of red tea, or Tartar tea, called *honan tcha*, which tinges the water of a pale red, and which is said to be extremely digestive; by means hereof it is that the Tartars are said to be able to feed on raw flesh. Its taste is earthy, and much the least agreeable of them all; but this is scarcely known in England.

Tea is to be chosen of the briskest smell, and as whole as possible; and the greatest care is to be taken that it have not been exposed to the air to pall and evaporate.

The drink, tea, is made in China, and throughout the greatest part of the east, after the same manner as in Europe; viz. by infusing the leaves in boiling water, and drinking the infusion hot. Indeed, among us, it is usual to temper its bitterness with sugar, but the Orientals use it without the addition of sugar or milk. However, the Japanese are said to prepare their liquor a somewhat different way, viz. by pulverising the leaves, stirring the powder in hot water, and drinking it as we do coffee. From the account given by Du Halde, this method is not peculiar to the Japanese, but is also used in some provinces of China.

The common people, who have a coarser tea, boil it for some time in water, and make use of the liquor for common drink. Early in the morning, the kettle, filled with water, is regularly hung over the fire for this purpose, and the tea is either put into the kettle enclosed in a bag, or by means of a basket of proper size pressed to the bottom of the vessel, that there may be no hindrance in drawing off the water. The Bantsjaa tea only is used in this manner, whose virtues, being more fixed, would not be so fully extracted by infusion.

The Chinese are always taking tea, especially at meals: it is the chief treat wherewith they regale their friends. The most moderate take it at least thrice a-day;

others ten times, or more; and yet it is computed the consumption of tea among the English and Dutch is as great in proportion as among the Orientals.

With regard to the commercial history of tea, we may observe that it was first introduced into Europe by the Dutch East-India company, very early in the last century, and that a quantity of it was brought over from Holland by Lord Arlington and Lord Offory about the year 1666, at which time it was sold for sixty shillings a-pound. But it appears, that before this time, drinking of tea, even in public coffee-houses in this country was not uncommon; for, in 1660, a duty of fourpence per gallon was laid on the liquor made and sold in all coffee-houses.

The present consumption of it is immense. In 1785 it was computed that the whole quantity of tea imported into Europe was about nineteen millions of pounds, of which it is conjectured that twelve millions were consumed in Great Britain and its dependencies. Sir George Staunton informs us, that the annual public sales of teas, by our East-India Company, did not, in the beginning of the eighteenth century, much exceed fifty thousand pounds weight, independently of what little might be then perhaps clandestinely imported. The company's annual sales now approach to thirty millions of pounds; being an increase of six hundred fold in less than one hundred years, and answers to the rate of more than a pound each, in the course of the year, for the individuals of all ranks, sexes, and ages, throughout the British dominions in Europe and America. Taking an average of seven years before the commutation-act, which took effect in September 1784, the importation of teas was 17,662,115lb. and, taking an average of the same number of years from 1784 inclusive, it amounted to 30,691,971lb. The importation is now about 40,000,000lb. of which ten millions are exported.

As to the properties of tea, they are strangely controverted; the eastern nations are at least as much possessed with an idea of their extraordinary virtues as the Europeans; but it is, perhaps, because imagination bears as great a sway there as here. The reason why the gout and stone are unknown in China, is ascribed to the use of this plant.

Tea is extolled as the greatest of all medicines. Moderately and properly taken, it acts as a gentle astringent and corroborative; it strengthens the stomach and bowels, and is good against nausea, indigestions, and diarrhoeas. It acts also as a diuretic and diaphoretic. The immoderate use of it, however, has been very prejudicial to many, who have been thereby thrown into the diabetes. And thus the infusions of tea-leaves have been extravagantly condemned by some, and commended by others. From the contradictory opinions even of medical writers on this subject, the natural inference seems to be, that they possess neither noxious nor beneficial powers in any very considerable degree. They seem, when
moderately

moderately used, to be for the most part innocent; in some cases they seem to be salutary; in some they are apparently prejudicial. They dilute thick juices, and quench thirst more effectually, and pass off by the natural emunctories more freely, than more watery fluids; they refresh the spirits in heaviness and sleepiness, and seem to counteract the operation of inebriating liquors.

From their manifest astringency they have been supposed to strengthen and brace up the solids; but this effect experience does not countenance, as it is in disorders and in constitutions wherein corroborants are most serviceable that the immoderate use of tea is peculiarly hurtful; as in cold indolent habits, cachexies, chlorosis, dropsies, and debilities of the nervous system.

Dr. Lettsom has particularly enquired into the medical qualities and effects of tea; and, having observed that infusions of bohea and green tea contribute to preserve sweet some small pieces of beef immersed in them, he infers that they possess an antiseptic power, when applied to the dead animal fibre; and from their striking a purple colour with salt of iron he deduces their astringent quality. From other experiments he concludes, that the activity of tea chiefly resides in its fragrant and volatile parts; and that, if the use of it be beneficial or injurious to any particular constitution, it becomes so principally by means of this odorous fragrant principle. He apprehends that it is the safest course to use the infusion of the more ordinary kinds of this plant, which abound less with this fragrant principle. Or the tea may be boiled a few minutes in order to dissipate this volatile part, which stands charged as the cause of those nervous affections that are said to be produced, or aggravated, by the use of this liquor. By this process may likewise be extracted more copiously the more fixed, bitter, and stomachic, parts of this vegetable. Dr. Lettsom, who seems to be thoroughly persuaded of the occasionally-noxious effects of this volatile principle, in the finer teas especially, recommends this last-mentioned mode of making tea, or the substitution of the extract instead of the leaves; by the use of which, the nervous relaxing effects, which follow the drinking of tea in the usual manner, would be in great measure avoided. This extract has been imported hither from China, in the form of small cakes, not exceeding a quarter of an ounce each in weight, ten grains of which might suffice one person for breakfast: but it might easily be made here by simple decoction and evaporation, by those who experience the noxious qualities of the volatile principles of this plant.

It may be further observed, that the effect of drinking large quantities of any warm aqueous liquor would be to enter speedily into the course of circulation, and pass off as speedily by urine or perspiration, or the increase of some of the secretions. Its effects on the solid parts of the constitution would be relaxing, and thereby enfeebling. If this warm aqueous fluid were taken in considerable quantities

tities, its effects would be proportionable; and still greater, if it were substituted instead of nutriment. The infusion of tea, however, has these two peculiarities, It is not only possessed of a sedative quality, but also of a considerable astringency; by which the relaxing power ascribed to a mere aqueous fluid, is in some measure corrected on this account. It is, perhaps, less injurious than many other infusions of herbs, which, besides a very slight aromatic flavour, have very little, if any, stypticity, to prevent their relaxing debilitating effects.

So far, therefore, tea, if not too fine, if not drunk too hot, nor in too great quantities, is perhaps preferable to any other known vegetable infusion. And if we take into consideration, likewise, its known enlivening energy, our attachment to it will appear to be owing to its superiority in taste and effects to most other vegetables.

Tea may be considered as a very powerful aphrodisiac; and accordingly a physician of considerable eminence in his profession, imputes the amazing population of China, amongst other causes, to the general use of it.

Various Acts of Parliament on the Subject of Tea.—No tea is allowed to be imported, except from the place of its growth, on pain of forfeiture, 11 Geo. cap. 30. and by 24 Geo. III. cap. 38. all the duties upon tea, imported; sold, or used, in this kingdom shall cease from September 15, 1784, at which period the East-India company is discharged from the payment of duties on tea in their warehouses; and afterwards there shall be paid a duty of 12l. 10s. per cent. computed upon the gross prices, for all tea delivered by the company to the purchasers, which duty shall be drawn back on exportation to any place where the drawback is already allowed. The company is required to make four sales in the year, and to sell such quantity as shall be sufficient to supply the demand, provided an advance of 1d. per lb. be bid upon the prices at which the teas shall be put up; and at the four first sales after passing the act, these prices shall not exceed the following rates, viz. for bohea tea 1s. 7d. per lb. for congo tea 2s. 5d. per lb. for fouchong tea 3s. 3d. per lb. for singlo tea 3s. 3d. per lb. and for hyson tea 4s. 11d. per lb. and afterwards the whole price at which the teas are put up shall not exceed the prime cost, with the freight and charges of importation, lawful interest from the time of the arrival of such tea in Great Britain, and the common premium of insurance. In lieu of the duties on tea, this act substitutes an additional duty on windows.

No drawback shall be allowed on tea exported, except to Ireland, when the whole duty on importation shall be allowed. 18 Geo. II. cap. 26. 17 Geo. III. cap. 27.

Every person having in his custody more than six pounds weight of tea is a dealer; and selling without a licence, to be had for 12d. shall forfeit 5l. a month. 11 Geo. cap. 30. 15 Geo. II. cap. 11. Every person dealing in tea, &c. shall cause to be painted or written over the door of his shop, the words, "Dealer in Coffee, Tea,

Cocoa-nuts, or Chocolate," on pain of 200l. 19 Geo. III. cap. 69. And any dealer, buying of any person who has not this inscription, incurs a forfeiture of 100l. and any other person 10l. By 20 Geo. III. cap. 35. no person shall trade in coffee, tea, or chocolate, without a license, at the price of 5s. under penalty of 20l. More than six pounds of tea cannot be removed without a permit. 10 Geo. cap. 10. The adulteration of tea is subject to a penalty of 100l. besides the forfeiture of the same, and for every pound of dyed leaves of tea, 5l. 11 Geo. cap. 30. 17 Geo. III. cap. 29.

VERVAIN. VERBENA.

THIS herb is described, with a plate, in the Herbal, p. 381; but, as it has lately come into great repute in the cure of the scrophula or king's evil, I cannot make this Appendix complete without giving some account of its use in that dreadful disorder.

Take a piece of fresh common purple vervain-root, about three or four inches long, and about the size of the patient's little finger, if a man or woman; to young children and infants, as large as their thumb, and so in proportion, but not less; because it shrinks much, and contains but little virtue. All the fibres are to be cut off smooth, and as little of the rind as possible: to be worn always at the pit of the stomach, tied with a yard of white satin ribbon, half an inch wide, round the neck of men and women of an ordinary stature; if taller an ell will be wanting; and children in proportion; but no other coloured ribbon is proper; because the dye in some colours may be prejudicial. The root must never be wetted, not when fresh gathered, but wiped clean with a dry cloth. It must not be sown up, or covered with any thing, but always worn naked at the pit of the stomach. If, after wearing, the end of the fibres stick out and hurt and prick the stomach, they must be cut off with a sharp knife as at first. When it has been worn a few days it will shrink, by the heat of the stomach; then the ribbon must be tied faster. Observe the root be not decayed or rotten but fresh and green, when applied; and it is necessary to have a fresh one every spring and fall.

The sores should be washed, night and morning, with a lotion composed of vinegar one-third, red port one-third, and distilled vervain-water one-third. If the distilled vervain-water cannot be so easily procured, the infusion of the leaves may be used; that is, boiling water poured upon the herb, like tea, and covered, may be used, when cold, in its stead. The sores, after washing, should be dressed with an ointment made of green vervain-leaves mixed with a fourth part of houseleek-leaves, boiled in pork lard till of a good consistence, and the watery part waisted.

WURZEL MANGEL, OR ROOT OF SCARCITY. BETA.

THIS root in time of scarcity affords to mankind a salutary and agreeable food; and, when fodder is dear, presents, both in summer and winter, a copious and cheap nourishment for cattle; which, in all seasons as well as in all lands, has an abundant and certain produce; and of which the culture is simple, the harvest and preservation easy.

This root is not to be classed either among turnips or carrots; and although in its exterior and feed it resembles beets, it is much superior to these plants in every respect, and seems to be a distinct genus, though commonly set down as a variety of the Beta cycla, or white garden-beet. Its culture is so easy, its advantages so numerous, supplying as it does the want of other food, that I think it deserves not only to be adopted every-where, but to be preferred to all other roots with which cattle are fed, even in the most plentiful years. It is planted in open and fallow ground; and succeeds well in all, and especially in moist and light lands. If in a stiff and clayey, where it cannot deepen its fibres, it stretches horizontally, and grows as large outwardly as it would inwardly were it not obstructed by the compactness of the soil.

This precious root is not sensible of the vicissitude of the seasons: it has no destructive enemy; the all-spoiling vine-fretter does not bite it; no other insect hurts it: mildew never affects it; nor is its vegetation ever impeded by the driest summer. It does not impoverish the soil which nourishes it; on the contrary, it prepares it for receiving seeds of every other kind afterwards.

In the months of March and April, the land being well prepared, manured, and made light, the largest and foundest scarcity-root seeds must be chosen, steeped in water for twenty-four hours, and then dried a little, so that they may be handled.

Lay the line upon the field, as if you were to plant roots, at the distance of nineteen inches, on each side; make with your finger holes one inch deep, in each of which put one grain only, which cover immediately with earth. After ten or twelve days, it will shoot, and every grain will have four, five, or six roots growing together. As soon as these small roots show their fourth leaf, the feeblest of them must be carefully plucked off, and the finest and most vigorous root only left. In a little time the growth of the root thus selected will be astonishing; not one will fail. After this manner, equally simple and easy, you avoid the transplanting of the roots, and obtain leaves four or five weeks sooner; the roots grow finer and larger, and deepen better; and, in a light land, much labour is saved.

As the roots naturally grow a little above the ground, you must notice those which do not so appear, and bare them by removing the earth from around their top. Sow the remains of your seed at random, that you may transplant the roots where
you

you please. If you choose to leave these in the same place, they must be thinned and dug round early : but this is very troublesome, and the roots planted thus never grow so large as those whose seed has been set. Experience has proved this difference.

At the latter end of June, or in the beginning of July, when the outer leaves are about one foot long, the first gathering of them is to be made, by breaking them round and close to the root. For that purpose you lean your thumb on the inside, and at the very bottom of the leaf. You must take care not to leave a stump, and to gather only the leaves which incline to the ground, always sparing those of the heart of the plant ; they then are re-produced, and grow faster.

Immediately after the first gathering, the ground round the root is to be again dug with a mattock ; in which operation the surface of the ground must be removed from the top of the roots with a wooden spatula, so that every root may be uncovered about two inches, which then seems to be planted in a kind of basin nine or ten inches in diameter. A child may easily do this. In light land it suffices to grub the weeds, and use well the spatula. After this second very important operation, there is nothing more to be done, but to use the leaves at pleasure. From this moment the roots begin to stretch and grow wonderfully. Be careful to destroy all gross weeds, which partake of their nutrition ; and give them the advantage of the open air, when they may be left to their own inconceivable vegetation.

In a good soil the leaves of these roots may be gathered every twelfth or fifteenth day. I have often remarked that the leaves grow to the length of nearly two inches and a half, and to the breadth of one inch and a half, within twenty-four hours ; and, at the second gathering, they are twenty-eight and thirty inches long, and twenty or twenty-two broad. This account may appear exaggerated till experience prove the truth of it.

Oxen, other cattle, and sheep, are fond of these leaves, with which they are easily fed and fattened to the greatest advantage, eating them whole, as they are brought from the field ; but for poultry they must be minced and mixed with bran. They are also very good nourishment for horses during the summer ; for this purpose they need only be minced with that kind of knife which I shall hereafter describe, and mixed with cut straw. Swine also eat them very heartily.

The leaves of scarcity-root afford also a wholesome and pleasant food for man. The stalks of them are eaten like those of beets, but have not the same earthy taste. They may be prepared in different manners ; when dressed like spinach, many prefer them to it. By the continual succession of their production, from spring to the month of November, they are very useful to farmers, and all others who maintain a great number of servants. In winter-time the roots are eaten, dressed also different ways ; they are wholesome, of an agreeable taste, much superior to the red-beet, and

at least equal to the turnip. The leaves produced by the roots when preserved in a cellar, during the winter, are very soft and delicate.

The approach of severe frosts shows the time for getting in the roots. This precious harvest must be made in fine weather, though it be a few days sooner than otherwise necessary, as the preservation of the roots depends very much on their being housed dry. The roots must be plucked early in the morning, and left exposed to the air and sun; children go behind the person who plucks them, and cut the leaves to the heart; an operation which may as well be performed one or more days before the harvest. In the evening the roots must be collected together, and, if sufficiently dried, lodged in a place well secured against severe frosts. If there is nothing to be apprehended from rain, those which have been plucked in the evening may be left in the field, and carried home next day. It is best to leave them exposed to the air for two or three days, when the weather will permit. As their skin is very thin, they must be handled softly, and great care taken not to bruise them, which would be prejudicial to their preservation.

The harvest-time is precisely that wherein the roots proper for bearing seed should be fixed upon; and those are the best for the purpose which have attained only to a middle size, are smooth and even, rosy on the outside, and white or marbled white-and-red within. Such is the description of the root which ought to be preserved for cultivation. Those which are entirely red or entirely white, are either roots degenerated, or the real red-beets, whose seeds have not been carefully distinguished by the sower. It is necessary to separate, and shelter from all moisture and frost, the roots which are designed for seed.

In the beginning of April, those roots which have been set apart for seed must be planted in the open field, three feet distant from each other. As their stems grow five or six feet high, they must be kept up with props seven feet long, placed a foot and a half in the ground, with small rods between them, in order to form a kind of trellis, to which the stems are tied, as they grow up, to prevent their being broken by the wind.

The seed ordinarily ripens towards the latter end of October: it must be gathered immediately after the first hoar-frosts. The stems are then cut, and placed against a wall or palisade, if the weather permits; if not, they are tied in small bundles, and hung up in a sheltered airy place, till they are quite dry. At last the seed is taken and preserved in bags, like others of the kitchen-garden.

The seed of the scarcity-root degenerates, like all others, if the soil is not changed every year, or every two years. Care must be taken, therefore, to sow in a stiff soil that seed which has been grown in a light or sandy soil; and in light soil, that which has been grown in a strong and compact soil. Thus, those who cultivate

such

such or such lands may be of great service to one another by making annual exchanges. This feed preserves all its qualities for three or four years.

If the quantity of the roots you intend to preserve is too great to be lodged in the house, some days before they are pulled pits should be dug in the field, or any other place that is sheltered from water during the winter. After the inside of these pits has been left to dry for eight or ten days, their bottom and sides must be covered with a small quantity of straw, and the roots afterwards be placed regularly one by one, taking care not to bruise them, and to clean them well from the particles of their natural soil. Then let the upper-roots be over-laid with straw, which is to be covered three feet deep with the earth dug from the pit; and this earth must be hard beaten, and disposed in a sloping manner, that the water may easily flow off.

The dimensions of the pits ought to be proportioned either to the rising of the ground, or to its declivity. They may be from two to three feet deep. Their length depends on the quantity of roots which are to be placed in them, but their breadth is commonly three feet and a half.

These roots possessing the valuable quality of being capable of preservation till the month of June without the least alteration, it will not be amiss to multiply the pits, and make one for each month, beginning in March, when the winter-provision is ordinarily over. The reason for this advice to multiply the pit is, because if the roots, after having been deprived of the action of the air, are exposed to it anew, they do not preserve their freshness long. The multiplying of the pits will prevent this inconvenience.

Every pit absolutely requires an air-hole, through which the fermentation of the roots may evaporate; for without this precaution all the roots you intend to preserve under the earth will rot. The air-hole must be made in the following manner:—Before any thing is put into the pit, a pole six or seven feet long, and two inches in diameter, must be planted in the middle of it; then place therein the roots, and dispose them in a sloping direction. When the pit is full, and the roots are half a foot above the level of the ground in the middle part, twist a rope of hay about an inch thick round the pole, taking care not to bind it too hard. After that is done, throw on the earth, and dispose and beat it as before mentioned. When the pit is quite covered, take out the pole; the hay will remain in the hole, through which the exhalation arising from the fermentation of the roots will pass. After some days, the hole must be covered with a pan-tile, and, on the approach of severe cold, shut quite close with a flat stone.

That cattle of every kind may eat the roots, they must be cut or minced, after they have been washed and cleaned; which is done with a kind of knife, i. e. a blade of iron, one foot long and two inches broad, bent like an S, to the middle of which

is foldered a socket about six inches long. In this socket is fixed a wooden handle about three feet six inches long. With this knife, which at first sight seems intended for printing the letter S, the roots are minced as equally as easily. This operation is performed in a bucket or trough used for that purpose only. A single man in one hour is able to mince a quantity of roots sufficient to feed twelve oxen a whole day. Before the roots are put into the trough, they must be cut in large pieces. It will be best to mince them as small as a walnut.

The roots, being prepared as above, may, without being mixed with any other food, be given to horned cattle and sheep, and especially to those which are to be fattened: but, if it is necessary to be sparing of the roots, they may be mixed with one-fourth part or more of hay and minced straw. It is even proper to observe that method during the three or four first weeks, with respect to lean cattle, which are meant to be fattened. Dry trefoil, faintfoin, &c. are best for this use. Those who have a hay-knife for cutting dry-fodder, of the same sort with that used in Germany with so much success and advantage, will save much time, and consume less of their provision.

Horses may be fed, during the winter, with the scarcity-roots, by adding to them one half of hay and straw minced together, which will make them healthy, fat, and vigorous. But in the season of hard and constant labour, a small quantity of oats must, from time to time, be added. This is the practice in those provinces of Germany where the scarcity-roots serve almost instead of meadows, and of which the horses are well-known and esteemed.

Swine eat these roots very well, raw, minced, and mixed in their greasy or milky drink. They become as fat as those which are fed with potatoes, which require to be boiled. By the use of this root, the expense of wood and coals, as well as the trouble of boiling, &c. is saved.

Besides the advantages which have been already enumerated, the scarcity-roots afford many others; amongst which, in particular, is the certainty of an abundant harvest, whatever may be the intemperature of the seasons.

If the culture of this root is adopted, it will no more be necessary to let the grass of the natural or artificial meadows be eaten by cattle during the summer; all which will, therefore, be converted into hay. How great then, will be the quantity of hay to be fold, since, during the winter, more than two-thirds of it will be saved! And, as the roots facilitate the feeding cattle in the stables for the whole year, the quantity of dung, so necessary to agriculture, will be increased.—When this root shall be well known to the farmers, there is no doubt but they will prefer it to all other fodder of the like kind.

TABLES and INSTRUCTIONS for GATHERING HERBS and PLANTS in the PLANETARY HOUR.

TABLE No. I.

To find the Beginning and End of the Planetary Hour by Day for ever.

Place of the ☉	Hours from Sun-rise to Noon.							Hours from Noon to Sun-set.							Place of the ☉		
	Sign	D	H. M.	H. M.	H. M.	H. M.	H. M.	H.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.		Sign	D
♈	0	6	07	08	09	10	11	12	1	0	2	03	04	05	06	0	♈ 30
	3	54	6	55	7	56	8	57	9	58	10	59	12	1	0	2	♈ 27
	6	47	47	51	54	56	58		2	4	6	9	11	13			♈ 24
	9	41	44	47	51	54	57		3	6	10	13	16	19			♈ 21
	12	35	39	43	48	52	56		4	8	13	17	21	25			♈ 18
	15	28	33	39	44	49	55		5	11	16	21	27	31			♈ 15
	18	22	28	35	41	47	54		6	13	19	25	32	38			♈ 12
	21	16	23	31	38	45	53		7	15	22	29	37	44			♈ 9
	24	10	18	27	35	43	52		8	17	25	33	42	50			♈ 6
	27	3	13	22	32	41	51		10	19	29	38	48	57			♈ 3
	♉	0	4	57	8	18	29	39	50	11	21	32	42	53	7	3	♉ 0
		3	51	3	14	26	39	49		12	23	35	46	58	9		♉ 27
6		45	5	58	10	23	48		13	25	38	50	6	4	15	♉ 24	
9		40	5	52	7	20	47		13	27	40	53	7	20		♉ 21	
12		34	48	3	17	46		14	29	43	57	12	26			♉ 18	
15		28	42	6	59	14	45		15	31	46	5	17	31			♉ 15
18		23	39	5	55	12	44		16	32	49	5	21	37			♉ 12
21		18	35	5	52	9	43		17	34	51	8	25	41			♉ 9
24		12	30	4	48	6	42		18	36	54	12	30	48			♉ 6
27		8	27	4	45	4	41		19	37	56	15	33	52			♉ 3
♊		0	2	23	4	2	41		20	39	59	18	38	57	♊ 0		
		3	3	59	19	39	0	40		20	40	1	21	41	8	1	♊ 27
	6	55	16	37	7	58	39		21	42	3	23	44	5		♊ 24	
	9	51	13	34	56	39		22	43	5	26	48	9			♊ 21	
	12	48	10	32	54	38		22	44	6	28	50	12			♊ 18	
	15	45	8	30	53	38		23	45	8	30	53	15			♊ 15	
	18	43	6	29	52	37		23	46	9	33	54	17			♊ 12	
	21	41	4	27	51	37		23	46	10	32	56	19			♊ 9	
	24	40	3	27	50	37		23	47	10	33	57	20			♊ 6	
	27	39	2	26	50	36		24	47	11	34	58	21			♊ 3	
	30	38	1	25	49	36		24	47	11	35	58	22	♊ 0			

TABLE

TABLE No. II.

To find the Beginning and End of the Planetary Hour by Day for ever.

Place of the ☉.		Hours from Sun-rise to Noon.						Hours from Noon to Sun-set.						Place of the ☉.						
Sign	D	1	2	3	4	5	6	7	8	9	10	11	12	128	Sign	D				
		H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.						
♈	0	6	0	7	0	8	0	9	0	10	0	11	0	12	♋	30				
	3	6	5	4	3	2	1	0	59	1	58	2	57	3	56	4	55	5	54	27
	6	13	11	9	7	4	2	58	1	56	54	51	49	47	47	47	47	47	47	24
	9	19	16	13	10	6	3	57	1	54	51	47	44	41	41	41	41	41	41	21
	12	25	21	17	13	8	4	56	50	48	43	39	35	35	35	35	35	35	35	18
	15	32	24	21	16	11	5	55	49	44	39	33	28	28	28	28	28	28	28	15
	18	38	30	25	19	13	6	54	47	41	35	28	21	21	21	21	21	21	21	12
	21	44	37	29	22	15	7	53	45	38	31	23	16	16	16	16	16	16	16	9
	24	50	42	33	25	17	8	52	43	35	27	18	10	10	10	10	10	10	10	6
	27	57	48	38	29	19	9	51	41	31	23	13	3	3	3	3	3	3	3	3
♌	0	7	3	53	42	32	21	10	50	1	39	29	18	8	57	♌	0			
	3	9	58	46	35	23	11	49	1	27	26	14	3	51	♌	27				
	6	15	8	3	50	38	25	12	48	35	23	10	3	58	♌	24				
	9	20	7	53	40	27	13	47	33	20	7	53	40	21	47	♌	21			
	12	26	12	57	43	29	14	46	31	17	3	48	34	18	46	♌	18			
	15	32	17	9	1	46	15	45	29	14	2	59	43	15	45	♌	15			
	18	37	21	5	49	32	16	44	28	12	55	39	22	12	44	♌	12			
	21	42	25	8	51	34	17	44	26	9	52	35	18	9	44	♌	9			
	24	48	30	12	54	36	18	43	1	24	6	48	30	6	43	♌	6			
	27	52	33	15	56	37	19	41	23	4	45	27	8	3	43	♌	3			
♍	0	57	38	18	59	39	20	41	21	2	42	23	3	3	3	♍	0			
	3	8	1	41	21	10	1	40	20	0	39	19	3	59	♍	27				
	6	5	44	23	2	41	21	39	18	1	57	36	15	55	♍	24				
	9	9	48	26	4	42	22	39	17	56	34	13	51	21	39	♍	21			
	12	12	50	28	6	44	22	38	16	54	32	10	48	18	38	♍	18			
	15	15	53	30	8	45	23	38	1	53	30	8	45	15	38	♍	15			
	18	17	54	31	9	45	23	37	14	51	28	5	43	12	37	♍	12			
	21	19	56	33	10	46	23	37	14	51	27	4	41	9	37	♍	9			
	24	20	57	33	10	47	23	37	1	13	50	27	3	40	37	♍	6			
	27	21	58	34	11	47	23	37	13	50	26	2	39	3	37	♍	3			
	30	22	58	35	11	47	24	36	13	49	25	2	38	3	38	♍	0			

TABLE No. III.

To find the Planetary Hours for every Day in the Week, beginning at Sun-rising.

Sunday. Planets H.	Monday. Planets H.	Tuesday. Planets H.	Wednesd. Planets H.	Thursday. Planets H.	Friday. Planets H.	Saturday. Planets H.
☉ 1 ♀ 2 ♁ 3 ☽ 4 ♃ 5	☽ 1 ♃ 2 ♁ 3 ♂ 4 ☉ 5	♂ 1 ☉ 2 ♀ 3 ♁ 4 ☽ 5	♀ 1 ☽ 2 ♃ 3 ♁ 4 ♂ 5	♁ 1 ♂ 2 ☉ 3 ♀ 4 ♀ 5	♀ 1 ♁ 2 ♂ 3 ♃ 4 ♁ 5	♃ 1 ♁ 2 ♂ 3 ☉ 4 ♀ 5
♁ 6 ♂ 7 ☉ 8 ♀ 9 ♀ 10	♀ 6 ♁ 7 ☽ 8 ♃ 9 ♁ 10	♃ 6 ♁ 7 ♂ 8 ☉ 9 ♀ 10	☉ 6 ♀ 7 ♁ 8 ☽ 9 ♃ 10	☽ 6 ♃ 7 ♁ 8 ♂ 9 ☉ 10	♂ 6 ☉ 7 ♀ 8 ♁ 9 ☽ 10	♁ 6 ☽ 7 ♃ 8 ♁ 9 ♂ 10
♁ 11 ♃ 12 ♁ 13 ♂ 14 ☉ 15	♂ 11 ☉ 12 ♀ 13 ♁ 14 ☽ 15	♀ 11 ☽ 12 ♃ 13 ♁ 14 ♂ 15	♁ 11 ♂ 12 ☉ 13 ♀ 14 ♀ 15	♀ 11 ♁ 12 ☽ 13 ♃ 14 ♁ 15	♃ 11 ☉ 12 ♂ 13 ♃ 14 ☉ 15	☉ 11 ♀ 12 ♁ 13 ☽ 14 ♃ 15
♀ 16 ♀ 17 ☽ 18 ♃ 19 ♁ 20	♃ 16 ♁ 17 ♂ 18 ☉ 19 ♀ 20	☉ 16 ♀ 17 ♁ 18 ☽ 19 ♃ 20	☽ 16 ♃ 17 ♁ 18 ♂ 19 ☉ 20	♂ 16 ☉ 17 ♀ 18 ♁ 19 ☽ 20	♁ 16 ☽ 17 ♃ 18 ♁ 19 ♂ 20	♁ 16 ♂ 17 ☉ 18 ♀ 19 ♁ 20
♂ 21 ☉ 22 ♀ 23 ♀ 24	♁ 21 ☽ 22 ♃ 23 ♁ 24	♁ 21 ♂ 22 ☉ 23 ♀ 24	♀ 21 ♁ 22 ☽ 23 ♃ 24	♃ 21 ♁ 22 ♂ 23 ☉ 24	☉ 21 ♀ 22 ♁ 23 ☽ 24	☽ 21 ♃ 22 ♁ 23 ♂ 24

To find what Planet rules any Hour of the Day by the Table No. III.

LET it be observed, astrological hours are regulated by the motion of the sun both in summer and winter; and the space of time which is contained from sun-rise to sun-set is divided into twelve equal parts, whereof the one half contains the hours before noon, the rest the hours after noon. So also the space of time from sun-set till sun-rise is divided into twelve parts: these hours are unequal, consisting of more or less than sixty minutes, as the sun recedes from Υ or \cong , as will be seen by example by the foregoing Table.

The seven planets are attributed by the ancients to preside over the seven days of the week, and each of them rules over the first hour of each day, as may be seen by the Table. The first planetary hour of Sunday is the Sun, the second is Venus, and so on; the first planetary hour of Monday is the Moon, the second is Saturn; and the same is to be observed of the other days.

The use of these Tables will appear by bare inspection, as they require no sort of calculation, but a person of the meanest capacity will be able to understand them. The reason of their being placed in this manner, in the form of Tables, is, because no Herbals which speak of the force and power of planetary influx, and the necessity of gathering herbs for medical use under the planet which principally governs them, have laid down any rule whereby any herbarist may know when those planetary hours are, and consequently could not know the fit time to gather them. This deficiency has not only occasioned much uneasiness in the minds of many medical gentlemen, but has much prevented the progress of cures, and many disorders have been deemed incurable from not making use of the precision which is absolutely necessary for the perfection of some cures.

These Tables are so calculated, as by bare inspection to point out those beautiful times, when man, who is endowed with a rational soul derived from the centre, is able, by expanding itself into the circumference of this outward nature, so to hit upon the hour, not only in gathering of herbs, roots, &c. but to administer them in a time corresponding thereunto, and thereby force from the patient the offending matter that robs him of the most invaluable blessing of health. But, as I intend not this as a treatise, but as a small part of the Key to Physic, I shall therefore pass over all observations on the ebb and flow of all sublunary virtues in terrene things, and only say, that truth needs not many words to recommend it, but will demonstrate itself by trial: so these Tables, and the rest of this little Key, will prove to the afflicted patient, or to the compassionate physician, the legitimate offspring of TRUTH and EXPERIENCE.

EXAM-

EXAMPLE I.

To find the planetary hour on Sunday, the 22d of April, 1792, at half-past ten o'clock in the morning.—I examine in the Ephemeris what degree the Sun is in, and find on that day at noon he is in three degrees of the sign Taurus; with this degree I enter the Table No. I. and seek three degrees of ϑ in the first column, and, by running even in the columns, in the seventh column I find 10h. 49m. which shows me, if I look on the top of the Table, that the fifth planetary hour would finish at forty-nine minutes past ten o'clock in the morning. Now I refer to the former column, and find the fifth planetary hour began at thirty-seven minutes past nine o'clock; and, as the time I entered was 10h. 30m. in the morning, and it being between 9h. 37m. and 10h. 49m. it proved to be the fifth planetary hour. To know what planet ruled this hour, I enter the Table No. III. and, counting down the planets in the first column under the word Sunday, find the fifth planetary hour on that day to be Saturn; if it had been on a Monday, the fifth planetary hour would have been the Sun; on a Tuesday, it would have been the Moon; on a Wednesday, Mars; and so on; by which rule may be found the planetary hour for any day of the week.

EXAMPLE II.

We will suppose that we want to find the hour of Venus on Saturday, the 19th of January, 1793.—I look into the Ephemeris, and find the Sun at noon on that day is in deg. 0 m . I enter the table marked No. III. and, in the column of the planetary hours under Saturday, I find the fifth hour is under Venus; now, as the Sun is in 0 deg. of Aquaries, I enter the Table No. II. in the right-hand column with 0 m , and in the ninth column on the left-hand I find the planetary hour of Venus began twenty minutes past eleven o'clock, and continued till noon on that day.

Such was the mode of practice, when nature only was consulted, and the intention really to make a cure, without a view to gain: then disease was but little known, and people lived to a good old age.

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GENERAL DIRECTIONS TO THE BINDER.

LET the Plates belonging to the APPENDIX be placed as nearly opposite to the description of each plant as circumstances will allow; observing never to place two cuts together, but to turn over the next leaf, so as to have one leaf of letter-press between them.

DIRECTIONS FOR BINDING THE KEY AND CULPEPER TOGETHER.

Let the APPENDIX be placed at the End of CULPEPER'S BRITISH HERBAL, which will complete the first Volume; and at the End of the MEDICAL PART of CULPEPER, add the KEY to PHYSIC, &c. which will divide them into two uniform Volumes, and make the whole Subject complete.—To be lettered, Dr. SIBLY'S FAMILY PHYSICIAN.

DIRECTIONS for BINDING Dr. SIBLY'S WORKS in FOUR VOLUMES.

LET the Sixty Numbers of the ASTROLOGY be divided into two Volumes; and the above two volumes added to them, making four in the whole; to be *double-lettered*, in the following Order, viz. The WORKS of Dr. SIBLY, to be the general Title of each Volume; then under Vol. I. is to be added, DOCTRINE of the STARS. Under Vol. II. CALCULATION of NATIVITIES. Under Vol. III. BRITISH HERBAL. Under Vol. IV. FAMILY PHYSICIAN.

Let the Portrait of Dr. Sibly be placed at the beginning of the first Vol. The Frontispiece of the Occult Sciences to front the second Vol. The Portrait of Culpeper the third Vol. And the Frontispiece of the Key, the fourth Vol.

A general Title for each Volume of Dr. Sibly's Works, to be placed before the Frontispieces, may be had gratis by those who have taken the whole in Numbers, and want to bind them uniformly, by applying at the publisher's.

END OF THE APPENDIX.











