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Contributors

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THE
POWER OF NATURE
IN DISEASE

BY

J. WALLACE ANDERSON, M.D.

*Formerly Physician to the Royal Infirmary, Glasgow, and Lecturer on
Medicine, Queen Margaret College*

"CONSULTRIX ET PROVIDA UTILITATUM OPPORTUNITATUMQUE
OMNIUM NATURA"—*Cicero*

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PART I

History of the Doctrine

AMID the activities and resources of art, never more abundant and more fruitful than in our own day, one is apt to lose or to ignore the underlying and enduring methods of Nature. Man claims art for his very own. To its exercise he is instinctively impelled, and in that exercise he finds his life's work and his reward. And the ways of nature that lie deep are apt to be unnoticed and to remain unknown. But surely of the physician better things are to be expected. If he bears about with him the traditions of his profession, if he knows anything of the lives which have made that profession famous, if he thinks but of his own name, the physician must above all things be a student of Nature.

Yet it would almost seem as if the close of the century demanded an apology for such a theme as this we have chosen. Our art asserts itself to-day as if Nature were a thing of the past. The great mother of us all, at whose feet we have played our little part from age to age, is at last gone, and she has left us—microbes. We think not. We think there is still something to be gained by the study of her methods and ways of working, as well as of the works themselves, of her methods of healing that are of no time or fashion, of her ways that were never new and are never to be old. In inviting attention to this subject we propose first of all to trace the development of the doctrine of the power of Nature in disease, and in doing so we shall keep within the period of written medical history in the ordinary acceptance of the word.

To commence then with Hippocrates, the father of medicine, we go back to the age of Socrates, of Plato, and of Aristotle, when Greek thought was keenest, and its art the purest; when medicine, allied as it was with philosophy, arose from this wealth of intellect to begin what was virtually a new life. We shall not stop to enquire to what extent Hippocrates was influenced and inspired by the still older masters of the Coan and Cnidian schools; and when we speak of his writings we shall do so in the widest sense, for it is equally beyond our plan



and our ability to discuss critically the genuineness of the many treatises existing under his name. That he was born about 460 B.C. sufficiently denotes the point of time from which we start.

It is in his memorable aphorism in the 6th book of the *Epidemics* that "Nature is the healer of our diseases" that all his teaching and practice centre. It is the final exposition of a truth for all time. No one need stop to prove that this doctrine runs through all his writings, or to show that in substance it is stated over and over again.

But the question once incidentally raised by Prof. Gairdner at a meeting of the Glasgow Medical Chirurgical Society,¹ What does Hippocrates here mean by nature or natures? is one of much interest, especially in view of the development which the doctrine underwent in later days.

It must be understood at the outset that this is not a question that admits of a precise answer. Let anyone ask himself what meaning he attaches to the word nature, and he will realise, especially if he has given some consideration to the matter, that it is very difficult exactly to say. And all that we can attempt here is to determine as best we may the attitude that Hippocrates takes throughout his writings in relation to this great and really indefinable force around us.

That he believed in the complete efficacy of Nature has never been doubted. It could not be. In *De Alimento* he says in his own terse epigrammatic way that "Nature is sufficient of herself for all purposes for every living being."² And in *De Diæta*, after speaking of the action of medicine in restoring health, he concludes by saying that it is Nature that effects this herself.³ But stronger even than the specific statement is the evidence pervading all his writings that in the course of the disease, in its every stage, one might say in every symptom, he sees Nature struggling to effect a cure. His whole doctrine of crises, sweatings, hemorrhages, etc., is based on this belief, a theory and consequent practice that in after ages brought upon himself the bitterest reproach.⁴

¹ *Glasgow Medical Journal*, 1885; vol. ii. p. 13.

² *Littre's Edition*, vol. ix. p. 103.

³ *Ibid.*, vol. vi. p. 491.

⁴ The opinion that we have the evidence of a belief in the healing power of Nature anterior to Hippocrates was held by Ermerins and Adams. The former maintained that the "*Prorrhetica*" and the "*Coacæ Praenotiones*" are pre-Hippocratic, and are the results of the observations made by the priest-physicians in the Asclepion at Cos. This view, according to Adams, has been established by Ermerins

Our difficulties begin when we enquire what Hippocrates exactly meant by Nature when he said it was the healer of disease. He undoubtedly in his writings uses the word in very different senses. For example he speaks of Nature as opposed to art; or again of Nature as we understand the term human nature; or again more specifically of the individual nature, constitution or temperament. But in what exact sense does he use the word here? To what extent does he believe it to be a special power which makes for recovery; and does he suppose it to be a deliberating intelligent force as has been held in modern times?

The inherent difficulty of the question is greatly increased by that very diversity in the use of the word to which we have just referred. In *De Alimento* he tells us that "The natures of the power," that is, the vital power (or, according to Littré, perhaps only the nutritive power), "are diverse." In other words, "the natures of Nature are diverse," using the terms in different senses, both of which are Hippocratic. This would be in harmony with the view held, according to Nemesius, by one section of the Greek philosophers, that there are as many species of Soul as there are organised structures. And Gairdner in preferring to translate the famous passage literally, "(Our) natures the healers of diseases," gives the word still another meaning. "The original," he says, "is at once more subtle and exact—'Our natures are the healers of our diseases,' in other words, the functions of the body which are disturbed in disease, and which in the aggregate constitute the *φύσις*, or nature of the body, are themselves the sources of healing."

This approaches very closely to the meaning of the term "faculty" (*δυνάμις*), and there is no doubt that by it Hippocrates means a special power. It is by the different faculties that every process in the human body is carried on. They make the blood, the spirits, heat, etc., flow to every part of the body. Each faculty has its own function and its own part. But it will always be a matter of opinion how far the terms "nature" and "faculty" are interchangeable in the Hippocratic writings; and altogether we do not think it possible to decide from anything that Hippo-

most satisfactorily; and in the works above mentioned we have references to the action of this power. Dr Ermerins' words are, "They (the two books) particularly relate the operations of a *natura medicatrix*." Adams' *Hippoc.* (New Syd. Soc.), i., 64 and 227. Sydenham indicated a similar opinion. *Works* (New Syd. Soc.), i., 16.

crates himself says whether he uses the word "natures" in a special or in a more general sense in his famous aphorism.

And then there is the question as to it being a deliberating intelligent force. We know that at a period somewhat anterior to Hippocrates philosophers were considering the soul less as an abstraction and more in relation to the body which it inhabited, Parmenides indeed holding that in man body and soul are one and the same. Aristotle considered the soul to be the *entelechia*, the actuality of the body, that which gave the body being. He further divided the soul in the generic sense into the vegetative, the sentient and the rational soul. To the vegetative soul was due the nutrition common to plants and animals; the sentient soul was concerned with sense perception; and the rational soul was the source of reason peculiar to man.¹ Here, then, we have both the specialisation of the generic soul and reference to its relation to simple growth, the growth equally of plants and animals.

Now though by the vegetative soul there was simply understood nature in its lower sense, *i.e.*, vital power or growth, still in its higher sense our natures derived an intelligence from the *entelechia* or generic soul. And speaking of Nature in the widest sense Aristotle says that "Nature and God are always working towards an end and striving after what is perfect."² Was it then this intelligent nature to which Hippocrates referred? It can hardly be, from the sentence which immediately follows the aphorism and which appears to have been virtually overlooked. "Nature is the healer of our diseases. She finds out ways for herself, not by intelligence (*οὐκ ἐκ διανοίας*), but just as in winking, using the tongue and the like." Could a thesis so essentially difficult to express in words be more clearly illustrated? It would not have helped us one whit if Hippocrates had said that Nature here acted automatically. That would only have been to transpose the difficulty to another word. But the illustration tells us that we are to understand that this Nature is not something intelligent or thinking, but a force which though not itself deliberate has all the effect or purpose of a deliberate act. No one can explain it; but Hippocrates gives us familiar actions that he believes are analogous. It seems strange, therefore, that

¹ Galen, *De Elementis ex Hippocrati*, Lib. i., cap. 5, asserts that Aristotle's system is but a copy of that of Hippocrates. (*Και μὲν δὴ καὶ τὸ εἶδος τῶν λόγων ὡσαντῶς εοικεν Ἀριστοτέλης πεποιησθαι τῷ Ἱπποκράτει.*) Kühn's edition, i. 448.

² De Cael, i. 4.

Le Clerc¹ and others should in the face of this argue that because Hippocrates speaks of Nature as "just," he apparently endows it with intelligence. Rather must we consider this purely a figure of speech, as when Sydenham refers to Nature as "fretted and vexed."

In seeking to explain the misconception, as we believe, of Hippocrates' meaning, which appears to have arisen at a very early period, we would suggest two contributing influences. First there is the speculative tendency of the age that would discuss soul, spirit, breath, innate heat, etc., as if these had a very tangible existence, and admitted of definite description; and second, there is the inclusion of many writings under the name of Hippocrates, which are quite at variance in their teaching with those admittedly his own. The term "innate heat" which we have quoted seems so far to illustrate both of these influences.

It has been remarked that there is a great resemblance between the effects which Hippocrates attributes to heat (*θερμον*) and those he attributes to Nature, notably in the 14th Aphorism, sect. I, which runs as follows: "Growing bodies have the most innate heat; they therefore require the most food, for otherwise their bodies are wasted. In old persons the heat is feeble, and therefore they require little fuel, as it were, to the flame, for it would be extinguished by much. On this account also fevers in old persons are not equally acute, because their bodies are cold." The "*calidum innatum*" is here evidently synonymous with vital force or simple vitality, and there is not the slightest suggestion of there being an intelligence in its action. Then in *De Carnibus* we read, "It appears to me that what is called Heat is essential and omniscient, that it sees and hears and knows all things present and to come." Here we have intelligence enough surely, but we would venture to say that this sentence is one of the strong internal evidences which we have against the genuineness of the work. And although this treatise and many others have in recent times been on general grounds quite decidedly set aside as spurious, still it can hardly be doubted that the number of these spurious writings existing under Hippocrates' name has greatly obscured his true teaching.

But while these circumstances have contributed to the foster-

¹ *Histoire de la médecine*, La Haye, 1729, p. 115.

ing of the doctrine of Nature an intelligence, the misconception was probably chiefly due to the fact that while Aristotle speaks of the vegetative soul in the sense that Hippocrates speaks of Nature in the famous passage, others have inclined to give to the latter term the wider meaning that attaches to the generic soul. But whatever be the cause, the fact remains that the conception of Nature so acting towards disease as if it were endowed with intelligence appears more or less definitely in the medical writings of every age, culminating, as we shall see in Stahl (seventeenth century) considering the rational soul as the source of all vital phenomena in the human body.

From the time of Hippocrates this doctrine of a vital force of Nature acting directly and essentially as a healing power has never been lost sight of, though often the subject of the bitterest censure, perhaps never in more trenchant and more uncompromising terms than when Asclepiades in the first century B.C. styled its practice a waiting or meditation upon death. We have only his writings at second-hand, but he is said to have maintained that Nature did more harm than good, and that the physician should not be her servant but her master.

Celsus, as we shall see by and by, when speaking of fever, indicates his belief in the doctrine, but Galen, in the second century A.D., the commentator of Hippocrates, stands out as its great exponent. His commentary on the famous aphorism from the 6th Epidemic is, that Hippocrates clearly considers Nature sufficient of herself, without the aid of art, yet able to consult like a skilful artificer for the good of animals; not only preserving the healthy, but restoring health to the sick, supplying all parts of the body with particular powers, which, like so many soldiers, protect them from disease.

Galen often speaks of this *contest* between Nature and disease (*De Arte Medica*), an old comparison that has been finally and completely justified only within the last few years. He maintains with Hippocrates, that Nature is wise, just, etc. But he goes further, for we find in Lib. ii. *De Diebus Decretoriis*, that the physician must be convinced of the absolute sufficiency of Nature, who with complete foresight, anticipates the needs of the body, etc. To what extent Galen here ascribes intelligence to Nature, or how far the expression is to be taken as figurative, we prefer to leave an open question. With all this Galen does not include under the term Nature the sentient or intelligent soul. By

Nature he would simply understand the vegetative soul of Aristotle, that is to say, organic life, which is common to animals and plants. He seems indeed to have been the first to detect the fallacy of Aristotle comprehending under the generic term Soul the phenomena and functions of organic life, as well as those functions which are peculiar to sentient and intelligent beings.¹

We have referred to heat, the *Calidum Innatum*, as having a close relation to Nature in the sense in which we have been considering it. This innate heat is again closely related to the *pneuma* or breath, which, as Hippocrates taught, conveys the sensibility to all parts of the body. This breath or spirit was "a sort of ethereal matter that serves as the vehicle of the intellectual and sentient principle, by the instrumentality of which the latter was supposed to operate on the organs of the body."² Such was Galen's view also, and the *pneuma* moved to and from the brain, the seat of the soul, through the foramina of the cribriform plate.

This idea of the existence of the *pneuma* persisted for centuries. Whether so termed, or, as Nature, Innate Heat, etc., it was held more or less generally to be intimately concerned with the preservation of health, until at last, in the first century of the Christian era, this principle became the basis of the system of a new and important sect, the Pneumatists, founded by Athenæus, a native of Cilicia. It did not as a sect exist after the second century A.D., but the basis of the doctrine was never lost sight of, and found expression many centuries later in the Archeism of Van Helmont, and Animism of Stahl. To this period we must now pass; for neither in the last days of Greek medicine, nor in the Arabian school which followed, do we find anything bearing on our subject sufficiently distinctive to call for notice.

After the revival of learning, the first prominent actor on the stage—one, indeed, who commands attention—is Paracelsus, who flourished in the early part of the sixteenth century. But how to take him is the difficulty. Not, at least, always seriously. With him, no doubt, Nature was sufficient for the cure of most diseases, and Art should only interfere to aid. Sound doctrine, indeed. Nature was his only book, and so he burned the works

¹ Thomson's *Life of Cullen*, i. 170.

² Adams' *Hippocrates* (New Syd. Soc.), ii. 837, 838.

of Galen and Avicenna. His shoe buckles were more learned than they ; but he believed in Hippocrates, and wrote a commentary on his aphorisms. With him must be bracketed Van Helmont, who flourished in the latter half of the sixteenth century, and Stahl, who lived a century later. Though usually classed as "naturalists," there is one feature that binds them in a closer brotherhood, namely, a degree of mysticism which runs through all their writings, in very varying quality, no doubt, as well as degree, but not greater than may be found in members of the same family. Paracelsus had his *Ens Spiritale* as well as his *Ens Naturale*, although the scope of the former is quite general, and not an influence of a conserving or healing character alone ; it is classed rather amongst the causes of disease.

Something of the same character is the Archeus of Van Helmont, "the principle," he says, "created by God, which makes everything what it is, and become what it ought to be. Every animal, every vegetable, every mineral, has a builder, a Vulcan, an internal architect, a hidden breath (*aura*)." Here, then, we have a revival of the old pneumatist doctrine—vital force or Nature, with the underlying idea of an intelligence, an *aura* or *pneuma* which inspires everything and determines what it is to be. The Archeus includes not alone the vegetative, but apparently also the sentient soul of Aristotle, with the addition of intelligence, and except when the rational soul interferes it (the Archeus) is the sole director of whatever is done in the animal economy.

Paracelsus and Van Helmont felt that an intelligence was needed to direct and control processes so varied and complicated as occur both in health and disease, and yet they could not suppose that the rational soul was the prime mover, for then the individual would have the direct control over those processes, an idea which we could not entertain. Yet Stahl went that step further, and ascribed all vital phenomena to the rational soul. As he remarks, "to attribute to the human soul the power of forming the body and keeping it together by a nutrition continuing throughout life, is to impose upon it a function not more difficult than assigning to it the power to rule and direct the movements of the body." So that while it is the vegetative soul, according to Aristotle's classification, that corresponds to Nature as generally understood by Hippocrates, it is the *anima* or rational soul of Stahl that now takes this position. It was the

duty of the rational soul to keep the body within "the latitude of health," as the old writers phrased it; and when these limits were passed, it was the rational soul that endeavoured to overcome the morbid influence and bring the body back again to the normal state. And yet, though he must needs ascribe all this to the rational soul, he is compelled to admit that it only manifests reason and design; that it is, in fact, an intelligent agent. Subtlety, indeed! Stahl needed Hippocrates' illustration of automatic movements to give us just a semblance of what he meant. "These views," says Bostock, "tended to repress the energy of the practitioner still more than the pathological doctrines of Hippocrates, inasmuch as the *anima* of Stahl was conceived to exercise a more direct influence over the operations of the economy than the *φύσις* of Hippocrates, which was simply a general expression of these actions, and which, according to circumstances, might be either beneficial or injurious to the system." And though the reaction against such an extreme view was rapid, its influence on medical opinion regarding the healing power of Nature continues to the present day.

To appreciate a great factor in this reaction, we have to hark back a little and come nearer home. Some fifty years before, the immortal Sydenham as Boerhaave called him, the English Hippocrates as we love to call him still, had bequeathed to the world that story of his faith in nature, told in the simple language of a true genius. He had no partial belief in Nature's powers of healing: he magnifies her office on every page. He, too, sees her hand working for a cure underlying every type and stage and symptom of fever; or if he cannot see it, he still believes that it is there and looks for it. And some of us may think in our wisdom that he sometimes finds it in vain, as when he fancies he discovers the finger of Nature indicating by the harassing irritation of the small-pox pustules that the patient should be out of bed, at least from time to time.¹

He looks for Nature's way, for in it the physician must go. "That practice, and that alone, will do good, which elicits the indications of cure out of the phenomena of the disease itself. It is this," he says, "that made Hippocrates divine."² Even disease itself, "however much its cause may be adverse to the human body, is nothing more than an effort of Nature, who strives with

¹ *Sydenham's Works* (Syd. Soc.), ii. 60.

² *Ibid.*, ii. 20.

might and main to restore the health of the patient by the elimination of the morbid matter."¹ And so Nature is better than physic; and yet physic has its use too, for Nature may, indeed often does, need help. "Whatever method helps Nature conduces of necessity towards the cure of the disease. Nevertheless, by the help of specifics, the patient might find a shorter way to his recovery. He might also be placed beyond the pale of those dangers which follow the aberrations of Nature."² But physic fails if Nature be contrary. Then "we must guard against doing violence to Nature, and not be too obstinate in our attempts. When Nature is resistant, you may kill the patient in forcing her."³

We have noted how Le Clerc remarks on Hippocrates apparently endowing Nature with intelligence by calling her "just." As well might we urge that Sydenham does so in saying that Nature triumphs, or that she has mother-wit, or that she is sometimes "*furiis agitata*." Such figures of speech are rarely used by Sydenham, but we know from himself that they are only that, and nothing more. He tells us what he means by Nature in words that reveal the good and great man, and make amends for the scant records of his outer life. "I often use the term Nature, and attribute to it various effects; just as if I pictured to myself under this name something universally diffused throughout the whole framework of the world; something that ruled, as it were, and regulated all substances reasonably and with intelligence; something, in short, like the *animus mundi* in the ideas of some philosophers. . . . Throughout my pages I have used the term Nature as an old word with a limited meaning, a meaning which I believe all understand and some adopt. Hence as often as I apply it, I mean the whole complication of natural causes; causes which, in themselves are brute and irrational, but which nevertheless are regulated by the highest reason, and which, under its guidance, perform their functions and exhibit their operations. The Supreme Deity, by whose power all things are produced and upon whose rod they depend, hath in His infinite wisdom so disposed all things, that they betake themselves to their appointed works after a certain order and method; they do nothing in vain; they execute only that which is most excellent, and that which is the best fitted for the universal fabric

¹ *Ibid.*, i. 29.² *Ibid.*, i. 21.³ *Ibid.*, ii. 46.

and for their own proper natures. They are engines that are moved, not by any skill of their own, but by that of a higher artificer."¹

His fame spread rapidly. Before the end of the century, Baglivi of Rome had frequently heard him styled "the doctor for fevers," and a few years later Boerhaave had singled out his works for special study. Sydenham and Boerhaave had much in common. They were both devoted followers of Hippocrates. They write in the same strain. Boerhaave's inaugural oration, when in 1709 he was appointed Professor of Medicine and Botany at Leyden, had reference to the simplicity of true medical science, "wherein exploding the fallacies and ostentation of alchemistical and metaphysical writers, he reinstates medicine on the ancient foundation of observation, experiments and deductions naturally resulting from them."²

He rejects all vain and useless hypotheses. "We cannot," he says, "understand or explain the manner in which the body and mind reciprocally act upon each other from any consideration of their separate nature; we can only remark by observation their effects upon each other without explaining them." And what is Nature? Simply "that chain of causes and effects which ultimately terminate in the sovereign cause and director of all things." He has no tolerance for the doctrine of a special intelligent force that directs the processes of health and controls those of disease. "I can scarcely believe," he says, "that Helmont was so insane as to credit all these things which he wrote about the Archeus; and as often as he says that the Archeus desires, selects, digests, and expels food, he seems to have meant nothing more than that food is desired, selected, digested, and expelled by some unknown power."³

Boerhaave died in 1738, exactly fifty years after the death of Sydenham. And as Sydenham's sovereignty was undisputed in the second half of the seventeenth century, as he inspired the thought and practice of Boerhaave, so did the latter reign as the supreme authority in medicine till late in the eighteenth century. Without anticipating the reputation of our own Scottish authority, Cullen, it is interesting to know from himself that when about the middle of last century he ventured to deliver opinions regarding the nature and cure of disease differing from those

¹ *Ibid.*, i. 119, 120.

² Burton's *Life of Boerhaave*, p. 31.

³ "Physiology," sect. 107, note 5.

of Boerhaave, he was stigmatised as a "Paracelsus, a Van Helmont, and a whimsical innovator." It is not as a fact in Cullen's life that we mention this here, but in support of what we have already said that to Sydenham and Boerhaave is mainly due the emancipation from the transcendentalism of Stahl and Helmont and Paracelsus.

Reference might reasonably be made to many others. To Hoffmann, for example, the colleague and rival of Stahl. He would have none of Stahl's rational soul, but believed that the different parts of the body can act and react on each other through their chemical and physical properties, and particularly through the nervous system, which transmits that ether-like fluid which gives tone to muscle, and controls the heart and circulation which is the life itself. He distinctly says that "by the nature of the human body, which according to Hippocrates is the foundation and the beginning of all medical doctrine and demonstrations, we understand nothing else than the economy of the vital motions. To watch these motions attentively, and when they deviate from proportion or symmetry, when they become too strong, or when from various causes they slacken or become deficient, then to reduce them to moderation by proper remedies, that is rightly judged to be the only and principal business of the physician." But we think the authorities we have mentioned are sufficient to outline the history of our subject up to the middle of the eighteenth century. We shall only remark further that the general trend of medical thought during the sixteenth and seventeenth centuries was steadily becoming less and less speculative, as the renewed study of anatomy, born of the genius of Vesalius, was every year becoming more and more diligently pursued, and yielding to its votaries a more and more abundant fruit. Following upon the new chemistry of Boyle, there came too, in the eighteenth century, the new physiology of Haller, he who finally demonstrated the inherent irritability of muscle, the *vis insita*, a force or property, a very life, quite independent of either will or nervous system. Thus did medicine find its fitting field of study in the human frame. The physician became less and less of the priest; the study and the cure of souls became more and more confined to philosophy and the church.

Hitherto we have traced the history of our subject through these memorials of great men, which seem to rise above the

ravages of time. But they carry us to solitary heights, from which the ordinary routine of everyday life can be but faintly, if at all, discerned. We wish we could catch a picture of the throng below, of the common wayfarer with whom we might have rubbed shoulders, or essayed to hold our own, had we lived a century or two ago. No doubt in the smaller works on the Art of Physic, which date some three centuries back, we get nearer to the general notions of the times, but even those authors were the exception in days when few read books and fewer wrote them. However, while investigating the history of our subject, we were fortunate enough to find a work in the Library of the Faculty of Physicians and Surgeons, Glasgow, on this very question published so far back as 1705. Of the author, Conrade Joachim Sprengell, very little is known. The work is entitled "*Natura Morborum Medicatrix, or Nature Cures Diseases, wherein The Energy of Nature is Demonstrated; Her Operations Explained and Her Various Steps are rendered Intelligible; in order to The Excussion of Noxious Humours, and the Preservation of Human Life.*"¹ He tells us he is a native of Germany, but resident in England; and he dedicates the whole work (the first part of which is merely his translation from the German of a surgical treatise) to Prince George of Denmark, the husband of Queen Anne.

Our author is evidently an observer of Nature in the widest sense. In his preface to the treatise of which we are now speaking he says:—"No sooner is a man delivered from his close confinement, to breathe the open air, but hundreds of internal diseases conspire against him. He scarce receives an entrance into life, but is amidst a thousand preparations for diseases and death: *Homo morbum gerit, morbum quærit!* How many diseases are contracted by his ungovernable passions, and how many infirmities does he carry about him, both in body and mind; and yet he is continually seeking for more; not only in eating, drinking, standing, walking, sleeping, watching, thinking

¹ We have not found any biographical notice of Sprengell, save the few lines accorded to him in the Roll of the Royal College of Physicians, London, edited by Dr Munk. From this it appears he was a native of Leipsic; admitted L.R.C.P. in 1719; received the honour of knighthood from George I. in 1725; and died in 1740. We are further told that he published a translation of the Aphorisms of Hippocrates and sentences of Celsus in 1735; but no mention is made of the work above referred to, or of the 1st Ed. of the "*Aphorisms*" published in 1708, both of which works are in the British Museum Library.

and imagining ; but his eyes invite what is his ruin ; his ears hearken after mischief ; his tongue affects what is pernicious ; his nose delights in things that are noxious and his desires are always hurrying him to destruction." But, fortunately, men are "miraculously preserved by Heaven and the vigilant operations of Nature ; of which I have sufficiently discoursed in the following treatise, by showing first, that by Nature is to be understood an immanent principle, or the Soul vitally acting for the conservation of our corporeal machines, and how those actions are performed. Secondly, that this internal agent, Nature, is still endeavouring to free the body from what is prejudicial to it ; and that she performs these actions by secretion, excretion, and nutrition. That by this means, many diseases are cured without the use of medicines and their causes sometimes expelled before they can produce their effects ;" and so on.

This sufficiently sets forth the purpose of the book. But as a follower of Hippocrates and Sydenham, he is well aware of the charge that may be brought against him by the profession ; and so he goes on to say :—"This discourse on Nature has no design to expose or render the noble art of healing useless, as some may perhaps conjecture from the title of the treatise. No ; but rather to make it appear in its proper lustre, to convince all men of its certainty and the incomparable benefit that redounds to mankind by the use of it." The work itself consists of some thirty pages in quarto, and is divided into five chapters. Notwithstanding the captivating purpose of the work as above mentioned, there is not much that need be quoted from it, even were this the proper occasion for doing so. At the same time, the fact of this being apparently the oldest special work on the subject extant warrants for it more than a mere passing notice.

He begins by summarising the ancient views regarding this "something in human bodies by which all the vital functions are ordered and directed" ; and this he does in quite the orthodox fashion. If he wanders a good deal into what would seem to our utilitarian age vain speculations, he returns betimes to rest a little on everyday experience :—"All that consult their own reasons and are not biassed by fancy and affectation of novelty will soon find themselves obliged to acknowledge the spontaneous and intrinsic power of this agent in conquering diseases and curing corporeal hurts, as may be easily observed in the reparation or restoration of any of the solid parts, in repurging and preserv-

ing the fluids, which daily falls under the remarks of *Clinick Practitioners.*" After having once more indulged in a few abstractions, a practice which he always counsels his readers to avoid, he fittingly concludes the first chapter with the wholesome injunction to "look a little further into the effectual operations and efforts of Nature that we may follow her steps with greater ease and delight, and reap the more benefit from her precepts and examples, to the glory of God, the health of our patients, and our own credit and satisfaction."

In the second chapter he considers it his business to demonstrate "How Nature frees the body from hurts and diseases when its health has been assaulted by such accidents," which we need hardly say he does not exactly do; but he immediately proceeds to give a very suggestive illustration of the manner in which Nature acts according to special requirements. "Supposing a large muscle was cut asunder, if the same fibres which were united before were not afterwards directly and exquisitely joined together again with their ends to one another, it is certain such a muscle must unavoidably lose its motion, or if it has any, it must necessarily be very indirect and confused for ever after. Now it is not, we know in the power of the best artist in the world to complete such a restitution, and actually join such small and tender fibres exactly together again and as they ought to be without making some or other unhappy confusion among them; and yet we see this wonder is every day easily accomplished in great perfection by our intrinsic agent, indulgent and skilful Nature."

The rest of the chapter is devoted to the discussion of the old doctrine of cure by fluxion, coction, and so on. The remaining chapters are disappointing. He becomes discursive and obscure, and we do not feel warranted in drawing further upon his pages. He only mentions Sydenham once, but we may feel sure that he had caught the spirit of the great master, who had passed away some fifteen years before.

It is fitting that we should close the purely historical part of our subject with the name of one of whom Scotland is justly proud, William Cullen, admittedly the greatest medical authority of the latter half of the eighteenth century. He may be said to be the last great exponent of the doctrine of nature curing disease. He had a mind naturally disposed to theory and general-

isation, but he builds on carefully observed facts, and he was granted the foundation of a long and matured experience. We think it right to say at the outset that Cullen appears to have been the first to adopt the phrase *Vis Medicatrix Naturæ*. This may seem to be hardly credible, as since his time it has been generally employed to express the great principle of which we are speaking. Adams, for example, in his edition of Hippocrates always uses the phrase in such a way, that the casual reader might suppose that it was at least a very early Latin rendering of some ancient Greek original. But it is the *language* as Cullen himself would have said of the *Vis Medicatrix Naturæ* that is old, and not this precise phrase. Thomson in his elaborate life of Cullen, does not say that the latter was the first to employ the phrase, but that is to be inferred from the context in certain places, while on the other hand it evidently quickly became a current expression, one which Cullen assumes in his lectures to be well known to all concerned. We have not at least found the phrase in the writings of any earlier author, and this is worth noting, because Cullen's habitual use of it must be regarded as a potent factor in the revival of the idea of a special principle. There was the great fact of the *Vis insita* of Haller, which anyone could demonstrate for himself. Here was undoubtedly another *Vis*, the word at once suggested speciality, and the safer *natura medicatrix morborum* was forgotten.¹

If this was the effect of Cullen's teaching it was clearly not his intention. He only intended the phrase to indicate a *something* whose action on the animal economy he was bound to recognise though unable to explain. He had spoken too so often of this *vis medicatrix naturæ*, that we can imagine some friendly banter with his *confrères* over his pet hobby, from his enemies much misrepresentation (and Cullen was sensitive to unjust criticism), and, perhaps, even from his students an occasional

¹ The transition itself is seen in a sentence from his Lectures introductory to a Course of Practice of Physic. "This power physicians very anciently attributed, under a vague idea, to an agent in the system which they called NATURE, and the language of a *vis conservatrix et medicatrix naturæ* has continued in the schools of medicine from the most ancient times." *Cullen's Works* (Thomson's Ed.), i. 404. We are quite aware that in his *Physiology*, sect. 120, he says, "This is what has been termed the *vis medicatrix naturæ*, but as this is in every book," etc. But we think he means here that the principle is admitted in every book, and that Russell in his *History and Heroes of Medicine* (p. 328), is correct when he says that Cullen gave it this name. He had such adjectives as *creatrix*, *genetrix*, *consultrix*, applied to Nature by Lucretius and Cicero, to guide him.

protest. In any case, a mind with the grasp of Cullen's, would see that this was a truth with many sides and many issues. And great teacher that he was he would be impartial; and so he says, "With regard to the mutual connection of these several states, I have only gone so far as to say that it has a reference to a general law of the system—or that there is a *vis medicatrix naturæ* or *autocrateia*—or that the system has a power to redress its own deviations, or that there is a power in the economy to resist and remove such things as are hurtful."¹ And again, "Now whether this power is to be imputed to the body or to the mind, it is not necessary to enquire here; the fact is enough, that there are symptoms which may be attributed to a *vis medicatrix naturæ*, or in other words, to a tendency in the economy to redress its own deviations."²

Whatever it was to be called, he firmly believes in the power or principle, and speaks of it repeatedly in his published works, particularly with reference to fever, to which we shall refer later. He even goes further and considers that the disease itself may in a sense be said to call out the remedy, as when he says, "where a deviation from the natural state of health happens, from the nature of the economy this deviation naturally produces a tendency in the system to restore itself to its former condition. This I say constitutes the *Vis preservatrix* and *medicatrix naturæ*."

But there was another important issue of this doctrine that presented itself to Cullen. He was fully alive to the errors in practice into which it might lead some feeble folk. Once more he would be fair, and so, "The general doctrine of nature curing diseases, the so much vaunted Hippocratic method of Curing, has often had a very baneful influence on the practice of physic, as either leading physicians into or continuing them in a weak and feeble practice, and at the same time superseding all the attempts of art." It was simply a warning against a habitual retreat into the convenient refuge of the purely expectant treatment. But once in his introductory lecture to a Course of Practice of Physic, he goes much further. "The *vis medicatrix naturæ*," he says, "must be received as a fact; yet, whenever it is admitted, it throws an obscurity upon our system, and it is only where the impotence of our art is very manifest and considerable that we ought to admit of it in practice." We do not

¹ Thomson's *Life of Cullen*, ii. 132.

² *Ibid.*, ii. 317.

hesitate to say that this is one of those rare and fatal errors into which the boldest and the wisest may fall. The words cannot be explained away, for the obscurity lies solely in the essence of the principle, what it is, and not in its mode of action, what it does; and as for the conclusion to which he comes, we must leave it with the mild criticism passed upon it by his biographer, that it was come to "somewhat incautiously and perhaps even inconsistently with his general views."

Cullen undoubtedly believed in Nature's restoring power as taught by Hippocrates. We shall see by and by how he embodies its action in his doctrine of Fever. And in disease generally he will always admit the influence of the "salutary tendency." Sometimes he refers to a more special action. For example, in speaking of the medical effect of narcotics, he says, "It seems necessary to assign some other cause than the directly stimulant power of the substance applied, and this cause appears to be that resistance and consequent activity which the animal economy is suited to oppose to every application that has a tendency to hurt it."

We must always remember that Cullen lived in an age when the belief in the reality and power of the medical art was again in the ascendant, and he led in that as in everything else relating to Medicine. He would be true to both nature and art: as we have said he wished only to be fair. He would take warning by Stahl and his followers who had greatly erred in this respect. "Trusting much," he says, "to the constant attention and wisdom of Nature, they have proposed the art of curing by expectation; have therefore for the most part proposed only very inert and frivolous remedies; have zealously opposed the use of some of the most efficacious, such as opium and the Peruvian bark; and are extremely reserved in the use of general remedies, such as bleeding, vomiting, etc." The wish to protest emphatically against such a view as this of Stahl's, will partly explain the hasty assertion referred to above. And we can easily gauge his final position by the careful study of his works. He admitted the all-pervading influence, call it vital principle or force or anything. But it was not to be uncontrolled; only when our art failed us was it to be trusted to alone.

With such a history as that which we have just outlined, with all that one knows of the attempts of the most learned in our own time to fathom the mystery of life or of nature, we

cannot but be struck with a sense of awe when we find ourselves face to face with the great enigma, What is this Life or Nature? Look at it as we may the silence of all the centuries remains unbroken. What nature is absolutely we can never know. We are, however, at that point in the consideration of our subject when it is right that we should admit this if we can do no more. And we may still contemplate the great Sphinx-like mystery, while we listen to the story of the guides. Augustine says that "Nature is the will of God."¹ We doubt if anything can approach this as a definition, and we dare not touch it. Newton's "God acting according to natural and uniform laws" is a mere paraphrase beside it. Then we have Darwin from another standpoint saying, "I have also often personified the word Nature; for I have found it difficult to avoid this ambiguity; but I mean by Nature only the aggregate action and product of many natural laws, and by laws only the ascertained sequence of events."² And Huxley tells us that "Nature means neither more nor less than that which is; the sum of phenomena presented to our experience; the totality of events, past, present and to come."³ Lastly Herbert Spencer defines life as "the continual adjustment of internal relations to external relations." All quite incontrovertible; and so the riddle remains.

But with regard to this healing power, we know at least that it is but a department of Nature's vast economy. Probably no one now considers it a special force, still less an independent, intelligent force, as some have maintained in the past. And while it is not one of the ordinary processes of the body, we do not say that it is one whit more remarkable than these functions that are performed so unheeded, because so unconsciously and so perfectly performed all through life. There are marvels in the performance of every act; and what greater marvel is there than sleep itself, that brings all conscious action to a close. But although the *vis medicatrix naturæ* is not a special force *per se*, it is special in the sense that it is exceptional in its application, for it finds no place in the trivial round of healthy, happy life; and then of its own limitless resources, only a fraction can be made manifest in even the most sickly. It is for these two reasons that one is apt to imagine that there is a greater evidence of

¹ Voluntas Dei rerum natura est.

² *Animals and Plants under Domestication*, i. 6.

³ On Hume (*Essays*), p. 154.

design in its action than in the routine functions of normal existence. Before going further, however, we had better give an illustration of the force itself to make our meaning plain.

A man gets a thorn into his hand quite under the skin. It is not extracted, but it cannot be allowed to remain there. What happens? Inflammation is set up, suppuration takes place around it, the skin over it dies, gives way, and the thorn is floated out along with all the mess it has made. In fact it created a disturbance and was turned out. No doubt it smashed a few things in the process, but that is willingly and quickly put right at the expense of the proprietor. This then is an example of a very summary and effectual ejection on the part of the *vis medicatrix naturæ*.

Now this is a very natural action. It is very natural that this disturber of the peace should be cast forth. And yet the action is very special in the sense that throughout the whole life of a man it may never occur once. Its speciality in that respect, and the evidence of design that it affords, are the two factors that create in our minds the sense of interest and of admiration. But in itself it is obviously not more interesting or more admirable than the ordinary processes of normal life. Let us take another example of a still more special action.

The walls of an artery, through injury or disease, begin to yield at a particular point under the normal pressure of the blood; a sac is formed, communicating, we shall suppose, by rather a small orifice with the artery. What probably occurs is this. The blood, in coming in contact with what is to it a new, a strange, an *unnatural* surface—we can give no other explanation—begins to coagulate in a thin film over the walls of the sac, and layer after layer is formed till, in some cases only too exceptional, the entire sac is filled up and a spontaneous cure effected. It is undoubtedly the very exceptional occurrence of such a phenomenon as this that makes one wonder at it and think of the intervention of a special beneficent and even intelligent force. For it will not occur once in a thousand people though we know the issues are momentous enough when it does occur.

It was these considerations that led Stahl and his followers to take the extreme position they did, a position in some respects so ludicrous that it has been doubted if they held it seriously. Let us suppose for illustration that a person swallows some

obnoxious article of food, something that the sooner it is got rid of the better for the organism. There are twenty things the irritant does not do. It does not affect the intelligence, it does not paralyse a limb or occasion a fever. No, but as an irritant it reverses suddenly the normal action of the stomach and the food is ejected. A very effectual procedure this is, no doubt, but not one that we are accustomed to surround with a halo of pleasantries. Yet the doctrine of Stahl would lend quite a dignity to the act. He would have said it is not the obnoxious food that irritates the stomach wall to vomiting. It is that the rational soul itself perceives the obnoxious food, and, knowing the consequences, proceeds to induce emesis.¹ But we shall further refer to this immediately in considering the objections to the acceptance of this principle.

The examples we have given will, we think, be sufficient at this stage of the enquiry to indicate the opinion we hold regarding this force. We may, however, formulate that opinion in the following proposition. In the animal economy we see very special and often very complicated processes set up in antagonism to the attacks and inroads of disease; they attract our attention and evoke our admiration because they are special and of necessity rare, though of themselves they indicate no greater a degree of design or of prescience than do all the phenomena of Nature. Probably there are not many who will greatly contest such a proposition as a whole, although there are undoubtedly many difficulties in the way of its unreserved acceptance. These seem to us to be mainly as follows:—

I. The difficulties arising from the inherent complexity of the human organism. These difficulties admit of neither denial nor compromise. Everyone admits them and must continue to do so. They have been fittingly summarised by the master mind of Paget. "It is not only that the pure science of human life may match with the largest of the natural sciences in the complexity of its subject matter; not only that the living human body is, in both its material and its indwelling forces, the most complex thing yet known; but that in our practical duties this most complex thing is presented to us in an almost infinite multiformity. For in practice we are occupied not with a type and pattern of the human nature, but with all its varieties in all classes of men, of every age and every occupation, in all climates

¹ Based on a similar illustration of Cullen's. *Physiology*, sect. 122.

and all social states ; we have to study men singly and in multitudes, in poverty and in wealth, in wise and unwise living, in health and all the varieties of disease ; and we have to learn, or at least try to learn, the results of all these conditions of life.”¹ Then there is—

2. The protest of a practical age against anything mystical or ultra-speculative. “The essence of modern, as contrasted with ancient physiological science appears to me,” says Huxley, “to be in its antagonism to animistic hypothesis and animistic phraseology.” If that is so we shall endeavour, in the paper which is to follow, to avoid animistic phraseology as far as possible, or when we do make use of it, we shall do so with becoming modesty. We shall not enter into any further speculation as to the character of this force nor attempt to define it. We shall remember what Cullen says in his study of the febrile state, “My anxiety is not to find out *how* it happens, but to find out *what* happens.” In that spirit we shall pursue our enquiry. Another difficulty that we meet with is—

3. The positive and extravagant assertions regarding the action of this force in particular cases, cases perhaps in which this action is at best very doubtful and possibly purely fanciful. This is a danger from which, of course, no creed is exempt, and we admit that it exists here. Even though a Sydenham declares that the disturbing irritation of the small-pox pustule is Nature’s indication that the proper treatment for the patient is that he should have the freer movement that being out of bed allows, we receive the statement with caution if not with a positive denial. Or suppose one were to urge that sea-sickness was a *Vis Conservatrix Naturæ* teaching or striving to teach mankind that the land and not the sea was his proper sphere, one could hardly expect an unqualified acceptance of the proposition even from a less prejudiced individual than the traditional Briton.

4. Another difficulty or objection arises from ignoring the fact that this principle often needs help, perhaps indeed control, and especially may have two opposite and antagonistic conditions to bring about. In other words, it must be admitted that frequently Nature seems to err. Her original intention was good, but it failed to meet the exigencies of new and complicated conditions. We might even say that her general action as a wholesome process may become frustrated in certain

¹ Inaugural Address, International Med. Congress, 1881.

species, though evident enough in the class or order generally. The development of disease may have outrun the development of Nature's remedy. For example, sweating in fevers as a class is unquestionably her method of attempting a cure, but in some species or varieties, and in many particular instances, it is a serious aggravation of the disease. And again, the lesions of mucous membranes which characterise a certain class of maladies, may, like those of the skin, indicate the mode of getting rid of the poison which Nature adopts, yet lead in special diseases to a dangerous condition or even a fatal issue, as for example, in diphtheria, or enteric fever. As the poet says—

“Nothing does good but what may also hurt.”

Sometimes, indeed, the ends which Nature has to fulfil are clearly contradictory. The suppuration which floated out the thorn with so much advantage may in some other instance be futile ; or it may even become, under certain conditions, a source of imminent danger to life. In those circumstances Nature not only requires but implores our aid. Even she cannot satisfy two absolutely antagonistic demands. We have here to some degree anticipated and answered a further objection to the acceptance of this doctrine which might be offered, the last to which we shall refer, namely :—

5. The derogation of our art which this principle is supposed to imply. The cry is, Our craft is in danger. Its dignity if not its very existence is assailed. But we need not fear. Our calling is the ministry of Nature ; and if Nature (or to limit our position slightly), if an existence under primitive and more natural conditions demands our aid, how much more the exigencies of the highly developed civilised life of modern times. For art creates the need of art. And so the scope of our ministry is ever growing. That it is purely a ministry cannot be questioned. “The physician,” says Hufeland, “must not pretend to be *magister*, but *minister naturæ*,” or as Bacon said two centuries before, “*Homo, Naturæ minister et interpres.*”¹

Nature, as we have said, often demands our aid, as for example, when she has conflicting ends in view ; or she may overreach herself, she may do too much. The old writers understood this well. Gaubius, the pupil of Boerhaave, says

¹ *Novum Organum*, Aph. I. See further Prof. Gairdner's Presidential Address ; Brit. Med. Assoc., 1888.

that "Nature commits her own errors and sometimes resists with a force which, because it exceeds due bounds, occasions much danger and even death itself." And even Nature successful may present some dangers. "Victory," he says, "is seldom without a wound."¹

¹ *Institutiones Pathologiæ Medicinalis*, 1758.

PART II

Fever—Inflammation—Hæmorrhage—Pain— Insensibility—Conclusion

IN the foregoing pages we have sketched the history of the doctrine of Nature the healer of disease, and we have stated our attitude generally with regard to that doctrine. We would now discover if we can some of the methods of Nature which illustrate her power in disease; and this not in particular disorders so much as in the ordinary phenomena of disease generally. To assert her action in every stage and symptom of every ailment, would simply be to invite the rejection of the whole doctrine. But we think that one may with advantage inquire into her ways of working in the broader manifestations of disease. This we shall endeavour to do; and we propose in the first instance to consider the evidences of this principle which appear to be found in

Fever

And first of all the febrile condition generally, the state of pyrexia, may be considered to be an indication of the healing, or at least the conserving, power of nature. Even in this sense the idea is very old, though not, we think, Hippocratic. The earliest reference we have found to such an opinion is the remark of Celsus that Asclepiades professed that the principal cure for a fever was the disease itself. Had this been all, the axiom would have been perfect—the fever is the means, or rather the expression of the means, adopted to overcome and dislodge its own immediate cause. But Celsus goes on to say that Asclepiades meant by this, that it was the exhaustion of the patient's strength by the fever that was good, and that his practice was to fatigue the patient in every way possible for three days and only give food on the fourth. Celsus himself did not by any means hold this view, and so when he says that "while fevers are themselves diseases they are the remedy for others" (*morbi sunt et medicina*),¹ he may be credited with being the first to state the pro-

¹ Opera, Lib. iii. cap. 3.

position in terms so unequivocal and pronounced as to satisfy the most ardent supporter of the doctrine. Celsus was a thorough believer in nature. "Medicine can do nothing in opposition to nature;"¹ and again, "The same things are often salutary, often in vain, so it may be doubted whether the return to good health be owing to the medicine or the constitution."²

When we say that we think the idea of fever being a conserving power is not Hippocratic, it must be clearly understood that we refer to the febrile state as such. Not that the point is important, for all the phenomena of a fever were, according to Hippocrates, salutary processes. With him fever was the increase of the innate heat of the body, the result of the coction of its humours; and this coction again was intended to increase the viscosity of these humours and thus effect their expulsion. This old view has never been lost sight of. But that the state of fever itself is an expression of Nature's conserving power (or resistance to disease) is a comparatively modern view, and is not, so far as we have observed, just exactly set forth even by Sydenham. He says at the very beginning of his Medical Observations that disease "is nothing more than an effort of nature, who strives with might and main to restore the health of the patient," etc., but it is disease that is the effort, nor does he say that the effort is the cause of fever.³

One is therefore constrained to agree with Thomson, who is rarely wrong in these matters, when he says, "Stahl was, so far as I know, the first pathologist who explicitly stated and maintained that diseases such as fevers, inflammations, hemorrhages, spasms, etc., proceed chiefly from the reaction of the organic system excited by the operation of noxious powers, and are to be considered as salutary efforts of the soul to defend the vital economy from the dangers that threaten it."⁴ Cullen also quite clearly expresses the opinion that fever itself is an evidence of the resisting force. "I suppose," he says, "that in every fever there is a power applied to the body which has a tendency to hurt and destroy it, and which produces in it certain motions which deviate

¹ *Ibid.*, Lib. iii. cap. i.

² *Ibid.*, Lib. viii. Præfat.

³ We note here, without further comment, a remark of Latham, his eminent biographer. "The belief (*i.e.* Sydenham's belief) that fever is an effort of Nature to expel morbid elements and that critical evacuations are the means she uses may possibly be an error. Nevertheless it is an error that half the physicians of the whole world may have shared with Sydenham."—*Life (Sydenham's Works)*, I. lxxxviii.

⁴ *Life of Cullen*, i. 178.

from the natural state ; and at the same time in every fever which has its full course, I suppose that in consequence of the constitution of the animal economy, there are certain motions excited which have the tendency to obviate the effects of the noxious powers or to correct and remove them."¹ And in one of these old text-books on medicine, to which we have already referred, we get a glimpse of what was commonly taught regarding fevers two centuries ago. In *The Art of Physic*, by Wm. Salmon, 1686, we are told in Book IV. p. 3 that, "There are also some who pretend that a fever has its original and rise from those globules which were discovered in the blood by Mr Lowenhoek."² And a few pages further on we are told that "Helmont asserts that fevers arise from a peccant matter which being once existent in the body, the spirit of the members, or Archeus, doth inflame itself by its own excrescence." The next sentence is exactly to the point. "This therefore only occasionally heats after the manner of a thorn, . . . not because the thorn heats but in that the spirit of the members, *i.e.* the Archeus, doth inflame itself in striving to expel the matter as if it were a thorn." From the context it is quite evident that the writer means that it is not the thorn itself that heats, *i.e.* it is not the disease itself that causes the fever, but the effort of nature to expel it. That view we believe is incontestable. There have been many theories of fever, but we can hardly imagine that this one, as a basis at least, can ever be disproved or set aside.

It has been truly said that "all nature is at war ; the strongest ultimately prevail ; the weakest fail."³ And what is true of the visible world is true of the invisible also. The germs, as the immediate cause of a great class of diseases, may have to give place to their products, and these to other germs, and so on *ad infinitum*, but the law of antagonism, as one of the fundamental principles in the relation of all natural things, is unalterable. The relation of the healthy body to disease may be one of peace, but it is an armed peace. The moment we lay down our arms we are lost. It is an armed peace, then, and when we are struck we strike back. We must do it. It is only dead men who strike no blows.

¹ *Works*, i. p. 514.

² Anton Van Leeuwenhoek, "the father of microscopical anatomy," as Sir Richard Owen calls him, had by this time been studying the circulation of the blood, its red corpuscles, and other unicellular organisms. He began with the animalculæ in water and in various infusions, hence *Infusoria*.

³ Darwin: *Animals and Plants under Domestication*, i. 5.

The condition of fever is, we repeat, the evidence of the conflict, of the *vis conservatrix naturæ* on behalf of the individual attacked. All the phenomena of fever indicate that the forces of the system have been called out for action. The flush, the quickened pulse and respiration, the heightened temperature, the anxiety and pain alike proclaim that war has begun. We believe that with a foe fairly met, the fever simply means increased action, the increased action of every molecule of the body. For in this general pyrexia every tissue particle will be attacked, and each will have the power to resist, as each has the power to grow. No doubt the nervous system has its part, and a most important part, in the economy of the defence. There is the command that must direct, regulate, and combine that resistance. There may be a needless call to arms, or the forces may become demoralised and panic-stricken, and we call it a nervous fever or a hyperpyrexia, as the case may be; but not to digress into a discussion of the various theories of fever, we maintain that fever of the normal type is primarily and essentially the expression of increased molecular activity where every part is fighting for the common good.

In turning our attention now to the different stages of fever we find in them a further corroboration of this doctrine. A fever which is fully expressed, as we might say, has three stages—a cold, a hot, and a sweating stage; and the interpretation of these stages, more especially as regards their relation to one another, has been an unending source of controversy amongst the leaders of medical opinion from the earliest times. Why the hot stage should follow the cold was their difficulty. It did follow, and was therefore the result. But could strength be the result of debility as the hot and the cold stage were respectively supposed to represent? The opposite they could have understood, but not this. But on the supposition that fever represents the response to an attack of some kind, the explanation becomes simple enough. The first moment of response cannot see that response complete. There must be the transition from rest to unrest. We may call it shock, we may say it depends upon a contraction of the cutaneous capillaries from stimulation of their vaso-motor nerves, but whatever we call it, or say it is, it must be something different from the state of developed response. We see many examples in nature of this transition. The scratch of the thorn is first white and then red. The pallor from the unexpected affront

precedes the flush of full resentment. The particular colour in our two examples is a mere accident, indeed in the second instance the order appears sometimes to be reversed. The first effect of even a sedative is stimulation, though no doubt if the amount employed be large the transition stage may escape our observation. Our argument, therefore, is simply that the first and second stages of fever represent respectively the first and the full response of this force in nature which the attack provokes; or as we might say, first the shock and then the heat of battle. And the sweating stage marks the battle won and the enemy put to flight.¹ To borrow from our illustration in the previous chapter of the thorn and the suppuration, the invader of the whole economy is floated or turned out along with all the products of the fray, and the system at once sets about its own repair.

We have sought to show, then, that the state of fever generally is the expression or evidence of nature's endeavour to overcome and expel the disease; and that the different stages are quite in accordance with what from analogy we should expect. And now we shall consider what evidences there are of a *vis medicatrix* in certain of the symptoms of a fever.

The rash, we think, affords a very special illustration of the action of this principle. It may have been somewhat fancifully considered to be, as the word *exanthem* indicates, the blossom or efflorescence that betokens the particular kind of fever; but what it really is there can be no possible doubt. It is nature's method of getting as much as possible of the invading force driven to and beyond the outworks. It is to the skin that nature endeavours to carry the poison, in the hope of getting rid of it altogether, and therefore, to change the figure, we might say, though it seems rather ungracious to speak in such terms of what Nature herself has designed to be so comely and so fair, that the skin is the dust-bin of the poisoned economy. It is also quite a matter of popular belief, and in this case a singularly correct belief, that the particular fever is all the more serious, if, having a rash naturally, it comes out badly, or worse still, not at all.² But it may be said, and with truth, that all fevers have not

¹ It is perhaps hardly necessary to say that although the sweating stage does not exist in all fevers nor in all cases of any one fever, there are other channels of elimination of which sweating is only taken as a type.

² Measles and scarlet fever afford us the most striking examples of this irregularity. But we know nothing of this kind so terrible, so overwhelming, as these rare

a rash, and those that are normally without one are not more serious than the true exanthem. The point raised is of much interest, and we do not say it can be altogether explained on our present lines. But to some extent it can.

It will be admitted that many fevers which are normally without a rash are expressed, so to speak, in other ways. Whooping cough is a good example of this. Here the burden of the disease falls upon the nervous supply of a certain area of the respiratory tract. Common catarrh, undoubtedly an infectious fever, declares itself on the mucous membrane of the same passages, and so does diphtheria. Cholera and dysentery affect the mucous membrane of the intestinal canal, while rheumatic fever invades preferably the serous tissue of joints. Epidemic cerebro-spinal meningitis, mumps, tetanus, etc., have all their special *loci* which they strike with varying severity. Influenza puts in a claim for every system and tissue. Typhus, with its freedom from internal lesion, is rarely without a rash, and when it is so absent it is practically certain to be owing to the mildness of the attack. Enteric fever is exactly the reverse, in as much as it frequently is without eruption, and it of course has its typical internal lesion. Again, in the case of small-pox, the skin itself is the particular *locus* of the affection, so that to speak here of the rash being well out is pathologically an abuse of terms. There are still left certain fevers which have neither rash nor special internal lesion, as for example ague and, according to British observers, relapsing fever. But ague is a purely endemic fever, by which nature simply enjoins us to avoid marshes, while relapsing fever must be the exception which proves the rule.¹

Next to the skin mucous membrane appears to be the surface cases of scarlet fever in which death occurs without a trace of fever proper. We have seen one such case in which the diagnosis was only made by finding out subsequently that in the same family normal cases preceded and one succeeded the case that was fatal.

¹ In this connection we would venture to refer, but only in a footnote, to a subject of great difficulty, even more difficult than that of the evolution of disease, namely, the evolution of those salutary processes in the economy of which we are speaking. We are not aware that this latter question has ever been referred to, but we have no doubt that such an evolution takes place. There is the development of disease as of anything else, and so must there be of the antagonistic force. May it not be that this method of the *vis medicatrix nature* is more developed in typhus than in enteric fever; that it is only just beginning to show itself in rheumatic fever, and on the Continent in relapsing fever; and that in whooping cough it has not developed at all.

which nature finds best adapted for furthering the expulsion of the poison. Though itself internal it communicates sooner or later with the external surface, and altogether plays a great part in the elimination of waste products, and inferentially is best suited for the elimination of poisonous products as well. There can be little doubt too that, from the fact of the gastro-intestinal tract being so largely an area for absorption, poisons also will readily find their way into the lymphatic vessels. But we can as little doubt that this covert attempt at a re-invasion of the system will be liable to be stopped at the nearest lymphatic glands; indeed we may be certain that as many of the intruders as possible will be there put under immediate arrest. And so it comes about that the implication of the intestinal glands, agminated and solitary, is a salutary process of the most pronounced kind. On the other hand an attack on a serous membrane must be wholly pernicious. It is absolutely an internal surface, and its invasion cannot be said to afford relief to the economy as a whole.

Many of the other symptoms of fever, such as quickened pulse and heightened temperature, are simply, as we have seen, parts of the general fever which we have already discussed. Other symptoms again, such as headache, general *malaise*, etc., will be considered later. And although so much attention has been given to crisis with its varied phenomena, there is not much more to be said of it than that it denotes the beginning of restitution in the economy. It is then that Nature devotes such strength as is left to her to the processes of repair. But this action of the skin, bowel and kidney is so obvious that there is little need for comment.¹ But it is interesting to note, as we leave this part of our subject, that singleness of purpose which

Then there are those transitory erythemata that sometimes appear during the prodromal stage of enteric fever, of small-pox, and of measles. Are they anticipatory of a yet fuller manifestation on the skin than has yet taken place? And are those rare anomalies *Morbilli sine eruptione* and *Morbilli sine catarrho* exceptional reversions to more primitive forms. They are certainly not always simply very mild attacks.

¹ We may remark here that the modern opponents of Hippocrates' teaching and practice found one of their objections on his study of these excretions. Houdart, for example, says that the object of Hippocrates was not thereby to get at the nature and cause of the disease, but simply to obtain evidence bearing on the issue of the conflict. And again, "He transposes the human body into a veritable arena where two athletes, bitter foes, meet in combat," and with him it is only a question which will go under, to the exclusion of the causation and diagnosis of the particular disease. *Sur la vie et la doctrine d'Hippocrate*. Paris, 1840, pp. 334-348.

Nature exhibits during the heat of the battle. She will not stay her hand to break bread or set her house in order until the crisis and the danger are past.

We proceed now to the consideration of some points connected with fever, or with *a* fever, which seem to show that Nature, however excellent her intention, may appear to overdo her part, or may fail, must necessarily fail, from being compelled to adopt a remedy which in turn is bound to become an aggravation of the original complaint. We shall look first at the febrile state itself.

To say that the fever as such may sometimes prove fatal, is only to say that in the bitter conflict the enemy has proved the stronger of the two. But it is not of pyrexia but of hyperpyrexia that we mean to say a word. Here surely Nature has overreached herself, has overdone her part; for it has become almost an essential feature of our conception of this state of hyperpyrexia, that its severity is out of all proportion to that of the primary disease underlying it. We cannot here enter into a discussion of the various theories regarding this state. We shall simply say for the present that in our opinion a degree of fever commensurate with the evil to be overcome is primarily and essentially metabolic; in other words, is entirely due to molecular action, and therefore quite natural in the circumstances. Hyperpyrexia, on the other hand, is, we believe, entirely neurotic in origin, in as much as it depends on a complete breakdown (whether of the character of a paralysis or a delirium we do not pretend to say) in the great centres of control and lines of communication that give unity to the whole complex organism. The matter is not one that lends itself to exact illustration, but we think it is somewhat as if the government of the country had made adequate preparation for war and certainly had the men that could fight, but there followed some inexplicable failure on the part of the general or his staff which rendered the heroic resistance of the common soldiers of no avail. For, as is well known, it is the nervous system that binds together, that confederates all those cells of protoplasm that do the actual fighting, and it is this bond that has given way. Nature must bear the blame. But it is in the complexity of this her highest metazoon that she is lost; it is in that she has overreached herself rather than in her *vis medicatrix*.

Nature again may over-reach herself by her method of getting

rid of the invader. We have pointed out that the skin and mucous membrane seem to be her chosen areas, but unfortunately even there the enemy may make a masterful display of force with which Nature cannot always cope. She is not equal to the occasion, for example, when the eruption of small-pox becomes the source of a new and even greater danger. We would not dogmatise, but we venture to think it is not the suppuration that constitutes the danger so much as the suppuration *on the surface* with consequent decomposition of the pus. We feel, however, on surer ground with our next example. There can be little doubt that the lesion of enteric fever is an attempt to localise and subsequently destroy or expel the foe. And we know only too well that nature frequently fails here, not as in small-pox by stress of circumstance, but often at least by inherent defect and with the most unexpected and disastrous results. We believe further, that these *loci* must frequently be held responsible for the imperfect crisis, the relapses, or possibly, as sometimes occurs, the actual recrudescence of the disease. To whatever extent enteric fever may be considered to be atypical, we believe that irregularity to be due to its local lesion. It is notorious that typhus with its absence of special lesion has a definite course and crisis, and "leaves no dregs." Enteric fever, as we have seen, presents an exactly opposite picture.

How different the course of diphtheria with a lesion which is moderate from that with one which is severe; not, we maintain, to be entirely explained by the greater virulence of the whole attack which the severer lesion presupposes, but greatly because that lesion, originally designed to limit the mischief, becomes rather a new source of its extension. And so doubtless it is with scarlet fever and its albuminuria. Without critically discussing the character of each of the two forms, early and late, we can well believe that the condition altogether depends on the irritation of the poison which has been carried to the renal mucous membrane to be there disposed of, but which may in turn become the source of a new and serious danger. Even the lesion of whooping cough, that "airy nothing" to which we give "a local habitation and a name," may proclaim its wounded sensibilities months after the disease itself has disappeared, in tones which are certainly an inconvenience if not a danger, an evidence to some extent, at least, that Nature has overdone her part.

Lastly, we have in the two great features of crisis, namely, sweating and diarrhœa, familiar examples of how Nature may go wrong. Both these sources of error have been recognised from the earliest times, and the Hippocratic writings contain abundant reference to them. There can be little doubt that sweating is primarily a critical phenomenon ; and it is interesting to note in this connection how rarely it is a feature of disease of the skin itself. It is in direct contrast to diarrhœa, which is as truly a feature of actual intestinal mischief as it is of crisis. We do not say therefore that diarrhœa is primarily critical, we do not think it is, but we do not doubt that all sweating is so, except of course from physical exertion, and that the non-critical forms are examples of the *vis medicatrix naturæ* thwarted and in some cases altogether gone wrong. There is no sadder illustration of this than the exhausting perspirations of tuberculosis. Here Nature in following a sound general principle of her own has gone far astray. We do not know where the real source of the error may lie, but may it not be, as we already hinted, that the salutary action in this instance is still in process of development ?

With regard to diarrhœa the question is more complicated. It is a feature of intestinal disease and may also be merely the evidence of a simple mechanical remedy as in general dropsy. We only mention the very obvious fact that in certain specific complaints, such as cholera and dysentery, the action of the bowels, whatever the original intention, may become as severe and as disastrous as any form of perspiration. It would seem then, as we said at the close of the previous chapter, that in certain original forms or orders of disease this sweating and other phenomena have been entirely good, though now in certain variations or species which have developed from the original type they are only ineffective and prejudicial. It may be, however, we repeat, that in some cases the salutary action is in process of development.

Speaking of fever, we would here refer shortly to immunity as an evidence of the *vis conservatrix naturæ*. This is a wide and interesting subject, on which much has been written ; but keeping strictly within the scope of our present enquiry, we shall confine ourselves to that more special indication of nature's conserving action, the well-known immunity to second attacks which the infectious fevers best illustrate. With that limitation, the

question can be very properly considered here, when we are considering our subject in relation to fever generally.

It is a remarkable fact about these specific fevers that, with some rare exceptions in individuals, and apparently even in families, they strike down the strong as readily as the weak. At least, as compared with constitutional disease, that is so. Now it is obvious that if this prerogative were allowed a free hand, as we might say, the survival of the fittest would be seriously affected. We know only too well how remorselessly typhus and small-pox, for example, strike down the unprotected even in our own day. But here this remarkable *vis conservatrix* steps in with its absolute veto, and says, Thus far shalt thou go and no further. For it is these very diseases—typhus, small-pox, measles, etc.—which confer immunity, each against itself. The point is all the more remarkable when we consider that, on the other hand, diseases which we term constitutional, in other words, those from within, confer no immunity. They arise from an inherent, inborn weakness. The various degenerations, the cachexias, and many inflammatory affections, are of this order. Here another universal law steps in—that the weakest must go to the wall, and die. But it is not so with the specific fevers. With them it is rather as if a law of limitation said to the fell destroyer, You have had your shot at the strongest with your typhus and your small-pox; you have missed your mark, and you get no second chance, at least with the same weapon; but you may take the weak, the sickly, and the unclean.

No doubt there appear to be many exceptions to this rule, and general tuberculosis might be urged as one. It is certainly a disease from without and almost as certainly an infectious disease, but we still hold to the old view also that tuberculosis depends as essentially on constitutional susceptibility. When we have completely recovered from the germ theory, we shall better appreciate how much in the etiology of disease must be accorded to personal proclivity. These two factors, the one within, the other from without, no doubt differ greatly as to their relative value in different diseases. In the case of measles, for example, the personal element probably counts virtually for nothing, whereas we should say that with erysipelas, constitutional susceptibility, *plus*, if you will, the accident of an abrasion of the skin, counts for a great deal. Tuber-

culosis probably comes between, but nearer to the erysipelas than to the measles type.

Our argument then is this, that constitutional diseases from which the general community is fairly exempt must, for their particular attacks, depend largely upon individual susceptibility, while on the other hand, diseases to which all of us naturally (*i.e.*, apart from artificially conferred immunity) fall a prey, are the more entirely due to the micro-organism. Fearful as are the ravages of tuberculosis, it must be admitted that with an equally distributed aerial infection the unprotected would be far more liable to typhus, enteric (if it were only aerial), small-pox, measles, scarlet fever, and so on. Now these are just the diseases in which this special immunity of which we are speaking steps in. Only two diseases, generally recognised as infectious, occur to us to which this rule will not apply, namely, common catarrh and influenza. But the first, though very inconvenient, is never directly dangerous to life, while the second seems, like a spoiled child, to insist upon getting everything, and will conform to no rule. And so, with these two exceptions, we think we may come to this conclusion, that the greater the liability of the community generally to the infection of a particular disease, the greater will be the immunity that will follow an attack of that disease—surely a good illustration of the *vis conservatrix naturæ*.

Inflammation

From the study of fever generally as the expression of this conserving and healing force, our thoughts pass naturally to the subject of inflammation. For inflammation is fever localised. They both represent *effort* to overcome something obnoxious. It must, however, be admitted that in many forms of inflammation this endeavour is not very obvious. It is not very evident in the congestion set up by a little wet mustard placed on the skin, still less in the similar condition occasioned, say, by lifting with the fingers a piece of hot coal. But let us look for a moment at some instances in which the purpose of nature is more apparent. The invariable effect of a moderate irritant on mucous membrane is to increase the natural secretion of the part. The eye affords a ready illustration of this ; and it will occur to everyone that the intention of the increased secretion is to wash out the offending matter. So in the case of the respiratory mucous membrane, where solid particles of any kind would work imme-

diate mischief. If these particles are more numerous than they ordinarily are in the atmosphere, and more especially if they are pungent in their action, the increased secretion becomes at once apparent irrespective of the cough which may or may not be set up. The city fog, and the coryza and catarrh following upon its wake, are well-known examples of cause and effect. Here, then, we see the purpose of the increased secretion which follows upon a slight degree of inflammation.

To return now to the skin, whatever we should expect to find there, it could not be, in the nature of things, a process similar to that of which we have just been speaking. For the skin is itself the surface of the body to which offending matter tends naturally to be carried, and there is no need for a fluid to convey the irritant from it to another surface. But suppose the irritant to be intrinsically powerful, so as to act more strongly even on the comparatively resistant skin, what do we find? The formation of fluid once more, but now not mucus but pus. Let us consider for a moment this process of suppuration.

We must proceed warily. If John Hunter, in the eighteenth century, puzzled himself over the use of pus; if, as he said, "the final intention of this secretion of matter is, I believe, not yet understood," no ordinary man will imagine, even a hundred years later, that he has settled the problem. But we venture to think that in the case of the thorn in the flesh already referred to, the purpose is not very obscure. Neither is it, we should suppose, in cases in which the poison affecting the system is carried to the skin and finally cast forth by suppuration. So also in the case of the common boil. Whatever be the original cause of the inflammation under or in the skin, one can understand how effectively suppuration rids the surrounding tissue of the dead part that has borne the brunt of the fight. Suppuration, then, seems to be required when, in place of an already formed channel, the solid textures have to be traversed or the skin itself fairly broken through in order to rid the system of the evil. And here let us just notice in passing how much further nature can go, and has to go, in the process of inflammation than in that of fever. We have said that inflammation is fever localised. It is because it is localised that the fever can go on to the very death of the part, and this not to the destruction but to the salvation of the economy as a whole. It is the sacrifice of the one for the many. Fever proper of necessity

stops short at what is probably, as regards alteration of tissue, a very initial stage of inflammation.

This general method of nature of which we have just been speaking, was noted, we find, so far back as 1829, by the late Dr Mackenzie, in a paper which appeared in the *Glasgow Medical Journal* of that year. Nature not only brings extraneous bodies to the skin in order that they may be expelled, but, he says, "has also guarded all passages or outlets into which we might perhaps suppose, though extraneous bodies were discharged, no great mischief could follow. Thus, an abscess in the cheek, close on the internal membrane of the mouth and some way from the skin, shall not, as we might perhaps have thought it should, open into the mouth, but shall push outwards and at last come to point and break externally." He does not proceed further in this direction, but adds that "cicatrization is a process of Natural Surgery in which there is invariably betrayed a great degree of economy, for we never find the new-formed skin so large as the sore was on which it is formed."¹

We think, then, that we can see the object of suppuration in those instances to which we have just referred. But we do not say that this purpose is evident in all forms of suppuration. We do not mean to say it is evident in the suppuration of a superficial granulating sore, or that in the case of an ordinary burn for example, we see either in the inflammation or in the possible suppuration the evidence of any conserving or healing power. It might be urged that in both these instances the lesion of the skin is the injury itself and not a stage in the process of repair; that it is an end and not a means to an end; but we do not maintain for a moment that nature is so discriminating. On the contrary, it must be conceded at once, as we stated in our previous paper, that she primarily proceeds on general lines and often fails in particular cases. Probably the two instances we have just quoted are examples of this. We shall, however, have something further to say on this matter before concluding.

Passing now to the consideration of chronic inflammation, we think that here, so far at least as the viscera are concerned, we have a no less notable illustration of Nature's conserving plan, and one of quite a different character from that we have

¹ A reprint of this paper will be found in the *Brit. and For. Med. Rev.*, vol. xxiii., p. 585.

just been discussing. It is a well-recognised fact, that while acute inflammations tend to affect the parenchyma of an organ, chronic inflammations involve chiefly the interstitial tissue. If an important organ of the body is attacked by acute inflammation, Nature no doubt may effect a very complete restitution, as in the case of primary pneumonia. The process indeed will be carried out after the manner we have been considering, for though not in all probability by suppuration exactly, it will at least be by a process of softening or liquefying of the inflammatory products which will lead either to their expulsion or absorption. But what is Nature to do, if the irritant or whatever we call the cause of the inflammation, though never very potent at the moment, is unceasing in its action, sparing only to wound again. Take the case of the mason or the knife-grinder. The minute particles of stone or steel may for a time be thrown off by the increased bronchial secretion; but still the irritant is renewed again and again, until at length, like the proverbial mud, a little of it sticks and that little becomes a little more. What can Nature do; what does she do? She determines that she will not have the more essential part of the lung interfered with while she can help it, and so she relegates these intolerable nuisances to all the out-of-the-way corners she can find; and are there not the mazes of the connective tissue just made for the purpose? Thus it is, as we have said, that chronic inflammations involve chiefly the interstitial tissue. This, after all, is simply due to absorption by the lymphatics, for all recent research goes to show that lymphatic tissue is virtually universal, many regarding it and connective tissue as constituting a single system.

And thus it is that we find the products of these slowly acting irritants spreading along the course of blood-vessels, invading the sub-serous and sub-mucous tissue of various viscera, or being packed away in neighbouring glands. So also if it be some slow and subtle poison from which the blood is never free. As it is borne along through liver, kidney or lung, it is absorbed and stowed away, anywhere out of sight, till by and by the evil thing creates a new mischief all its own, and nature gives up in despair.

It is here that it most naturally occurs to one to notice the remarkable indications of a *vis conservatrix* that the so-called adhesive inflammation affords. Adhesions may not always be

inflammatory, but they are so very frequently, and then they fulfil that well-known and all-important purpose in relation to a serious complication which that inflammation may bring about. We are all familiar with these cases in which disease is making its way through the tissue of the lung in the direction of the surface of the pleura. If that membrane be perforated there will be a terrible catastrophe. This must be anticipated. An antecedent inflammation is set up, lymph is thrown out, and possibly the visceral and parietal surfaces of the pleura are so firmly bound together, that the admission of air into the pleural cavity is prevented. The same thing is brought about, if Nature only gets time, in many other circumstances equally familiar to every practitioner. But the evident anticipation of the evil and the apparent prescience in the whole process are peculiarly fitted to suggest a salutary power that acts under the guidance of a deliberate intelligence.

Hæmorrhage

In this common feature of disease, of traumatic disease especially, there are one or two points to be noted in illustration of our present subject. There is first of all the fact that the shedding of blood, or even the very sight of blood, is of itself naturally abhorrent to man. He realises that "the life of all flesh is the blood thereof," and he instinctively shrinks from the obtrusive ebbing of that life even more than from the sight of death. We know also, as a matter of everyday experience, that the amount of blood lost from an injury is habitually exaggerated, especially by the sufferer himself. For man is a miser if you would take his blood. It is a natural instinct which becomes in turn a great conserving power.

Yet there is no commoner phenomenon connected with injury or disease than the loss of blood; and as a matter of fact this loss is often of the greatest benefit. The relief thus afforded to both general and local disease has been noted, as we have already seen, from the earliest times, and a moderate acquaintance with disease will lead the medical practitioner of to-day to the same conclusion. Such relief resulting from an epistaxis is too common an experience to need any insistence on our part, and there are many other cases familiar to us all in which the blood escapes from the blood-vessels as by a veritable safety-

valve. Here then we have this seeming paradox that the loss of that which we instinctively dread to lose, as our very life in tangible form, may be a loss that is directly salutary. A *vis conservatrix* and a *vis medicatrix* in contradiction! How is that to be explained? Clearly in this way, that it is the loss of a moderate amount of blood that does, or may do, good; it is the loss of more that kills. So true is this, that even while we dread, and rightly dread, the ultimate issue of a hæmorrhage in a desperate case, Nature may assent to her other law by admitting an improvement at the moment. We have seen the headache, fever, dropsy, in a word, the whole *malaise* of a hopeless tuberculosis, disappear for days as the result of an epistaxis that only too certainly hastened the end. We can recollect from our student days in hospital a similar improvement following upon secondary hæmorrhage after operation. How far modern surgery admits of such an experience we do not know, nor do we consider ourselves competent to pass a criticism upon its methods. But in this connection we would merely venture to express in the form of a question a doubt that has often passed through our minds. Is this recent development in surgery, the attempt at a bloodless operation, a good practice in view of nature's teaching? Has she not her bond too, other and older than Shylock's, that there shall be no cutting of the flesh without loss of blood? In any case we feel sure that the drop of blood that escapes from either the most trifling wound or the severely inflamed lung represents a salutary principle of which the physician of to-day only too seldom avails himself.

And lastly, when the end is imminent, when through some serious injury the life blood is flowing fast, Nature will make her final effort. She will feign death that perchance she may escape it. For in the state of syncope that results, the patient will lie limp and motionless, his pulse so weak and small, that even yet the coagulum may form, and stem at the last moment the feeble current that has brought him to the brink of the grave.

Pain

This is another evidence of the *vis conservatrix et medicatrix* which we must consider. We are not now concerned with the problem or mystery of pain. The question before us is not what pain is, or generally why it is, or what it fails to do, but once more the narrower and simpler question, What does it do?

Pain is first of all a conserving power. Charcot has said that "pain is the cry of the suffering organs." It is the cry for help. It is borne upon our first breath in our unconscious appeal to those around us, and as soon as reason asserts itself the appeal is made to ourselves. Romberg rather anticipates Charcot when in speaking of hyperæsthesia in anæmia he refers to pain as a "prayer of the nerve for healthy food." In the two figures we have the same idea.

But while this conception of pain is undoubtedly a correct one, it is equally true that pain is often less of an appeal than we altogether like. It may become more of a command. Should we leave the path that nature has laid out for us, pain can expedite our return very effectually. It can compel us to give heed to an evil course with which we may be inclined to temporise. For it brooks no shuffling. It can be imperious and not importunate. Pain is therefore not only universal but is also one of the most powerful conserving forces that nature has. More specifically, in the case of idiopathic disease, pain compels us to give heed to the possibility of the recurrence of the malady and so adopt means for a more effectual resistance to a future attack ; in the case of threatened injury it will set us on our guard or enjoin us to take refuge in flight. It is in such ways as these that pain is a potent conserving force.

In the second place, it is a healing power of the most effective kind. It is so mainly by enforcing rest. The cry is, Let me be at rest, that I may recover strength. This rest is at the foundation of all healing. It may be rest from the routine of normal activity, in order that the whole energy may be directed to the invading disease, as in the case of the *malaise* of fever, which enforces a general rest ; or it may be the more restricted anorexia that compels the rest of a particular organ. Or again, in the case of injury, pain may compel the rest that is needed for the reconstruction of the wounded part, whether it be the serious fracture or the trifling abrasion of the skin. The evidence of this conserving and healing power is the more striking the more special its action is. Cullen refers to the pain of rickets as a good example of the *vis medicatrix naturæ*. The child feels pain before ever the bones begin to bend, and so it will not walk unless we, in our ignorance, compel it. One is impressed the more by this example because the pain may precede every objective sign of the malady. It anticipates the very com-

mencement of deformity, and may forestall the action of the surgeon himself. But we do not think that this is any more truly an instance of Nature's power and action in disease than are the aches and pains of commencing fever. The weariedness and shivering (for these in their purpose are simply pain) of the initial period of fever compel to rest and warmth, and the anorexia, often so grievously interfered with, equally declares, as we have said, the need for rest. The untutored savage, with his shivering fit upon him, with his nausea and his aching head and limbs, betakes himself to such warmth and rest as a corner of his rude dwelling affords. If Nature will only further leave him strength enough to wet his lips betimes in the nearest stream, she leaves him all he wants and haply all he needs. With these he can bide his time, like the best of us. He has his rest; let him wait till his strength returns. We need not stop to enquire what would happen were it not for this rest that pain enforces. We know that without it the fracture of the arm would never unite, that the ulcer of the leg would never heal. Rest is the first essential for the process of all repair.

There is another respect in which pain may be a *vis medica-trix* that has never, we think, been definitely set forth except by Sydenham. In speaking of gout, he says, "the pain was the sharp remedy of Nature." By that he clearly meant the pain *per se*; not the pain as the expression and the measure of the local structural changes, but the pain absolutely, the pain without which these changes might be of little or no avail as a relief to the general economy. We have no doubt this is Sydenham's meaning, and this interpretation is borne out by his further observation that "the worse the pain, the shorter the fit."¹ Nor can there be any doubt that pain may be of itself beneficial. We speak of the relief of tears; there is as truly the relief of pain. The malady of whooping cough is relieved, as we have already noted, by its expression on the nerves of the throat, and no less effectually though it is a purely functional manifestation. So in epilepsy there is a something which we cannot gauge, yet which accumulates towards instability; and when this accumulation is expended, stability returns. And we call it a nerve explosion. In gout we have the same accumulation, though its origin is in something more material. The force is expended in the form of pain, and it is that pain which is

¹ Sydenham's Works (Syd. Soc.), ii. 128.

nature's safety-valve, although it is so doubtless because expended on a non-vital part. So also are many neuralgias, many asthmas and similar purely functional seizures: so also are fits of temper and fits of weeping.

The distribution of pain, or rather of the sensibility to pain, in the organism demands a word in passing. It is well known that this is more marked on the surface of the body and of individual organs than elsewhere, and also at the commencement of particular areas or tracts, such as the respiratory and alimentary. Nature has always recognised, what mankind must have at a very early period discovered, that the best way to deal with an evil is to keep it out. That prevention is better than cure appeals to the community and to the individual alike. Nature therefore guards her frontiers in order that the particular viscus or area, as well as the whole organism, may be left free to fulfil its proper function. Hence the special sensitiveness of the skin, the pleura, the rima glottidis and similar parts. It is obvious too that if all parts of the body were as sensitive to pain as surfaces are, severe injuries would kill by their pain alone. The man whose legs are run over by a railway engine will tell you "it just felt like something warm," and he survives the terrible ordeal. A greater sensitiveness of deeper parts is not required for any conserving purpose. The injury itself to such a part will ensure the needed rest, independently of pain, by the very disability of function which results. There is no need to tell that to the poor fellow whose case we have just quoted. But the fact presents itself to the physician in many less obtrusive forms. Take away the pain at the outset from an acute primary pleurisy and there is probably nothing left to suggest injury at all; but a similar pneumonia needs no such acute pain to convince the patient that he is really very ill and must lay up. Or better still, contrast a meningitis with a myelitis. The former does not directly lead to loss of power, and so requires that greater pain to enforce rest or even to convince of something wrong; whereas the deeper lesion directly paralyses, and has no need of pain to create alarm or insist on the rest that is only too complete.

Insensibility

We take this term to represent the last mode of Nature's conserving and healing action to which we shall at present refer, and that in a word or two. An unlikely quarter, some may think, to

look for such a principle. For the state of shock or of unconsciousness from injury to mind or body is not one that will appear to the ordinary observer as anything but a serious aggravation of the original evil. Yet those who have experienced it tell a very different tale. How often have we heard it remarked of an overwhelming loss that if one could have realised it fully at the time it could not have been borne. So is it often with some physical injury. When pain of itself might kill, or at least is of no avail, shock or unconsciousness comes to our relief and draws its sheltering curtain round our bed. The pain of gout is itself, as we have seen, the explosion of force that acts as a safety-valve to the whole economy, and so it is left to work its cure. But in epilepsy the explosive force is expended in muscular spasm, and pain is not required. We do not wish to push the analogy between these two diseases too far, for indeed as regards their real nature there is none. We only wish to bring out that an ordinary epileptic attack would be a very painful thing, and therefore all the more exhausting, were it not for the loss of consciousness which is one of its characteristics; the loss of consciousness conserves the system from the pain which is not needed. It is the same with shock (we exclude mental shock), which is just a kind of physical stupor. Like the hæmorrhage of which we spoke, it may be fraught with dangers to come, but it is often a mercy at the time. Of the unconsciousness or semi-consciousness that is so frequently a feature of acute disease, one cannot speak so confidently. To judge from the account of those who have passed through such an experience, there may be little to choose between the racking incubus of a typhus and the conscious misery of an acute inflammatory attack. But again we do not doubt that the delirium and the other harassing forms of mental disturbance that complicate such cases belong to this order of affected sensibility whose primary intention is entirely salutary. Surely it is no small gain if the convalescent can sometimes tell us that his illness is to him a complete blank, and that thus the memory of his wretchedness is cut off for ever.

And then when healing and hope are alike past, when there is nothing to conserve, nothing to be done but to speed the parting guest, Nature will not withhold her *pax vobiscum*. For "there is peace before death"—*Tha feigh ro bhas*,¹ as the Gaelic

¹ *The Interpretation of Disease*, Part i., p. 23, by H. Cameron Gillies, M.B.

proverb has it. "When remedies are past the grief is ended." Nature will be kind at the end; perhaps she has been always kind, though the pessimist will not have it so.

To the consideration of these general features as illustrating the action of nature in disease we propose to limit our present enquiry. But before concluding we must revert to the great fact that this conserving and healing force is exercised on general rather than on special lines. We have remarked more than once that it appears to deal with classes or orders of conditions rather than with species, and that these species may err or fail, though the purpose of the genus or order is evident enough. We do not affirm that the classification of nature's methods in this respect is possible, or that it is self-evident that one mode of action is the order while another is simply the species; but we know of no other terms by which we can express what we believe to be so far an interpretation of the many difficulties with which we are confronted in unreservedly accepting the doctrine of nature's beneficent rule. It is a matter of common observation that scars, for example, are smaller than the original wound, and that contraction favours the process of healing and also tends to conserve the sightliness of the part. But everyone knows that the cicatrisation of even a small ulcer in the neighbourhood of the eye, may by its contraction produce a most unsightly deformity. So in the case of inflammatory adhesions. Their general purpose, as we have seen, is conserving, yet we know that in certain affections of the pleura they may interfere with the action of the lung in various ways. Instances such as these are quoted by those who maintain that Nature is simply a bungler. So far from being a bungler she is only following out that great fundamental law of hers to which we have just referred, that the individual or unit must be subordinate to the common or general. It is a common necessity that the respiratory tract be kept free from obstruction; and the association between different parts of the body, which has been termed sympathy, is a common and essential feature of our economy; but when a diseased lung, by means of this sympathy, or a hyper-sensitive throat of its own accord, sets up a quite purposeless and positively hurtful cough, we have Nature erring, perhaps grievously erring, in the individual case. And further, it goes without saying that there

are and must be limits to Nature's salutary action. Are we to expect that she will successfully contend with two concurring evils so contrary in their character that the remedy for the one is of necessity the aggravation of the other? The arterio-capillary fibrosis that calls forth the compensatory hypertrophy of the heart, by so doing increases the blood pressure and aggravates the danger depending on the weakened state of the vessels. Nature cannot respond to these two opposite demands, and she complies with the one that was first made. Considerations such as these throw light, we think, on many of Nature's failures. If we understand that in these very failures she is but acting in accordance with that wider law to which we have just referred, we shall see that she is consistent in it all, that she is still true to herself.

It is in this law of nature that we find the key to the practice of our art. Nature works on principles that are broader, vastly broader, than we can apprehend; art finds its application in the individual need. To correct the unit of error, to conform the exception to the rule is the province of our art. Nature proceeds on lines that run deep and are permanent; art meets the obvious necessity of the moment, a necessity that she herself has possibly created. It has been said, for example, What does Nature do for the child suffering from resistant gums when one or two free incisions would do away with all the pain and jeopardy? Nothing, if that will satisfy the pessimist. In the case of this particular child we have the unit of exaggeration of Nature's general law that there shall be a certain degree of discomfort set up by the growing teeth, which shall in turn lead the child to practise on its little fists or any other *pièce de résistance* it can find in anticipation of the more substantial joints of later life. But the exception when positive pain is suffered, will occur from time to time, arising very probably out of conditions that have been elaborated from a more artificial existence, although the abeyance into which this practice of lancing the gums has lately fallen is calculated to draw a smile over the face of Nature herself as she reflects on the ephemeral existence of her critics' own methods.

And so it is that while Nature is true to herself she is not false to us. She has left us the need of individual effort. We must know how Nature does her work that we may know how to help her. We must know how much she can do and how

much we can help her. Let no one imagine this is easy. The complexity of the human organism in its structure, functions and relations surrounds the subject with every difficulty. Here again we find our stimulus to individual thought and work. Here too is the criterion of the practice of the expectant method. If by this is meant the habitual folding of the hands on the part of the practitioner, the ban of Asclepiades is well deserved. But it is not the doctrine of Nature's healing power that is assailed by this abuse of the expectant method. Though timid and feeble folk should shelter themselves behind its creed, the reproach is not upon the doctrine but upon themselves. So far from inculcating a policy of inaction, it calls us to further effort and renewed thought, that in the clearer light of Nature's methods we may learn to find our own.