

Preface to Part Three

It may look, despite my protests to the contrary, as if the hypotheses presented in this book are determined to be viewed as scientific, as if that were the only validation worthy of the name, as if I wish to emulate the quaint error made by Freud in his fierce determination to make of psychoanalysis a science in the modern sense. This book cannot be described as scientific in the strict sense because I have conducted no experiments, apart from the universal one of being alive and thinking. However, beyond the modern scientific method, Science also means knowledge in the broad sense (*sensu latu* as we botanists like to say in contrast to *sensu strictu*), and these hypotheses of mine are consistent with research that has benefited from experimentation. I fervently hope and do not believe that I make any pseudoscientific claims, though I appreciate that my ideas of the analogic mind are unfalsifiable, but they are presented as an offering towards our collective ignorance.

My intention would be to make these ideas at least plausible to scientists and certainly not open to the accusation of being anti-scientific or incongruent with modern pharmacological research. I have no interest in trying to make herbal medicine “sound scientific” in the hope of gaining respectability *sensu strictu* but to be accepted as taking the complexities of the therapeutic endeavour seriously, without condescension to patients or practitioners. I wish to avoid scientism on the one hand and do not want to contribute to the culture of naive reductionism on the other. If I had a third metaphorical hand, I would like to contribute to contemporary herbal practice a working model that focuses treatment upon the maintenance of people’s health.

Medicinal plants are uniquely placed as therapeutic agents towards this maintenance of health, with this notion of health as seeking poise—a nexus of biological states—in the absence of disease or as a refuge from the threat of disease. They are well placed not because of their potency but, paradoxically, because of the relatively weak and complex biological signal that

they convey to a person whose health is compromised, even if temporarily. Temporality is a key word in health: not only how long we live but how well and timely we live.

The Multi-Modal Hypothesis of Herbal Medicine presented in this third part may not constitute a new "Theory of Cure" but at least collects and integrates phenomena that are overlooked perhaps because they are too obvious. I want to emphasise in phytotherapy the particular and powerfully evocative connection between the human sensory apparatus and our experience of plants. From the therapeutic point of view, to mediate between the sense of uniqueness felt by the individual and the generalisations made by their biology obtains the power of generalisation but refines its coarseness of grain. The benefits of placing the individual in their familial and social context with great and exclusive particularism will tend to emphasise the commonality of these modes as much as their individuality and help succour them against the generalisations of modern medicine.

I do not wish to dress up pre-scientific humoral theories in modern garb using biochemistry as the stand-in for a dynamic humoral approach. The historical use of medicinal plants is culturally fascinating and should give us cues to biological insights. The remedial effects of the plants presented in the *Materia Medica* section have been substantially documented.

There are not many medicines of any kind that have been demonstrated to change the outcome of a disease and those that are powerful enough to abolish symptoms of disease come with so many unwanted or unforeseen effects that, if they are a blessing at all, unmixed they are not. If medicinal plants are able to relieve symptoms of disease without side effects, it seems improbable to me that this derives from particular compounds, as if these have, by some strange oversight, been missed by pharmaceutical researchers. It seems much more plausible that processes adjuvant to known pharmacological mechanisms are operating and that these operations are material.

When it comes to invoking magical qualities, I would be gratified if this book helped rescue the contemporary practice of herbal medicine from antiquarianism, pietism or nostalgic idealism: while these may feed the ego, I do not think that such approaches really help people's health or contribute to understanding the conundrums of our being, let alone our being well. I must however accept that my work is exploratory rather than explanatory.

At a deeper level, I see now that I have written this book back to front and the wrong way around. Giving primacy to human health (and that is the title so I suppose should be the subject) has allowed our species to view all others as subordinate and has skewed even that supremacy into a greater interest in fauna than flora. Yet plants are the pioneers of our atmosphere before even they created the earth out of rock: the soil we necessarily tread is both organism and ecology.

SECTION NINETEEN

Mindedness in plants and animals

All life depends upon air and water and the dissolved substances from rock. These three compounded materials give humans a great sense of physical and psychological coherence. Heat accelerates the process. Sitting in front of a blazing fire, the power and warmth connects with all humanity. We would find little relief if we could not wash and wash away some of our personal difficulties. Fresh air, moving air, moves and motivates us. There is no reason to abandon the comforts and poetic sense of unity that the “Four Elements” bring us, but they are not sufficient for a truly holistic approach to biological medicine. A very recent scientific approach shows us that the distinction between animals and plants is a superficial one and allows us to see deeper in both the divergences and the deep similarities.

The physical and formative differences between plants and the vertebrate animals results from the respective evagination and invagination of the surfaces of their metabolic organs. Contrast the thylakoid membranes of chloroplasts with the cristae of mitochondria. Plants need to maximise their surface area to feed, and to distribute offspring at a distance when they reproduce. Terrestrial animals by contrast need to minimise their surface area to reduce losses and to enclose the reproductive process. Plants are distributed and extensive: they forage, as it were, for food in earth and air. They have an endocrine system and both a symplastic and an endoplasmic circulation but no nerves. They maintain a network of embryonic structures throughout even the longest life, and they are the longest living multicellular organisms. Stem cells in animals may be the closest equivalent but do not show anything like the versatility and the powers of de-differentiation possessed by the meristematic tissues of plants.

At this point you might expect the contrasts to be further elaborated but I want to go in the opposite direction. The absence of a brain in plants confirms the distributed nature of their informatic and control systems but the presence of a brain in vertebrates gives us the impression that this is where control lies. I am suggesting that this distinction is to some extent illusory and

that illusions are the very nature of our brains. In Part One (where I introduced Mindedness in the Structure of Poise) I described the distributed proprioceptive nature of our bodies as the “thalamic mind”. The brain may be the repository of our memories, desires and personality and it may even control movement, but movement itself comes from the distributed mind and the sensorimotor mind of our animal bodies.

The congruence between these two highly distributed systems, plants and animals creates a resonance (and I shall use resonance soon in a different sense) that makes plant material so obvious and natural a source of metabolic transformation when taken in by animals as food and medicine. Congruence is not identity and here the potential difference creates the power to hurt and to heal. Power cannot be inert. The toxicity of a plant is an index of its power.

At the small scale, the most pervasive examples of contrast between evagination and invagination in plants and animals must be that between the thylakoid membranes of the chloroplast and the cristae of the mitochondria. At the level of organelles, the influence of organs is distant and the lack of systemic organs in plants reflects their open and shallow hierarchies. Their cells constitute a direct democracy while ours is parliamentary, and we all know how faithless representation can be. Animals, though, can retreat indoors, to the interiority of their nested matrices while plants insert themselves among the ancient elements. We, unweathered, need to filter the harshness of the sun and brutal extremes of life-giving air and water. Plants and animals—along with algae, fungi and even protists—are members of the same eukaryotic family.

Because our mindedness gives rise eventually to a sense of a single mind and a self-conscious identity, it conceals the distributed and cellular nature of our true origins. The physical world can only exist through differentiation; biological energy, like any other form, though, can only exist through potential difference. The poise between energy available to us at once and that in reserve gives us the index of our health, which is always relative and relational.

As for plants as medicines, the essential message of this book is that we do better as herbalists if in most cases (never say “never” or “always”) we treat plants as allies rather than as agents. We can use their distributive effects to mobilise and nudge our relatively partitioned structures into a more energy-efficient alignment and thereby lead us towards greater comfort.

The terrain is a useful abstraction and models the endocrine and metabolic behaviour of our selves. Although the terrain, as a model of adaptation, necessarily involves the environment to which it allegedly adapts, it remains a closed system because it describes internal relationships and from these points to the world outside it. Yet, the physical terrain is undoubtedly a product of mindedness, which is inherently an open system in which boundaries are but markers in the larger sphere. The purpose of Section 4 Poise as an ecological approach to Health was to point to these distinctions.

Humoralism

Traditional Humoral Systems, even when they invoke the cosmos, absorb the larger into the smaller and so remain closed systems in which biology cannot function in unison with the ecology in which it is said to be embedded. These may sound like subtle or even arbitrary distinctions but hinge on the difference between biological structures that emerge from mindedness and eliciting their parts to make an essentialist diagnosis. Another crucial distinction from ancient

humoral theory is that no mathematical relations can be established, even in principle, between the four elements or between these elements and the humours of the human body.

Clearly it portrays an anthropocentric world view and a religious one, giving coherence to the individual in the demos rather than to a ruler of the Greek State. Each of the three substances that flicker and flow and blow is akin to a force, and earth is the stuff of the homeland. Fire was preserved as the sacred source of the power of the Roman Empire in the Temple of Vesta, and as a tribute to Ahura Mazda in the Persian Empires. Floods are destructive when not channelled into irrigation, and winds are difficult to harness and in earlier mythology often stood for discord. Four Element Theory during the Hippocratic period represented a trend towards secularisation at the time when doctors assumed the healing powers of priests and moved to place medicine on a biological footing. For all its metaphorical power, humoralism manages to obscure the deeper truth that all of these elements are moving compounds. Adding metal, as the Chinese did, coincided neatly with the power of metallurgical skill but again obscures the fact that earth is the most compounded of the “elements” and contains all the metals.

It is of course true that each of the several metals that are essential to life has a normative range and therefore a quantifiable expression in the individual. It is also true that each metal can be deficient or excessive in a person, but it would be stretching the analogy to think of such people as being “metallic”. In the case of calcium or sodium ions, as these are never found in nature as metals, the analogy would have no purchase. If you were to try to make one between limestone dug from the earth and human bone, the metallic connection would not be apparent.

Despite its rich repository of descriptive ideas, humoralism is too inflated and conflated for the modern mind. It enmeshes human variety with essentialist categories. Perhaps the most serious objection to using ancient humoralism today is that the interpretation is almost exclusively subjective. All diagnosis is founded to some extent upon subjective opinion but to rely on it without any corroboration in a way that is easily possible for us seems to me to be perverse.²⁷⁹ While it might satisfy the aesthetic sense of the practitioner, it is difficult to see how it can benefit the patient by pretending that we are unaware of what has been discovered since these ancient formulations. For all that, the six “nurtures” of ancient humoralism encountered in Section 9 are as helpful today as they always were; I take them up again in *The Four Drives*.

If there were some means of identifying ratios between the state of the four humours in an individual patient that could then be correlated with objective findings, it might make humoral theory clinically useful. I have tried to keep this criterion in mind in formulating this biological and psychosocial model. It is limited by my inability to find a mathematical coefficient of health but although no product is measured, Poise does at least postulate a ratio that is cognate with those found for bistable systems.

²⁷⁹ Despite the obsession with examining the stools as auguries. The emergence of a modern contrasted with an ancient diagnosis is portrayed with brilliant insight by Alan Bennett’s screenplay of *The Madness of George III*. The humoralists were looking at the wrong end but the dictatorial arbitrariness, brooking no opposition, and inherent cruelty of the modern approach was also recognised.

The pharmaceutical model

It is not difficult to understand the scepticism that pharmacologists display towards our claims for herbs having the precise meaning that we give them. The sensory priming of this plant material will mean that its interaction with the individual patient is not entirely predictable: we can only speak of general tropisms that may well not pertain in a particular situation, may be modified or even contradicted. But to insist that something put in the mouth that tastes very definitely of something has *no* effect at all would be unreasonable to the point of bizarre. To say that it is not easily generalisable is quite another matter. Pharmacologists readily accept the idiosyncratic, but standardise and quantify an effect and expect it to be found in statistically significant ways. This militaristic approach to disease (viewing health as a temporary remission) will of course have its casualties and these are built into the risk/benefit analysis that accompanies the pharmaceutical product to market. To apply this gambit for conditions of ill health where the biological element is not dominant creates harm and risk with little benefit, and so is ethically dubious. This book is dedicated to showing that this anomaly pertains in the majority of cases outside the surgical ward and the intensive acute care of life-threatening illness.

In testing for a pharmaceutical product, the assumption is binary: it will or will not have an effect on the human body. The assumption is of course well founded because cognate molecules are known to have an effect and the hypothesis being tested, for that is what it amounts to, has been thoroughly scrutinised. If a real effect is found, that effect will be reproducible in nearly all people; that is what is meant by “real”.

An extract of part of a plant cannot match these criteria. It will be composed of a multitude of compounds, some of which may be unstable, and which may interact together and with the person into whom it is introduced with results that are unpredictable and variable.

The expected outcome for a pharmaceutical product has to be stable and predictable. Once this hoped for result becomes established, the compound or formulation then has to be screened for adverse effects. These are to be expected and they must be conscientiously sought for.²⁸⁰ The long and difficult analysis must eventually be resolved into an assessment of the scale of adverse effects and an assessment of the risks compared with the benefits. If the benefits are modest and the potential harms are great, the product has no future but if the converse is thought to be true, a great success can be claimed, even a breakthrough in the treatment of disease. The ingenuity of drug designers and persistence to their task must be admired and celebrated, especially for the recent generations of monoclonal antibodies that try to switch off auto-destructive processes. Their project is to combat the ravages of disease for which they should be applauded but they would not claim to help people who are ill but have no disease. The word “healthcare” as it might appear on the side of a van speeding to a pharmacy or “care” home usually denotes a mopping up of broken pieces.

Certain plants have been known since prehistoric times to have definite and reproducible effects on the bodies of humans and other animals. Even critics of botanic drugs recognise that the opium poppy had effects that were incontestable. Is herbal medicine an over-optimistic extension of these known facts? Many of the plants that have been used medicinally in historic

²⁸⁰ See Hanin 2017 for how this cannot really be conscientiously researched by vested interests.

times have not had such entirely predictable actions. Has our history been one of hope over established knowledge in the face of the intractable pain and suffering over the centuries, for which any remedy had to be better than none, in which the straws of plants were clung to? Zealous opponents would say so resoundingly, while equally zealous adherents might indeed cling to ideas that no longer have the merit that was once ascribed to them.²⁸¹

The scientific analysis of effect assays the difference between the norms and the controls. Finding a way to randomise and control the very therapeutic modality of sensory priming would present a methodological challenge. The motivation for extracting a generalisation from the particulars of human illness falters if we resist the commodification of the medicinal act.

Why plants? How do they work?

The simple answer is that these are the wrong questions. In the co–evolution of all organisms, each phylum is constrained and enhanced by all others. Mindedness begins with bacteria, with the binary choice facing the primitive organism. These possibly put junk RNA and other nucleosides into a travelling bag from where they emerged as the virus. Viruses may be the memo-pad of life that just started to assert a life of their own because, as limited but widespread packets of information, thermodynamically they had no choice. Like all information, deadly in the wrong hands or in the wrong place.

Plants have more completely created the atmosphere than the earth. Soil is a byproduct of air, roots the product of shoots, mediated by fungi and other networks, minerals among their merchandise. Air, Land and Sea: these bring a few of the elements to Life. Plant roots help create soil; their aerial parts temper the atmosphere. Soil (a meta–organism, an ontology of terrestrial ecology) needs plants to manage and orchestrate so that carbon–returning animal life can thrive. Fire, when it exists, consumes them all and is both an originating state and a deciding fate but the light it emits can be harvested by the unburnt chloroplasts and reignited in the mitochondriae. If bacteria and archaea are the “atoms” of life, and eukaryotes are its “molecules” enabled by their engulfed chloroplasts and mitochondriae, the drivers of the biosphere, we do not need essentialist “elements” to describe their progeny. Nor, I hope, do I have to ask the myopic question about plants: a culture that forgets its roots will overheat and desiccate. With an appropriate depth of field, we can fully celebrate herbal medicine as truly correlational medicine, sustaining human life rather than adding to it the burden of intervention.

How do plants exert an effect upon the human body?

To answer this question involves making assumptions about the medicinal act but I am deferring that discussion to the section that follows (Theraps) because otherwise we will never get to the point. The thing that has most surprised me in discussion with herbalists and pharmacists is how

²⁸¹ See *Bad Medicine* by David Wootton (Bibliography); although it divided medical opinion in the field of History of Medicine, doctors tended to applaud it: the child psychiatrist and playwright Iain McClure numbered it among the books every doctor should read. Professor Wootton delivered a most engaging piece about the scientific method in discussion with Michael Rosen on BBC Radio 4 on 23 March 2018. Being on the wrong side of his argument did not detract from my admiration.

often this big question has been considered broadly settled, apart from some minor details yet to be answered. Pharmaceutical science makes a highly sophisticated investigation about phase states and the behaviour of molecules in bodily fluids, their interactions and their regulation of receptor sites. It leads to the assumption that molecules in plants can act solely in accordance with these well-defined and tested laws of action, and are not inherently different to synthetic or semi-synthetic compounds. Even so, workers in the field notice some curious anomalies. For instance, Professor Peter Hylands²⁸² has convincingly demonstrated that “inactive” compounds in the complex herbal formulae he has studied have synergistic effects with the “active” molecules, and that their presence is necessary to obtain the observed therapeutic outcomes.²⁸³

In his presentation about these research results, he took an empirical stance as would be expected from a professional scientist practising and teaching at his level. He described some aspects of humoral theory to give his audience of doctors and pharmacists the context in which the research was undertaken, and without which they would be unable to conceptualise the diagnostic picture. He has spent his career researching the chemistry of plant compounds but has always presented himself as a disinterested pharmaceutical chemist: he has never been a promoter or antagonist to herbal medicine, whatever his private thoughts might be. In this presentation, he disavowed any allegiance to, or proposals for, the promotion of his research subject, Chinese Herbal Medicine, but in making the professions aware of these research results, he perhaps implied that they might touch upon social and economic aspects of pharmacy and medicine.

Be that as it may, his work shows that in some cases the presence of compounds that have no demonstrable effect are necessary to the efficacy of other compounds that do influence the overall clinical outcome and might provide an example of some kind of obligate synergy. These anomalies do not of course prove or disprove anything but do illustrate how complex systems cannot always be reduced to their parts. Even in standard accounts of pharmacy, the action of drugs like Senna were not accounted for by isolation of single anthraquinone derivatives and required the complete set of ingredients, some apparently inactive.²⁸⁴

In his undergraduate teaching (and I still have my notes of his lectures), Dr Hylands acknowledged that botanical drugs as complex mixtures will include compounds that may ballast or modify those that produce the main therapeutic effect. These are well recognised and documented in pharmacognosy, but we were not encouraged to make too much of them as a therapeutic principle. The question perhaps hinges on whether certain effects are idiosyncratic exceptions or the rule, whether anomalies can be expected and, because unremarkable, should not be a cause for enthusiasm or dismissal. Enthusiasm is characteristic of the arts and of belief but is suspect in a scientist who has a reputation to protect. This institutional scepticism becomes instinctive. Evidence is invaluable for corroborating knowledge but can also narrow the inquiry and carries with it an enormous weight of coercion in modern culture.

²⁸² Head of Institute of Pharmaceutical Science and Head of Pharmacy Department at King's College, London. I had the good fortune to be taught phytochemistry by him. He would always say that all chemicals are chemicals and would make no distinction between molecules inside and outside living organisms. He conducted trials on Feverfew, findings published in *BMJ* 291, 569 Efficacy of Feverfew on prophylactic treatment of migraine.

²⁸³ He presented these findings to a meeting of the Society of Apothecaries in January 2016.

²⁸⁴ Trease & Evans 1978, 378–379.

In extremis, a reductionist approach may offer immediate relief and save lives. Otherwise, if health is to be viewed as a cluster of complex variables coupled with interactions between complex systems, a complex mixture will be assimilable and normalise energy constraints without further taxing a person already burdened by illness. By contrast, the medical application of single compounds will have to provide maximal forcing in order to be effective and so will be too forcible to nudge the system. Inevitably, powerful mono-therapy will produce unwanted and unpredictable effects.

Whatever medicinal effects plants may have, they had themselves and not us in mind as they pursued their metabolic pathways, adapting to life to avoid death, just as we do. We must not think that our benefit is their purpose. As the Zen sage Sep-pō asked rhetorically, “When the hundred flowers of springtime come, for whose sake do they bloom?”²⁸⁵

I have developed a model that I have called The Multi-Modal Hypothesis in a quest to show how medicinal plants may modify the terrain and how they can contribute towards health in the sense that I have described as poise. The theory hypothesises two different but complementary mechanisms which I have named Sensory Priming and Stochastic Resonance. These will be discussed in Section 20.

The principal point is that mixtures of plant extracts such as we use in clinical herbal medicine produce most of their effects by multiple signal transductions and not by way of molecules that find their way eventually into the bloodstream. They also have similar effects upon the mucosae of the upper respiratory and digestive tracts which make their evaluation even more complex. Plants may also engage within us a further physical complexity in that within physical spaces containing liquids with variable *pH*, like the mouth and the urinary bladder, colloidal systems may be encouraged by many phytochemicals which may disrupt the films with which bacteria enrobe themselves for protection. The formulation of some toothpastes is designed to mobilise salivation and influence the bacterial life harboured by plaque, but these products can do nothing for cystitis. Certain plant constituents retain their effects in the far reaches of the bodily cavities.

Colloids and films

Many volatiles are products that have been excreted by or have leaked from cells and have entered into the air. Floating on the air they are a necessary part of the aerial ecosystem. The surface-volume relationships in aerosols is so different to that in bubbles and other zones of composite materials that these physical properties enhance the life prospects for bacteria and viruses. Disturbing this environment that is so comfortable for them will make life easier for us. To do so, what else would we use than the complex solubilising matrices provided by plant materials.

Things move fast in solution and are difficult to retain and restrain. This fact is useful when positive and negative poles sort the ions into useful differential compartments, but slower more complex molecular assemblages require adherence to a cellular ambit: this can be accomplished by the gel state, and operates outside tubules within the cytoplasm and outside the cell border in

²⁸⁵ Blue Cliff Records–Hekigan Roku Shaw RDM (trans.). London: Michael Joseph 1961, 40.

colloidal films. Mucus and spermatic fluid are examples where suspension is more appropriate than solution.

The films that bacteria generate have useful, even necessary, properties when they form part of the gut's ecosystem—the microbiome—but need to be modified in structures open to the exterior. Here plants can usefully modify these bacterial films and aerosols. Bacteria promote, even permit multicellularity and thus give rise to our essential biome but inevitably there are some casualties among bystanders.

Essentialism

As I mentioned in an earlier segment with the same title (Section 4), nineteenth-century science made it more difficult to accept the idealisation promoted by Plato and easier to espouse the analysis of process found in Aristotle's biology. Philosophically, whether an agent appears to have the power to reduce a human ailment seems to be a narrow question. If the agent is a plant, it cannot have an essence as it is an organism with a highly distributed control over its circumstances, and circumstances, almost by definition, confound the idea of an essence. I do try to use the term "volatile oil" but often find myself referring to the therapeutic use of "essential" oils and don't bother to correct myself. After all, we speak of the aromatisation of adrenal hormones when no aroma is perceptible during the process. Historical accidents are interesting and it would be pedantic and puritanical to extirpate them from our discourse. Besides, there are so very many features of animal life that are *essential* to survival that we must use the word in the sense of an absolute requirement, to go no further than blood, the commonest synecdoche for life itself. Jehovah's Witnesses extend this essential requirement to essentialism in the sense of the biblical prohibitions against consuming blood.²⁸⁶

When it comes to a therapeutic intention, however, to slip into essentialism sends us back to a time when the world was thought to be about 4,000 years old and everything, living and non-living, was fixed and nothing had evolved. If we want to embrace a dynamic, energetic understanding of people and plants, we cannot fall back on Essentialism, where the "qualities" or "virtues" of plants are fixed and people can be fitted into schemata of types. It is not that generalisations are outlawed by an energetic approach, but events take precedence over things, living entities are constantly in process, all is movement. Phytotherapy is like bodywork: we do not apply categories to a static situation but rather we move with our plants and our patients and try to generate movement. If I understand it properly, homeopathy is essentialist if it considers that disease states are entities towards which remedies can be introduced to correspond with them.

For the purposes of this book, a more pressing objection to essentialism is that it creates boundaries between the body, psyche and the social being as if they are truly separable whereas I have been at pains to insist that the separation we make between them is no more than a useful convenience, necessary for analysis and discussion. If we think there really are three entities that exist beyond their use as figures of speech, we have slipped into essentialist mode and we have effectively strayed back to the doctrine of the Trinity which so detained theologians of the

²⁸⁶Notably in *Genesis* 9, 4; *Leviticus* 7 & 17.

Christian churches over centuries and their opponents over a few more.²⁸⁷ I don't know whether it is fair to describe the writer Richard Dawkins as a proselytising atheist but his trenchant views are well known from his books and broadcasts. During a recent radio programme,²⁸⁸ he used the word "spiritual" without altering his anti-theological stance, and spoke of the "soul" while expressly excluding the idea of an existence after death. Are we to take these epithets as religious terms or are they simply expressions of a being in its manifest entirety that is not quite material and touchable? The word "essentially" easily trips off the tongue when speaking of deep intangibles: it does, after all, have its commonplace meaning and would not have made me an essentialist any more than Richard Dawkins a convert to theism.

The best objection to the notion that the human psyche is inescapably sociolinguistic and can exist only upon a biological substrate is that it is too obvious to mention. Unlike a Venn diagram, this tripartite structure overlaps in its entirety. It is not unreasonable for three different sciences to be built upon these three manifestations but this separation performs a linguistic convenience: no partition exists except in our language. There is only the one person in the biological sense; the nuclear and mitochondrial DNA of that person will itself be unchanged throughout life, but the way it is expressed will be subject to such an unimaginably large number of variables that this doesn't say very much. The essentialist mode would have an essence stand in for the processes that are built upon Mindedness, itself a fluctuating product of constant flux. Again, it would be futile to object to a verbal convenience: a person with a name, a personality with a history, a sense of identity that make us feel whole constitutes a social psyche and a conscious being.

My point exactly is that while these are normal expressions for everyday essentialist living, they do not serve us well when we wish to consider the physiology of health in any detail. All categorisations are convenient essentialist shorthands for processes that have condensed into things.

Terrain

There are many structural differences between plants and animals; modes of feeding are opposite and so respective metabolisms are inverted, but perhaps the difference with the greatest effect upon structure is our capacity for movement, one that constitutes an obligation. Voluntary movement, in vertebrates at least, requires a central processing unit and complex connectivity with the periphery, whereas in plants, where the connectivity is almost exclusively endocrine, the control operates (at least in spermatophytes) from tiny distributed endocrine "glands" (to distinguish them from the exocrine glands found mostly on surfaces) in the apices of shoot and root.

²⁸⁷ The reader may, like me, be amazed at how religious faith has stumbled over what are no more than verbal configurations imposed by the limitations of language. That an entity can have three aspects yet remain one is true for a triangle, it seems fair to describe it so, yet the theologian Sabellius was excommunicated in the third century for making such a commonsensical point. Mahayana Buddhism seems to make a similar distinction between the body that manifests in space and time and those processes of the body that can only be abstracted.

²⁸⁸ *Start the Week* on BBC Radio 4, Monday 3 July 2017, to coincide with the publication of his anthology, *Science in the Soul: Selected Writings of a Passionate Rationalist*.

Plants are minded (in the way that all beings possess mindedness) but without an anatomic control centre. Their control is distributed to the extent that local perception alerts the whole plant to mobilise towards nutrient and away from toxicity, to react against predation and to sense the weather and climate so as to optimise reproduction.

The terrain of a human bears some resemblance to a plant in that it is peripherally distributed and is fundamentally endocrine. The organs of perception feed the centres in the brain so that it may eventually assume an idea of “control”, a construct, a phantasm, that bears some analogy with a political settlement that can in some individuals seem to endorse the Divine Right of Kings!

The peripheral organs represent the fast and immediate system that makes a myriad of decisions every second, while the brain is in effect the relatively slow deliberative system that “comes to” a decision that may seem to override and control the musculoskeletal body, though it can do very little to modify reflex arcs. The “choices” may be both immediate and strategic, both inhibitory and stimulatory. This unwieldiness comes at huge cost but confers eventually (on balance) enormous benefit to the species, the society and culture. This apparent central dominance flourishes at best when responsive to its dependence upon an integrated periphery. These were the difficult ideas I tried to express in *The Thalamic Mind* in Part One. When it comes to procedural memory (like riding a bike) even if the driver modules are in the brain, the primed receptors reside in the muscles, connected by a walkie-talkie.

All types and sizes of plant and animal species create and are recreated anew by the biotic part of the physical landscape. The signalling pathways between the inhabitants of a physical ecosystem create a neuroendocrine terrain of astronomical complexity. Such a terrain exists within our own bodies. Tropism can hardly be separated from trophic function so that heliotropism in plants is nutri-tropic. Humans in common with all animals can exploit this terrain of plants for the benefit of their own.

The terrain has to avoid, sidestep and negotiate inherited predispositions. In the embryo, where it is first configured, the terrain of the mother will dominate the informatic, endocrine, trophic and nutrient landscape but the structural influence of the grandmother will be palpable so that the terrain will back away from a disease predisposition (for example, to rheumatoid arthritis). This avoidance strategy may well dominate the life of the newborn: its compensatory drive may well throw up difficult patterns of its own, to say nothing about the paternal directives in this new exemplar of the human genome.

Belief, facts and assertions

In the cognitive theory of intentionality, mental states represent objects in the physical, social and emotional worlds along with the circumstances that emerge from their many interactions. We see how things are or how we perceive them to be and contrast them with how we would wish them to be. These perceptions amount to belief. They generate an emotion, even when the emotion is one of feigned indifference. True indifference is a belief almost devoid of emotion. Our social reality involves us in action, abreaction or refraining from action. Mental and emotional states underly all desire and all our acts. Belief is a *practice* and so underpins social reality.

The world of facts in the scientific sense is relatively new. Some facts are absorbed into belief in the sense that they are not worth asserting or denying: the world being round suits most people. The world of facts can also be contractual in the mercantile world: we are forced to accept that some things are as they are said to be or else we may face legal or social penalties. Facts are difficult to distinguish from assertions: religious belief has always been asserted, in private or public practice, but with or without it, we cannot act without belief in our course of action.

Pharmaceutical science has distilled facts from chemistry and physics into criteria for efficacy; this search for effective agents serves as an assertion of economic and political force. The naming and labelling of medicaments must inevitably involve a corresponding naming and labelling of disorders and presupposes a commodifiable human being. The contributions made by the humanities and social sciences towards an understanding of human pain and suffering are excluded from this project, one that is driven in great part by actuarial studies. Perhaps epidemiology and statistics are necessary and appropriate tools in the management of infectious disease and monogenetic disorders, but in so-called developed countries other illnesses are raging which pharmaceutical science is not designed to tackle.

My patients do not ask if I believe in herbal medicine: it is obvious, that is what I do. They sometimes do ask me if I believe in homeopathy or applied kinesiology, to which the reply is simple: I do not practise it or them or anything else, as if I were in need of anything else. They may also ask whether I believe in the gluten theory of disease or any number of topical fears. This is more difficult and makes me more sympathetic to the notion of evidence based medicine and, of course, I do assert that some dietary approaches are more salutary than others, and in general my advice is considered sensible and often very helpful. I try to tailor my recommendations to the patient's circumstances but it is difficult to avoid one's own partisan beliefs. Even so, people acknowledge you when they know you do not believe that all facts are equally deserving of respect. Patients recognise that the strength of conviction that is open to new facts and persuasion, expressed without hostility, shows a care for them and their truth.

The notion that human survival depends upon plants should meet with little opposition. This fact of our survival depending upon the cognate notion that all life has co-evolved might be opposed by some modes of religious thought but is, I believe, the key to understanding the potential helpfulness of herbal medicine.²⁸⁹ As for plants as food, treating human hunger as the only worthwhile aim does treat the earth as a kind of hydroponic system and excludes the web of life as an inconvenient contamination. Unfortunately, this belief has been far too readily accepted as if the urgency is thrust suddenly upon us and no other remedy is available, as if our dietary practices are unchangeable and undeniable.

Our herbal practice is for the moment legal in Britain but there are doctrinaire and totalitarian forces in pharmacy, medicine and elsewhere that would like to remove our legitimate activity. They are ideologically antipathetic to pluralism and assume they can count on being entrusted with the guardianship of the health of the populace. To counter this illiberal threat, the appeal

²⁸⁹ Comparative religious studies show a wealth of approbation for plants as food and medicine (often extended to their purveyors) as proof of the bounty of the Creator. Co-evolution is the element that might be taken to repudiate essentialist doctrine.

to more and more facts about the efficacy of herbal medicine is not, I believe, as desirable as the assertion that modern medicine and pharmacy have become narrow in their focus and knowledge base.²⁹⁰ Medicine is not the only sector that has become narrowly monetised, but market based utilitarianism—to the exclusion of other approaches to healing—will lead, in a tightening spiral, to an ever more expensive healthcare system. It is not by looking after the pennies that the pounds will look after themselves, but rather that the currency itself needs to be re-evaluated. The way against disparagement of our practice is for more of us to do more of it, and to do it better, looking to plants and to people, not to fashions and enthusiasms, those transient beliefs.

The four drives

The invisible matrix of enzymes is the thread of mindedness that binds all cells together within an organism. It binds all the organisms together in an ecosystem and creates the unbroken connectivity between every manifestation of life. Our attendant micro-biome on skin and membranes witnesses the penetration of these invisible threads as much as the organisms themselves. Our psyche is substrate dependent, especially on a handful of amino acids, and has no capacity to interact with other people without these matrices. Our sociality, like language, is preloaded into the human being. Just as we cannot digest without the unbroken threads, we cannot feed or even know what it is to hunger without substrate and enzymes. If you insist on a world of essences, then these are they.

The drives to drink, to eat, and to sleep permit us to continue and recreate our bodies. To meet is human, and beyond recreating our own bodies, perhaps at a certain point there is the drive to create new ones, or to engage in activity that might lead to them. Disturbance or frailty or excess in any of these impulses will lead to illness and promote disease.

All four of these can be addressed better with polyvalent herbal medicine than reliance on the misguided mono-therapeutic obsession. The silver bullet may often be a certain and appropriate strategy for targeting infectious disease but leads to overkill in the many conditions that we see in general practice, emerging from turbulence in the terrain.

Coherence

Health is Coherence. A coherent signal transmitted, distributed and returning without disruption or turbulence saves energy, improves function and maintains structure. Coherence allows limbs to respond to intention and allows intention to be liberated from dither and deliberation.

A coherent signal is energy saving but cannot be generated and recovered without a good and stable reserve of energy. So strength begets strength but only if the current available amount rests calmly upon a solid deposition of stored energy. Lack of calm is always a deficiency or

²⁹⁰ The College of Medicine recognises the limitations (and unsustainability) of current approaches to “health”. Its officers report hostility from medical colleagues towards its campaign for pluralism. In a more shallow way, it has become commonplace in primary care to be exhorted to take up yoga or mindfulness by people who do not appear to take their own advice. Even with all the lifestyle advice, the scandalous admission (after a certain age) that one’s life is not supported by pharmaceutical drugs is met by a surprise that borders on hostility.

(which amounts to the same thing) a break in coherence. Calm will inevitably be disturbed by circuit breaking.

Medicinal Plants provide us with a remarkable benefit in allowing us to operate at any point within the circuit. If treating an irritable, reactive and inflammatory bowel associated with depression and emotional turmoil, we can use, say, *Hypericum* and *Melissa* either as psychosomatic or as somatopsychic agents (making the huge and unwarranted assumption that these are discrete entities when they are locations on a circuit). Even if we add *Agrimonia*, with the rationalisation that its tannins will act directly on the gut, we underestimate the polyvalence of that herb but also the direct and positive somatopsychic effects of calming the immune response at the epithelial layer.

The energy deficiency associated with lack of coherence will also promote energy wasteful recruitment of muscles. Muscles operate in groups and recruitment of accessory muscles towards a desired action is a normal feature of musculoskeletal activity. Some efficiency has to be learnt and some inefficiencies are associated with a disorganised intention or ambivalent desire. Children often rush at an activity, which is part of their learning, but so much depends upon the environment created by their minds, their peers, their parents and others. So much also depends when facing a muscular task on the freedom and voluntary agency involved in the proposed movement, on whether it is a new or repeated task and whether template models are held in memory, whether there is time to compose a good approach to the task and, most importantly for coherence, whether there is an adequate supply of available energy with a sense of reserve.

These are difficult ideas to convey in words. I was fortunate enough to study with the legendary Dance teacher and Educationist Jane Winearls (1908–2001) and even more lucky to have Gerald Wragg (1931–2012) as the accompanist on piano. His work with Alexander²⁹¹ led him later to concentrate on voice production. She demonstrated—both at the bar and in caricature mime—how balanced action obviated the need for recruiting other muscle groups: they were not needed, impeded action and were a major source of wasted energy. Occasionally, Gerald would emerge from his almost reptilian silence and stillness to lay gently correcting hands upon the misaligned body and with a very few words, allowed one to take one's maximum height. The effect wore off after a few years in the wilderness; I have never been so tall again.

Body work of this order is difficult to come by but the choice of technique is not as important as helping your patient to take their posture and breathing seriously. Gerald Wragg and Jane Winearls had learnt from each other and so the original source of the following (though it occurs in print) is difficult to credit:

Posture is not standing in a certain position; instead, it is the position of the body to its environs, and the disposition of the parts of the body relative to each other.

Loss of equilibrium means loss of vocal freedom ... the imbalance often stems from focusing on one aspect of vocal function which invites subconscious participation of nonvocal muscles as a compensatory measure. [That is what I meant above by muscle recruitment.]

²⁹¹F. Matthias Alexander (1869–1955), an Australian actor who developed a method, now known as the Alexander Technique, to correct difficulties with his own vocal instrument.

Poise needs assured posture and relaxed abdominal breathing for its maintenance. This is at first achieved in adults by controlled exercise, but allowing control to move from centres where it does not belong into what I have called the thalamic mind where it does, allows for poise to be maintained eventually without conscious straining.

Theraps

The primary response to hurt is compassion and the attempt to help. Self-treatment bypasses the empathic impulse and suffers from this limitation: we cannot see ourselves as others see us: our own reflection in a mirror is a closed circuit to which we have not the capacity to respond empathically. When we are ill, the only mirror we need is for another person to relieve us of the burden of introspection and diagnosis. Illness is a lonely business at a time when the energy for such a labour is unavailable. The therapeutic signal is enhanced when it is compounded by the energy of another focused person. The therapeutic motivation and an understanding of the full context is an integral part of even the medicinal signal. Self-medication seems to be one of the flaws in Hahnemann's notion of Proving.

In one reading, *theraps* in ancient Greek means a witness, someone at hand, someone who stands *near* not *by*, an engaged person. In the most successful of medical encounters, this stage of engagement precedes the technical and may last only a few minutes, even seconds, during the first greeting. It provides the basis for trust and for the placebo state to usher in the technical treatment. It should not (and possibly cannot) be feigned. It is not a trick or a technique. All it requires is for you to forget at first meeting that you are a herbalist and to manifest as a benign human stranger.

I would extend this very simple idea to all therapeutic encounters: there is a primary stage of human recognition (no need to invent a term for it) that precedes the technical. It should apply equally to surgeons and psychotherapists. It is the mode that transcends and precedes culture. Like all simple ideas, it is easy to overlook or take for granted.

Fake projection and authentic acquaintance

I dispense only extracts of Plants that I have at one time or another cultivated or experienced in the wild. The great majority of these plants I know very well and many of them live close to me in my wild garden at home or the rather larger one at my practice. This is simply acquaintance, though it is far from simple. By and large, like friendship, its value lies in not over-thinking about it: rumination rather than cogitation, just a cumulative recognition. This acquaintance contributes greatly to my instincts as a prescriber and I recommend it as the basis on which a long-term practice can be built.

Our response to plants says more about us than about the plant. Intense perception of a plant, as well as the extensive daily familiarities throughout the seasons and weathers, forms a deep and authentic knowledge. To presume that we are constructing a "dialogue" with them is to commit to a piece of extraordinary vanity. We are communicating with ourselves: the plant is not eavesdropping on our conversation. The experience of the encounter can be vivid and

deeply moving but the person, not the plant is the beneficiary. The poetics of plant familiarity will contribute deeply to a herbalist's knowledge and ability to use them constructively and creatively, but to elevate these experiences, both the quotidian and the numinous, to a mystical power that you can direct towards your patient's health seems presumptuous and self-congratulatory to me. It is like theology without God. Of course, you could recruit Goethe the idealist or the New England Transcendentalists like Emerson and Thoreau to support such claims, but the assumptions about the source of the voice seem to me to be not so different from the distinctions that Augustine of Hippo and others of the Church Fathers made about the source of the voices heard.

Although I am proposing that we should not claim too much insight into plants (to try to get inside the head of a plant imaginatively is to investigate your own) the two of us are united by the same invisible threads, by the matrices of enzymes, nucleic acids, nucleosides and nucleotides.

Replacement therapies

Nursing is the first and often the best place where the nurse replaces the energy and function the patient has lost. Vitamin and mineral supplementation are Replacement Therapies as is the administration of hormones in one guise or another.

Herbal remedies can be used as replacement therapies but are so well placed to work as non-replacement medication, it seems rather pointless to try to compete with standardised replacement therapies and rather questions why as a herbalist you would not prefer to recalibrate the terrain of your patient.

The medicinal act

There are two speeds the body adopts towards medicinal plants:

1. The shock of the new, the unknown
2. Cumulative repetition and therefore part of the known repertoire.

There are six loci of application and operation:

1. Shifting the centre of poise within the autonomic nervous system
2. Modifying bias and conflict within the hypothalamic and pituitary endocrine systems
3. Modifying functional relations between autocoid hormones and the aminergic and cholinergic neurotransmitters
4. Dampening (or occasionally encouraging) flow of neuropeptides from the hypothalamus via the posterior pituitary and from the digestive tract into the blood
5. The function of organs, especially the pancreas, small intestine, kidney and liver (external applications may also be used to influence these)
6. Influencing blood flow, coagulation cascades and other cardiovascular and tissue effects.

Building on the work of my teachers, Drs Duraffourd, Lapraz and Hedayat, I have developed supplementary ideas that attempt to explain how medicinal plants modify the terrain and how they can contribute towards health in the sense that I have described as Poise. The theory hypothesises two different but complementary mechanisms which I have named:

1. Sensory Priming with Associative Pathways, *and*
2. Stochastic Resonance

These will be the subject of the next Section.

SECTION TWENTY

The multi-modal hypothesis for the actions of medicinal plants: sensory priming and stochastic resonance

The multi-modal hypothesis for the action of medicinal plants

Herbalists in the Western tradition²⁹² have, at least since the time of Paracelsus, shown great cognitive bias towards professing the profound and almost exclusive efficacy of plants in human medicine. They have often accepted as axiomatic that medicinal plants have a special place and an effect on the patient that is qualitatively different to other therapeutic medicinal modes, chiefly mineral or other treatments with purified materials. This assumption has often been expressed in religious terms.²⁹³ In those cases where scientific validation has been sought, the postulated mechanisms do not seem either adequate or comprehensive to explain effects repeated in tradition or self-reported from clinical practice.

Proteins were thought to be first and foremost, hence their name. Now it is better to understand that a whole family of informational molecules are protean, that the immune system depends upon informatic sequences in protein receptors. Life depends upon interpreting signals and responding to them by internal signals made up of complementary or reciprocal codes. As in harmonics, the pure pitch is unattainable, enharmonic pitches will always be sounded at the same time, which adds to the pleasure of listening to musical instruments, whether strings or columns of air in metal or wood are vibrating. The human ear picks up the entire range as the “strings” in the cochlea vibrate across the whole acoustic range. Apart from the enharmonic range, there may be interference with the signal itself, which is defined as noise. The idea of a “pure” signal without any noise is an abiotic idea and is intrinsic to the desire for a standardised

²⁹²Not just Anglo-Saxon and European but taken in the more historical sense, including the great Arabic and Iranian Canons and the Egyptian and Indian practices and thought that informed the Greek and other Mediterranean traditions.

²⁹³In an age of secularism and faith tourism, cognitive bias assumes that faith has no place in political or scientific discourse. This work makes no such *a priori* assumption but nor does it seek to address the question at all.

purity of a pharmacological agent, a notion initiated by Paracelsus and elaborated by the drive of science towards simplicity.

But life is not so simple. As detailed in Section 3, the bias of mindedness created by the binary modes of approach/avoidance is fundamental to microorganisms and extends upwards in an unbroken thread to all living beings. Bacteria move along gradients towards nutrient and away from depleted or toxic zones and this bias remains unbroken. It is difficult to maintain a distinction between informatic and chemical tropism: even though the products of information may be transient and emergent, their origins are material.

Multicellular organisms require systems to manage the colossal amounts of information self-generated at every moment. The immune response, though highly diversified, is at least founded on a binary “choice” (see Multiple Choice in Section 14) of accept (or at least tolerate) or reject (or at least discourage). There is some evidence that the human leucocyte antigen (HLA) system, coded within the major histocompatibility complex (MHC) plays a role in mate selection in humans.²⁹⁴ Smell is an immediate sense and is primary in that fewer synapses occur between peripheral receptors and central processing. Pheromonal molecules are potent propulsive agents, whether attraction or repulsion, and typically enter beneath the radar of conscious appreciation.

When molecules from whatever dietary source enter the bloodstream, they will have done so as products of personal choice as modified by the familial and cultural (as well as accidental) influences on personal history. Molecules found in natural sources will have been filtered by many layers of mindedness, both in the person and their antecedents. Their presence may easily trigger a number of associative neural pathways.

Sensory priming

Light is the signal that gives us our sense of space.²⁹⁵ Sound is the vibration that provides us with a sense of time: echoes occur after an event; music is appreciated in its duration and also afterwards. It is easier to reconstruct aural memories (humming a tune) than visual ones that rely on a cluster of the organs of our brain.

Smell is a signal of identity. (When it is a command signal demanding swift response, the vomero-nasal organ rather than the olfactory bulb is involved.) This auxiliary olfactory organ is also involved in lipophilic sampling and is thought to process the pheromones of others. The tongue is not passive but a major investigative organ. We are primed by taste and smell, confirmed by sight to accept or reject plant material for food as well as by cultural cues and the knowledge and prejudices of our familial and social milieu. Taste provides a secondary confirmation of smell but also evaluates texture and makes a provisional analysis of the advisability of the material presented to the taste buds on the tongue. Very few tastes or textures are neutral. Even bland tastes (as well as the notion of blandness) are recorded and archived. Seeing space, hearing time, smelling and tasting for deciding.

²⁹⁴ And, notoriously, the choice may be masked or confused if the female chooses a mate while taking the contraceptive pill. Confusing, no doubt, also to the selected male.

²⁹⁵ Wilczek 2015, 158.

When we consider whether to ingest a plant for the first time, smell and taste will influence our choice. Those with a desire for novelty will be driven in the opposite direction to those who crave repetition of the known with a corresponding aversion to novelty. Although olfaction is not the primary function of the hippocampus, its connection with the limbic system, memory, emotion and the avoidance of conflict means that our ingestion of plants is highly primed and then conserved. It is scarcely credible that this stored tropism (a *turning towards*) does not navigate eventually to the hypothalamus, the fulcrum of our neuroendocrine relations with our digestion and metabolism, to say nothing of our limbs and the rest of our proprioceptive mind.

Our system will be primed towards any molecules that bear similarities to those originating from those plants we have encountered and towards those we have not but may be attracted to on the basis of potential value, depending upon our propensities and previous influences. These can cross generations to the extent that they can cross the wall of the placenta.

Pharmaceutical preparations of whole plants are relatively odourless and tasteless and to this extent will not prime the patient towards them, but the patient may already have been primed towards them by previous ingestion. Likewise, tinctures and fluid extracts will have a much less direct priming effect than the plants themselves, especially if the plants from which they were manufactured contained volatile oils or resins or other terpenoid compounds. Taste buds up-regulate the alimentary tract.

Sensory priming extends along the gut lumen and so what has begun in sensory organs continues below the conscious level as the plant material travels. Of course, this powerful resonator should not be confined to medicine. Spices and aromatic herbs should be included in most meals every day. Whether food or medicine, the tiny dose is further amplified by the multitude of our microbiome.

Sensory priming influences all buccal, respiratory, gastric and intestinal epithelia before any material enters the bloodstream where any effect will be amplified by stochastic resonance. The many classes of phenolic compounds present with strong taste and smell and polyphenols will later feed the microbiome. Even plants with a mild sweetish taste, such as Marshmallow leaves, prime the mucosal surfaces with their emollient texture. Alkaloids are often slightly bitter with a background odour. Drug plants which depend for their effect upon a relatively high alkaloidal content operate via the bloodstream but bitter aromatic plants which operate via a wide range of phenolic material but contain also a very small amount of alkaloid, may have this effect amplified. Careful observation is needed with some of the labiates described in *Materia Medica* (Section 24). It could reasonably be argued that this lack of precision and reliance on the individual context makes the actions of plants difficult to generalise. I would agree: these plants can be directed towards tropisms in the human body; the consultation refines the context. The notion that disease can be defined by biomarkers is itself imprecise and broad with many exceptions: disease categories turn out to be statistical probabilities rather than the categories previously named with such confidence. Health itself can never be so categorically defined, though we know it when we feel it. Health is sensuous and sentient; the sensuousness of plants, the woodland environment, hillside and meadow provide medicine for the heart of humankind.

Stochastic resonance

The discovery of random motion in suspended materials was discovered by the botanist Robert Brown as he worked upon pollen.²⁹⁶ The word stochastic originally meant to make estimates towards a target, a kind of guessing through a sea of random variables, and first found use in mid-seventeenth-century mathematics. Life flows stochastically from moment to moment but every movement is strictly dependent upon only the previous movement, with a finite number of possibilities for the next, although historical predispositions may narrow the scope of probabilities.

Resonance is the transmission of a force or oscillation from one system to another and is simplest to appreciate in music but can also be demonstrated in mechanical systems: when anything is struck and makes a noise. There is resonance in the orbital motions of the earth, sun and moon (and to some extent other bodies in the solar system). Randomness of events is stabilised for living creatures by the periodic punctuations in time provided by the movements of these three bodies. But of course the routine of our days is variously interrupted by unexpected events, the weather and a host of unpredicted tasks. The contribution made by our entrainment of circadian and other periods to health was discussed at length in Section 2.

The term stochastic resonance originated in climate studies and was first employed at the beginning of the 1980s, but the mathematical work was applied in electronic engineering, especially in acoustics. The goal of sound recording had been to find and preserve the perfect signal and to exclude the disruptive influence of noise. But “high fidelity” turned out to be a misconception: there are no perfect signals in nature, and in many circumstances the addition of a certain amount of noise actually strengthened the signal. The effect is known as the noise-to-signal ratio, a measure that may be critical to complex dynamic systems. In the 1990s, stochastic resonance was applied to other fields, all of which depended upon the first modern formalisation of Probability Theory, made by Alexei Kolmogorov in the 1930s.²⁹⁷ Computational Biology in common with other dynamical systems requires these mathematical analyses; contemporary genomic analysis depends upon algorithms generated by them.

The idea can be expressed relatively simply: life is a sequence of events; where you are now is more or less likely depending upon what happened to you before. The range of possibilities is huge but not infinite: it depends upon some probability. The set of probabilities which relates to you is constant within bounds: outcomes for each individual depend probabilistically upon previous outcomes. Entropy in the physical world is hidden (but only for a time) in living beings. Yet entropy operates silently throughout our lives and generates the dynamic search for energy that constitutes our health.²⁹⁸

Pharmaceutical science is an example of a field that searches resolutely for perfect signals in the form of perfect molecules, uncontaminated by the stochastic effects of organic molecules

²⁹⁶ Described by Goethe as “this acknowledged greatest of botanists”, though Brown did not return the compliment.

²⁹⁷ Modern theories of probability were pioneered by Pierre-Simon Laplace (1749–1827), one of the great scientists of all time who also developed the interpretations made by Thomas Bayes (1702–1761), whose work on logic gates has been revived in this computer age of ours.

²⁹⁸ While the idea is simple to state, the mathematics that assesses the probabilities of outcomes is not. For a most lucid introduction see Vidyasagar 2014. For the mathematically adventurous, I recommend Marcus et al. 2011. While most of us cannot manipulate the symbols in the equations, we can with deep attention follow the arguments.

and the oligo-complexes typically found in medicinal plants.²⁹⁹ A multitude of organic molecules from industry and agriculture are toxic in concentration but when extremely diluted are found to be potent endocrine disruptors.³⁰⁰ They constitute the basis for the two pieces of advice I offer my patients (in the passage entitled Advice in Section 10; and in Section 22).

The approach taken by herbal medicine, in contradistinction to the purification process demanded by the pharmaceutical trend, seeks to adopt the “noisy” signature from whole plant extracts or plant material to strengthen what is actually quite a weak signal from a dilute complex mixture, even in a single plant before being mixed with others. The dilution is made by the water in the plant and that which is added in the preparation, and then further diluted by the several litres of body fluids when ingested. Our medicines are strengthened in their relative weakness by their very noisiness. These are already high levels of dilution but we may even be able to appreciate these noisy signals diluted by an order of parts per 10^{-6} or even 10^{-8} . Going any higher than these dilutions would seem to over-extend the theory and stretch credulity.

Stochastic resonance is a phenomenon in information-transmitting systems that exploits noise in a self-optimising manner. Resonance is a form of feedback in any informatic system. Sensory priming amplifies the stochastic effects of a complex medicine upon the even more complex human being. In stochastic circuitry, minimal forcings “nudge” the system into resonance.

This is my core theory of herbal medicine and makes no sense without the concept of mindedness. The unbroken web of matrices that pervades every eukaryotic multicellular organism is nested within mindedness.

The core theory of human health is biological and therefore energetic: all living systems depend upon the ability to reduce their disorder relative to their external and internal environments. They cannot do so without a constant and predictable source of energy. This supply, I have tried to show in Part One, depends absolutely on a reserve replenished at a controlled rate. These controls are reflected in capacitance, pressure on which will result inevitably in symptoms.

Pulsatility

All living things count. A pulse has no determined existence until it is counted. A pulse relies upon a circuit; the neuroendocrine terrain is nothing but circuitry (see SORe in the next section). Even bacteria count in the sense that they need to know when to divide, so in their case it might be more realistic to say that their counting is done for them by the environment acting upon their mindedness. Language depends upon calculation in the sense that a sentence coalesces out of an understanding of form (my English teacher used to say that the word “sentence” meant “sense” so could not avoid making sense). A single word does not count as a sentence and singularity can only occur within a series. Communication depends upon this form, this

²⁹⁹ When discharged they contaminate watercourses, their diluted but pervasive and persistent signal causes a catalogue of unintended consequences in great contrast to those we intend with our patients.

³⁰⁰ One could fill a book with citations, but here is one close to home: The occurrence of pharmaceuticals, personal care products, endocrine disruptors and illicit drugs in surface water in South Wales, UK was conducted by Kasprzyk-Hordern, Dinsdale & Guwy and published in 2008 Elsevier’s *Water Research*, 42, 13. Dr Jean-Claude Lapraz devotes a section to the phenomenon in *La Médecine Personnalisée* 2012.

circuitry. Besides the imaginative mirroring that language requires (ensuring that empathy is universal), all cultures move rhythmically and use music, the mode in which we hear ourselves or the world counting. To speak, to count, to notice—each emerges from our biology to create the pulse of life at all scales: cell division, tissue differentiation, heartbeat, walking. Our identity requires us to recognise the parts of ourselves, partition of time, objects and other beings. Our imagination allows us the separation of psyche from soma, or to separate social and cultural ideas from biology, but these are fictions, just as on a plane you cannot have a length without a breadth, and in three dimensions do without depth.

All this pulsing, all these rhythms, they launch out into the sea of random fluctuation generated by myriad other signals, from both the living and non-living. As everything is in flux, the world to exist at all has to be meta-stable. Greater order in any living system (for instance, me and you) comes about inevitably, if unpredictably, by the economics of reduction and compression of information. Disorder, in the sense of diffuse attention or in febrile states, can temporarily be achieved by shock and aggression but we will need in turn to recover from this destabilisation if we are to survive. Surviving well is the theme of this book.

Living expects some disorder. Pharmaceutical intervention can indeed meet shock with shock tactics, to be welcomed in an emergency, but not as a way of life. Emotional shocks can jolt us out of our complacency but a healthy life needs, on average, some predictable comfort and reassurance. Inducing order in ourselves is as necessary as extracting energy from our environment. Resonance cannot be escaped for long if we are to be healthy, and if we are not to be healthy we will not last so long.

Health is the best conservation of energy and reserve that is possible under whatever circumstances we suffer or enjoy. Using complex indeterminate mixtures such as that provided by medicinal plants affords us an opportunity to tune in to a more conserved frequency, paradoxically because the medicinal signal is both noisy and resonant. The noise exists in the material redundancy composed by the plant material. The process is not as abstract as I fear I have made it sound. Health depends upon comfort in our sensorium, upon the congruence between the thalamic mind and the self. Life is rhythmic when we are walking, talking, dancing, thinking quietly to ourselves. We hear time as we walk and talk, see the space of the exterior and remain faithful murmurers of all this to our interior selves. Life is also phasic, inescapably so, entrained by our star and satellite. We entertain the phases of our life's memory in our constant dealings with ourselves, and with others.

Poly-cyclicity

Our sensorimotor system negotiates with the world to interpret the present state of our environs and interfaces with our various "selves" in the thalamic mind. To survive and thrive, we need to register and follow the cyclical events in the physical world so that we may eat, sleep, meet and mate. There are at least four dominant cycles that we have to represent internally on a daily and monthly basis. The measurement of day length via the ganglion cells in the retina informs us of seasonal opportunities and threats. These signals pass into the SCN and include the pineal for circadian processing towards which the organs are entrained. The cumulative signals are

incorporated into the major autocoid hormones and are discharged as pulses. The timing of these pulses gives us an analogue of the external stimuli that allowed us to create them.

The hypothalamic–pituitary system transduces these pulses into hormones. The contrast, one might almost say the opposition, and the sequentiality between FSH and LH, between these and the somatic modifiers like somatostatin, generates the menstrual cycle that males have some capacity to flatten out: androgens diminish cyclical signals. The system is rehearsed in the age phase 7 to 11 (–14) years and initiated between 14 and 17 years.

This pulsatility is reflected particularly on the sequential behaviour of the colon and, in tandem with diet and the feeding window, situates herbal medicine at the centre of the poly-cyclicity of life. It affords us a strong benign influence on sleep, digestion, menstruation and reproductive health, with all the attendant benefits of strong bones and sinews. I have drawn attention to Alternators in several places; it may be that this tendency bears less witness to a delay in circadian entrainment and more to a cycle of the microbiome of our gut which is hidden away from the sun, though it may respond to terrestrial and lunar tides.

Similarity and sameness, differentiation and uniqueness

The wonders of civil, electrical and mechanical engineering are all around us. These works are testament to the wonderful predictive power of the scientific approach. Quantifying things has allowed people to deliver probes to the rings of Saturn after the more tangible miracles of building structures a mile high and conveying people up and down them in speeding rooms with automatic doors. It has become human to take our technologies for granted and no one person could know all the component sciences and techniques that are required to interact and be organised to accomplish the modern world. It all requires an exactness and precision quite foreign to daily life, but also an ability to experiment and use heuristics so that good enough approximations will usually work well. Newtonian physics works perfectly well for mechanical engineers but when physicists looked deeper into matter at scales that we cannot see, and barely imagine, they found that exactness and definiteness of identity eluded them.

Even so, the fundamental thermodynamic laws are not in question, nor the great tabulation of the species of matter exposed by Mendeleev in the Periodic Table. Biological structures and operations have been described in great detail and mathematical models of their interactions with the physical world have predictive power. The immense complexity of ecosystems is mirrored within the interactions between component parts of any body at so many different scales (to say nothing of our microbiomes), and reaches its apotheosis in those relations forged between the human central nervous system and the physical body, which in turn negotiates with the physical world.³⁰¹

Given all this and in spite of the extraordinary (and welcome) pace of advances in scientific knowledge in recent years, the extent to which we can generalise about the individual seems to have shrunk rather than expanded: in other words, every individual person belongs to the same

³⁰¹ Nancy Cartwright and other philosophers of science of the Stanford school promote a pluralistic view of science and contend that the nature of physical reality is intrinsically complex and irreducible to a single unifying theory.

species but is unique in what might seem like a homogenous population, where sameness is something of an illusion and yet differentness can be much smaller than might be apparent, and yet crucial for an understanding of our health. The case for Personalised Medicine that herbalists have been championing for a long time is now being made by the contemporary biological sciences.

Our uniqueness makes us unknowable. This and any other book on health can only attempt to draw some lines of generalisation around the immense human population of particularities. Uncertainties are assured but a healthy avoidance of the notion that nothing can be said leads us away from a romantic despair³⁰² about the impossibility of the enterprise, like Nietzsche's to the pragmatic optimism of Hippocrates.

Geneticists tell us that while our genomes are unique they are mostly the same. It is our metabolism that is particular as managed by our terrain and modified by our interaction with the multiple environments, external and the internal one so created. As all individual experience is unique, the degree of differentiation and resultant competencies develops uniquely. So it is with plants, that show much more plasticity when it comes to dealing with their world of soil and atmosphere. They differentiate and de-differentiate seasonally and annually and play with their genomes like a game of canasta with multiple packs of cards.

As for our metabolic personalities, I would add that the repertory of our cyclicity is unique. This is the conclusion I was striving to reach in Section 13 Patterns of Life. The response to the cyclical events of the world is genetically imprinted on virtually all organisms, and is refreshed and rehearsed anew each day. We generate cycles within cycles as we respond to the new with the archive of our past experience. This is what makes clinical judgement so difficult and the response of our patients to our complex medications (even if we prescribe a single plant) so important to register as a response to pattern and cyclicity. Waves can have resonances with our reactions to events earlier in our histories and so can restimulate with alarming force when patterns repeat. Such resonance is rather like an allergy that becomes amplified with repeated exposure and is baffling when the current stimulus appears to be relatively trivial. Cyclicity cannot be separated from life events.

Paradoxically, our phenotypes are quite likely to converge into recognisable generalities that hide important particularities (see Section 14 The Patient as Personality). Phenotypic similarity or dissimilarity counts for very little; convergence makes it easy to overlook underlying sameness. Such an oversight can lead to racism and other appalling stereotypes and ignorant abuses of biology, fuelled by an almost inexplicable amount of ill will.

All schemes are approximations. They generalise the uniqueness of the one instance in the ocean of instants. That does not make them worthless: rather it saves us and our patients from the hubris of presumption and a recognition that all methods are rules of thumb. The more we qualify our generalisations, the more reliable does that thumb become. There can be madness in too much method.

The scientific method aims to debunk analogic and symbolic representations and delineate a world described by statistical data. It is a powerful, sophisticated and productive approach and

³⁰²Samuel Beckett went as far as he could in this direction and then returned to tell us the tale.

makes modern surgery (coupled with anaesthesia) possible and vital systems to be preserved. When imported into less technical medicine and applied to the individual metabolism, it is less successful than at first sight appears. It is designed to take the guesswork out of physiological phenomena, and claims to make the unknowable known. The number of scales that have to be scaled (from molecule to body) and the number of relationships to consider—more than—astronomical—makes pharmaceutical science a poor tool for influencing unique phenomena that may not recur or do so with individual patterns of cyclicity.

The application of herbal medication cannot magically escape this conundrum. Our individualised approach (assuming that most herbalists go along with this practice and that may be a false assumption) means that every new prescription involves an element of experimentation even though we operate by guidelines that are protected by lengthy training, traditional knowledge and good research data. Even so, such an admission would confirm the worst fears and prejudices of our opponents and might horrify some herbalists, but we cannot have it both ways. But guesswork is not as bald as it sounds. The dosages we use are not usually high and the remedies are not pharmacologically potent except when using those reserved by law for special measures and restricted dosage.³⁰³ We pay great attention to follow-up (unless we are retail herbalists) and prescribe only after lengthy and attentive consultations with every clinical method at our disposal. We maintain real clinical learning (besides continuing professional development) as we are prescribers connected to patients and plants with an immediacy other clinicians rarely enjoy. Our instincts and insights are continually validated or modified by our prescribing and clinical experience. Constant long-term use of medicinal plants should be confined to food and the kitchen (see *Daily Medicinal Plants in Food* in Section 22). When it comes to the clinic, we do best with episodic treatments, often on a seasonal basis. My educated guess (that word again) says that an experienced herbalist obtains at least 60% efficacy within the narrow definition of improving presenting complaints. In the wider sense of a positive outcome, the benefits are considerably higher. The guesswork is largely removed by a deep attention at the botanic as much as at the clinical level to those tropisms that medicinal plants express in the human body. They represent a wonderful accident of life and could not be so designed: plants metabolise for their own preservation and against aggression. These metabolic agents provide us with tropisms and affinities that are an outcome of evolutionary parallelism and an almost inevitable product of ecological diversification: we are similar in our eukaryotic needs (despite our phenotypes being so very different and our differentiations being so dissimilar). These biological homologues have the power to heal and the power to harm. We are privileged to be given the opportunity to try to make the best use of them.

Coupled with the sensory priming made by the smell and taste of the medicinal plant or a preparation of one, a long, detailed and successful consultation will provide the patient with thematic priming when they embark on a course of herbal medicine.

³⁰³ Formerly contained in the provisions of Schedule III of Section 12(1) of the Medicines Act 1968; this exemption for herbalists has been transposed to Schedule 20 of the Human Medicines Regulations 2012. E.g. *Convallaria* q.v.

Family resonance

Signals reach the foetus from many sources, with those from mother and her mother expected to have the greatest strength. Early in development, all manner of pheromonal signals will accompany the familial and social events of life and gradually other players will act upon the genetic potentiality. Those players are not, however, entirely random as our predispositions will attract us to some and away from others. In the womb, the very weak signals will be relatively noise-free and paternal contributions may influence duration of staging. Stress and pheromonal signals within the household during gestation will modify the mother's terrain as will the pregnancy itself. Resonance between distant family members playing out in the genome may make for clear and proximal signals, even across generations.

The clarity of the signals comes from their relative weakness and absence of noise. One can transpose this idea from inherent signalling pathways to external modulation of the terrain by the introduction of dietary patterns (weak but tenacious) and other extraneous interventions like shock where the persistence of the signal depends upon the sensitivity of the terrain, its ballast and buffering strength. Strong simple messages (as from powerful molecules like alkaloids and glycosides and from xenobiotics such as most modern pharmaceutical drugs) carry with them a lot of noise, creating strong turbulence. Weak signals emanating from complex mixtures such as those adaptogens and complex simples we use in herbal medicine come paradoxically with little noise. (See the table in Section 21 that follows.) These, amplified by sensory priming, provide our patients with the efficacy which we are used to observing and will be put down by critics to an elaborate placebo response. There is little point in rebutting this: the placebo effect is as real as any other.

But the effects of the plants are physiologically real. I hope it has become obvious, but just to labour the point, these effects happen because plants are material beings: no immaterial force or action needs to be invoked to explain their efficacy.

Personalised medicine

Medicine has to work on a generalised ground: unless we can make some assumptions we cannot act. In the first shock of pain and distress, we welcome generalisation: a human being in need. Later on in our trouble, we might be glad, even insistent, upon being seen and known in our particularity. When it comes to medication, we might at first want to be generalised: this damned cough, these incapacitating aches and pains. Surely something will work. After a bit of this and nothing working, we might consider how our personal circumstances led us to this point.

If herbalists insist that something is good for, say, a cough then should not that something always be used for a cough. If there is a list of cough remedies, we can always work our way down the list. How can a cough be so personal to an individual? The answer, surely, is that beyond emollient activity on the mucous membranes and some other fairly transient effects, herbs used in this way are unlikely to be transformative upon the individual circumstance.

Personalised medicine means abandoning specific uses and generalising neuroendocrine tropisms only after the plant (with its relatively weak pharmaceutical effects) has been introduced

to the person by way of sensory priming. Stochastic resonance will amplify the effect. The consultation in the way I have elaborated, with due attention to personality and personal physiology will prepare the ground. A person unifies and organises her or his perceptive world but will not for the most part connect this organisation with the one that the parents and grandparents have preset, without any deliberation, for them. Our job is to help integrate these historical events with the patient's current purview.

The congruence between the totality of the plant and the person forms the basis for change. No intention can be ascribed to either party: they are both particular and general accidents converging at the same time.³⁰⁴

Trials and tribulations

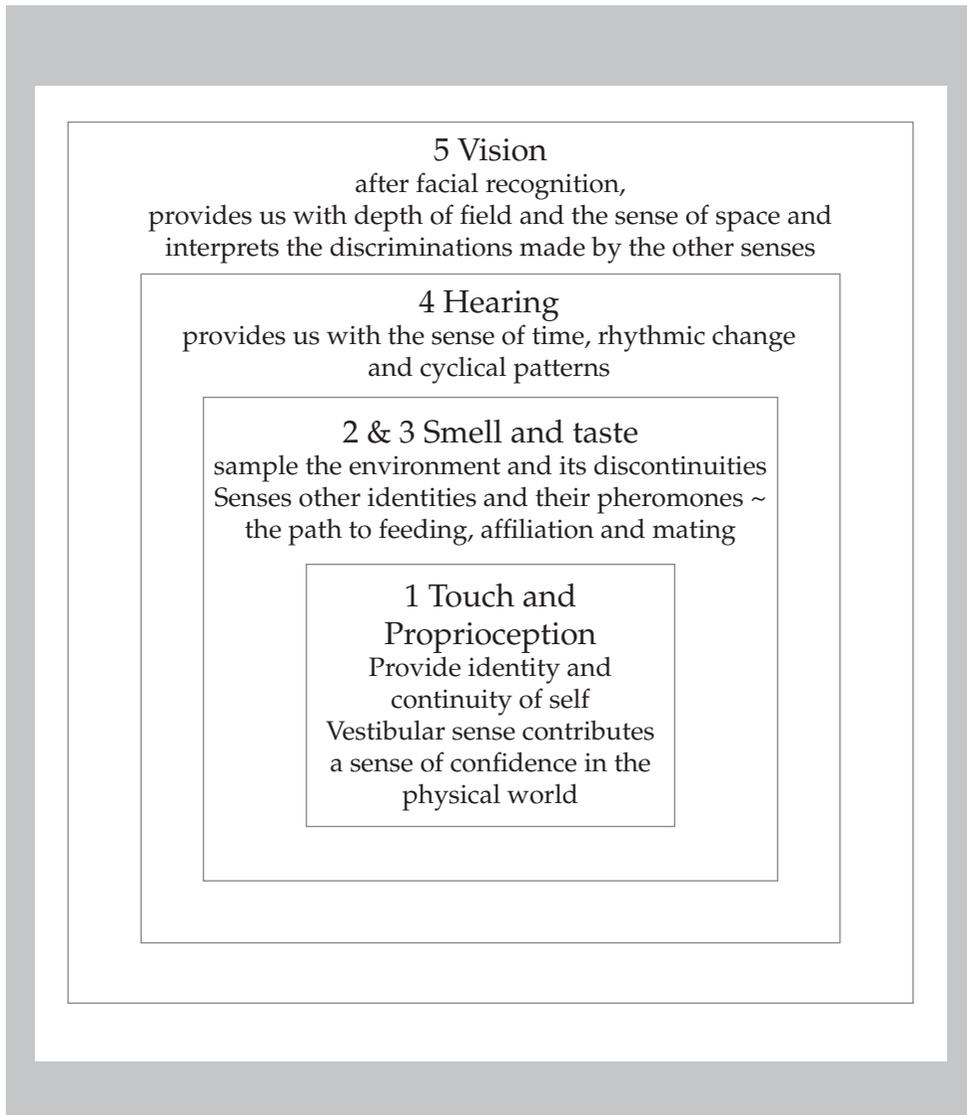
Medicine is in part technical and quite rightly dominates emergency medicine. Modern medicine has commandeered the technical path, perhaps appropriately for a state-funded enterprise. Yet in its commodification, it can render pain banal: shrug, and take a paracetamol. In assuming hegemony over life and death, the sense of the fleeting nature of existence is segregated to the religious as if having no place in medicine.

Herbal medicine in the sense I have tried to elaborate in these pages seeks to discover the entire narrative of the patient to as many generations as possible, to allow the patient to experience that quest by another and then, in companionship, to modify their movement towards poise. Poise considers life as a process of ratios in which the irrational numbers are inevitably at play. Humans sail upon a sea of desire and emotionality in crafts that are fragile yet robust, to be strengthened and to be sustained by appropriate medicament. Herbal medicine is ancient, but if it pits itself against technical improvements and the rigours of the experimental method, which have incomparably improved our lives, it becomes merely antiquarian.

Life is a Randomised Trial. Our life history declares our diagnosis. Our personality accumulates, gathering all the narratives we have been told and those we have told ourselves. The eventual outcome is the only known. Otherwise our uniqueness is both ordinary and wonderful.

³⁰⁴ Biotherapy research in cancer is directed towards the personal microenvironment, seeking correlations between receptor populations in the immune system and related genomic controls and stimuli.

The Five Senses



The precursor to and the product of this sensory assemblage is ceaseless biochemical movement with the eventual outcome of locomotion, biased towards nutrient or away from danger and destruction.

SECTION TWENTY ONE

Medicinal plants

Polyvalence and contradiction

Even a cursory reading of a contemporary herbal written in the traditional mode will trouble the credulity of even a sympathetically inclined reader whose first inclination may be to ask if a plant can really do so many disparate things. The wide range of effects seems little short of miraculous.

It has been expressed (and was certainly my own impression) that when first you read about herbs in those popular books that eschew references and have rather gone out of fashion, you would be struck by the wide claims made for them: can one plant really improve digestion, circulation, concentration *and* menstruation? This difficulty arises from the habit of summarising the *uses* a plant might be put to rather than its *actions* upon human physiology. Even if the list of actions is as long as that of the uses, the latter seem more plausible when the overall properties of the plant are specified. The important point I want to make would encourage the herbalist to develop a strategy to improve physiology rather than to treat a list of conditions. The matching of a herb to the symptoms of a condition tends towards the very generalisation that may be deplored in conventional medicine. Such an approach limits us to a role as dispensers of remedies rather than modifiers of the terrain.

Because of the wide range of actions that many plants can bring about, it is usual in any prescription to find competing, even conflicting physiological processes, especially in neuroendocrine activity. These conflicts are resolved by appreciating that there is a hierarchy of strengths. Degrees of effect, as they say in the old herbals.

For example, if you were trying as an overriding strategy to restrain metabolic oestrogen, you would be careful of administering plants with strong oestrogenic properties. You might not, however, necessarily avoid adding *Rosmarinus officinalis* to your mixture (because its

oestrogenising effect is relatively mild), just as you might give it, along with *larger* doses of vagolytic plants to a vagotonic asthmatic. But this plant is only weakly vagomimetic and only weakly oestrogenic so it might well be combined with the vagolytic *Thymus vulgaris* if other aspects of the strategy call for it. And they often do because both plants operate powerfully on the adrenal axis. The degree and the strength of the effect has to be balanced with its overall usefulness, and dosage provides a critical modifying factor; *Vitex agnus-castus* for example, at a very large dose³⁰⁵ reverses the very effect that is usually sought.

Sometimes the very tension between the opposite effects is fruitful, especially with the complex and multiple effects of a plant like *Ballota foetida*. However, there are also plenty of examples where to commit to such a conflict would simply be an error: I cannot imagine a situation where you would combine the strongly vagomimetic *Verbena officinalis* with the strongly vagolytic *Thymus vulgaris*. It is a matter of judgement and experience; in the schedules and in the illustrative examples, I shall draw attention to these *relatively* conflicting situations. The strategy must not be conflictual, but it is a rare prescription that is devoid of any contradiction.

I would go so far as to say that the polyvalence of medicinal plants will necessarily involve the herbalist in embedding contradictions within their prescriptions. Even with strategic thinking, I would say that *if there is a complete absence of paradox in your prescription, you might possibly have missed something*.

When it comes to modifying the autonomic nervous system with medicinal plants, the important point to reiterate is that constitutional tendencies should be seen as relative tendencies, not as fixtures, as trends rather than as classification. The ANS is a constantly mobile switching system that gets us through daily life: it enables the deeper neuroendocrine structures to be expressed from minute to minute. The rate of change and the mode of change expresses the individual more clearly than terms like “vagotonic” even though they are convenient as short-term markers. For these reasons, I have found the classification into the four major autonomic types³⁰⁶ unhelpful, in the sense that if you need a chart you have already lost your way.

Contradictions within the prescription

Contradictions within the Prescription are inevitable on account of the polyvalence of medicinal plants within the human body. If the plant can have an effect on one or more branches of the autonomic nervous system, be oestrogenic and stimulating to the thyroid, the question must arise “Oestrogenic to *what extent*, *how* stimulating to the thyroid and are these effects more pronounced than those on the autonomic nervous system?”

The truthful answer to these questions is that, apart from the *Biologie des fonctions* of Endobionics, little attempt has been made to quantify these effects and even the *Biologie* assesses the physiological states of the individual, not the properties of the plant. Subsequent *Biologies* after a course of treatment are taken in order to make inferences about the efficacy of the prescription but do not directly quantify or generalise the effects of any particular plant. These medicinal

³⁰⁵ At a dose above 600 drops, Duraffourd and Lapraz warn that ACTH is in danger of being relaunched.

³⁰⁶ Duraffourd & Lapraz, *Traité* 488–493.

effects are held to be tropisms from the plant to the person and we can best assess them retrospectively from clinical experience. The greater the clinical experience, the greater the predictive power of the clinician and the better the prescriptions she or he will write and dispense, but it is an inferential process that by its very nature is fraught with potential contradiction. This is the reality of the practice of a herbal practitioner and nothing is to be gained by shirking the issue. Some of the anti-science rhetoric used by some herbalists of my acquaintance, who may well place the word “scientific” in mimed quotation marks, testifies to their resentment against the scientific method which in effect invalidates their experience because of its exclusive reliance on data that can be quantified. Lofty dismissal of your honest and honourable livelihood is hard to bear but it is better to incorporate such criticism into our own self-assessment. We need to examine those cases which resulted in poor outcomes rather than bask in the warmth of positive testimonials.

Drugs or adaptogens

All plants put in the mouth and chewed will at least have a modicum of an effect on a person, even if it is simply one of disgust. The same might be said for an extract sipped, though if you bothered to make an extract of plant material, it would have been to some purpose and so it is likely that the effort spent followed some idea of what consequences might have been intended.

The dietary or the medicinal intention will follow tradition or recommendation. The contradictions mentioned in the previous passage hardly apply if you give someone opium, or even chamomile. The first has been known for analgesia for thousands of years and the second as a “gentle” digestive aid, as has peppermint and many other “simples”. Is there nothing in-between the powerful analgesic known to ancient civilisations and the herb of “herb tea”? Herbalists think so, of course, but they may be in a minority.

A distinction between opium and chamomile can simply be made on the basis of known constituents. The alkaloids of opium will always have an effect and, even taking idiosyncrasies into account (and these have been famously expressed by, among others, the poet and polygraphist Jean Cocteau, the poet and polymath Samuel Taylor Coleridge, and the essayist Thomas de Quincey), they are predictably strong. Chamomile is quite as predictable but its effects are directed towards mild digestive upsets, which are themselves difficult to manage successfully with powerful medicaments. This benign influence is presumed to derive from a number of well-known and well documented complexes of compounds, including very remarkable volatile oils.

Much work on the “active constituents” of very many plants used in traditional medicine around the world has revealed the many wonderful examples of phytochemistry and their potential for physiological effects. Much of it is not new and those of us who trained in pharmacognosy know that the interest in phytochemicals is as old as the spice trades and medicine itself.

The concept of an adaptogen as an agent (usually a plant) that confers on the body a normalising effect was probably a useful one when it was formulated in the late twentieth century. It assumes that the plant assists a person build a buffer against stress and, by some catalysing

process, allows the movement towards homeostasis without a demand on metabolic energy. My own contribution towards the adaptative response takes a somewhat different position and constitutes the text and argument of Section 3. These concepts do not fall within mainstream pharmacological thinking, in any case.

Whatever the benefits of the original formulations of the concept, the term has been rendered meaningless by the commercial exploitation of medicinal plants, any of which now can be marketed as adaptogens, whether they were once conceived of as such (such as *Panax ginseng* or *Eleutherococcus senticosus*) or have obvious and well-known pharmacological effects (e.g., liquorice). Indeed, plants that have become fashionable are almost required to carry the label of adaptogen. Much of it is little more than branding, with consumerist appeal to Health-ists (see Consumer Health-ists in Section 9). The suggestion that such plants influence the response of the adrenal gland seems to be a requirement for inclusion; in these contexts the gland itself reads like an interchangeable logo with adaptogen. Presumably, this kind of labelling would not bother to include chamomile in its classification, which might be dubbed a symptomatic remedy and short on consumer cachet. Chamomile has no need of this kind of market prestige; besides its clear action on digestive tissue and function, it also (along with many other “simples”) insinuates itself comfortably within the orb of constructive pleasure through the process of Sensory Priming as I have described it.

I suggest that plants can better be ranged according to the following spectrum of effects, with plants with reflex properties acting much like simples:

Plants with defined effects ascribed largely to single groups of compounds, notably alkaloidal or glycosidic.	Plants with a range of effects ascribed largely to oligo-complexes of diverse compounds; alkaloids, glycosides or other powerful constituents usually absent.	Plants with defined tropisms which cannot be ascribed to any compound or single group of compounds.
<i>Drug Plants ...</i>	<i>... Complex Simples ...</i>	<i>... Adaptogens</i>

Plants with defined reflex effects on skin and mucosae ascribed largely to physical properties of compounds such as mucilage. Marshmallow may not be “potent” but its efficacy will be gratefully noted by the patient with cough, cystitis or an irritable bowel.

One could also place upon this single horizontal axis a vertical one to express the degree of potency, although such a classification would yield as many anomalies as useful explanations. Galen no doubt knew his four degrees of intensity but they stood in later centuries as markers of variable opinion.

If it counts as a classification system at all, it is a very rough-and-ready one with no tight separation and some leaking between its parts. Very many plants will fall easily into all three categories at the same time. Burdock as a bitter digestive is a simple, but also (with its effect upon the pancreas) a drug plant with defined effects but also, taken over the long term, an adaptogen. In the British Herbal Pharmacopoeia and elsewhere, it is classed as an alterative. I would suggest that there is merit in using the two terms more or less as synonyms.

One could point to the duration of treatment as a necessary requirement for any claim to adaptogen effect, and so taking a single dose might be enough for a drug effect and also for a Simple to work, but cannot be sufficient for it to be termed adaptogenic.

There are many other anomalies: plants like *Glycyrrhiza glabra* are in a sense drug plants with certain tropisms. On account of its action on aldosterone with various well-known consequences, it should be taken for only a limited duration. Surely this debars its classification as an adaptogen, even though it has neuroendocrine activity on the adrenal axis, but also on at least one other axis, the gonadotrophic. From this and many other examples, I could hardly pretend to have offered a rigorous classification, but my point is that with traditional medicinal plants that herbalists use, there is little point to a rigorous classification. It is more convenient, given the range and diversity, to have a sliding scale against which one places each plant, modified by experience, research and scholarship. Providing one accepts the limitations, there are benefits to a simple fluid approach to therapeutic (not botanic) nomenclature, and, as no more than a rule of thumb, it may be reasonable to refer to nearly all medicinal plants that lack drug-like activity (at least in the recommended dosage) as adaptogens. It would take some wind out of consumerist sails.

As for Drug Plants, there are certainly differences between taking crude opium and refined morphine, as one would expect: one is complex and the other simple in the sense of singular; there are differences between taking a whole plant extract of one of the species of *Ephedra* and the alkaloid ephedrine. I differ from some of my colleagues in thinking these differences adequately define a therapeutic position, whether you consider these differences advantageous or the contrary.

Another way of considering the spectrum of activity (and all events lie upon some spectrum) would be to accept that all outcomes are probabilistic (but achieve certainty when they happen). Plants (such as those in Papaveraceae and Solanaceae) which have a high probability of a defined outcome (and it would have to be narrowly defined) can be called drug plants on account of the repeatability of their actions. Complex Simples (as I have described above) also possess highly probable outcomes but ones that are more diffuse, sensitive to context and, perhaps more to the point, less heroic. Adaptogens also, I contend, have high probabilities of outcomes but ones that are less defined and more dependent upon context, that is, the deep systemic consultation that precedes and conceives their prescription, including the strong participation of the patient in that very process. Their action has less certainty than drug plants or Complex Simples but a greater probability than random chance.

When taking medicinal plants in crude form or as strong-tasting extracts or solid preparations, whatever spectrum of effects is intended or hoped for in any particular case, there is a more extensive and deeper process that is pervasive and cumulative. The effects are permitted or emphasised by sensory priming and obtains adaptogenic potency by way of stochastic resonance. Those plants which fall in the middle of the series, between the two ends of the spectrum are well known to everyone and are uncontroversial in their effects, whether we choose to call them "simples" or something else. Herbalists understand what was meant historically by "simples" and that their effects are broadly replicable. These plants also have the potential through sensory priming to enter the archives of the limbic system of the person who takes

them. Alkaloids are much associated with their effects on the central nervous system but as nicotinic and muscarinic effects lie deeply embedded in the autonomic nervous system, small wonder that plants with less dramatic effects than *Nicotinia tabacum* or *Amanita muscaria* will modulate rather than enforce autonomic transitions.

When Alan Watts said, or quoted, “If Christianity is wine and Islam coffee, then Buddhism is most certainly tea,” he drew attention to the fact that no culture or society lives without a beverage that influences the central nervous system and the quality of attention and participation. It would be difficult to imagine someone who cares about the quality of their social and psychoactive beverage becoming a zealot for pharmaceutical medicine to the exclusion of all other. The management of pain and distress by unseen industrial means may have become a cultural norm in post-industrial societies, but that should not be to the exclusion of pleasurable and culturally accepting and healing beverages from plants.

Stimulus—organisation—response events or SORe

Before leaving the discussion of plants as medicinal agents and proceeding to that of their application in the next section, I would like to revisit some of the notions expressed in Sections 2 and 3 in light of Sensory Priming and Stochastic Resonance. Negative feedback loops in biological (as well as electronic) systems provide stability and the preservation of a set point. It is the principal instrument of homeostasis and contrasts with positive feedback loops which generate dynamism but also instability and even chaos. It operates when a kick is needed to boost the system into a temporary chaotic state to launch a new event during a complex cycle, such as ovulation which is in effect the driver of the menstrual cycle.

In orthodox clinical endocrinology, the measurement of serum levels of certain marker hormones is used to diagnose disease such as thyrotoxicosis or hypothyroidism. It is commonplace in clinical practice³⁰⁷ to find a mismatch between serum levels of marker hormones and clinical presentations. This is caused in great part, I suggest, from a gap between Stimulus and Response, perhaps with overtaxed or exhausted sensors or slow metabolism by organs, or a failure in sensitivity of the negative feedback signal, or rather in a shift in the threshold at which the reply is triggered. Such thresholds are characteristic of important heptade stages (such as menopause) or (as I have suggested in Section 13) during prime (non-composite) years of age when experience cannot be factorised. Stimulant perception by the receptive organ provides the critical focus for the S-O-R-E Cycle. E for Events might just as well stand for properties that Emerge from the circuits, or even better for Equifinality.³⁰⁸ The number of pathways to any end or finality is almost incalculable as the initial conditions can vary so much. This concept goes some way towards resolving the tension between a causality that is indifferent to human wishes and the teleology we are wont to favour. Equifinality is expressed well in the related concept of

³⁰⁷ Well, at least in mine, as it was for those GPs and other medical practitioners who attended my lectures on the MSc run jointly by the College of Phytotherapy with the University of East London in 2002. They also were frustrated with this simplistic approach and expressed some relief at hearing coherent and rational explanations of the discrepancies between biochemical and clinical presentations so that clinically euthyroid patients with aberrant test results were treated and, conversely, clinically thyroid patients with “normal” readings were not.

³⁰⁸ Coined by the developmental biologist Hans Driesch, and widely used in general systems theory by Ludwig von Bertalanffy and by William T. Powers in perceptual control theory. See also Cziko 2000.

isotelesis (from Greek ἴσος “equal” and τέλεισις: “a directed performance” suggesting direction of effort and intelligence towards achievement of an end.³⁰⁹

If biological life is made up of these S-O-R event cycles, the situations in which your patients find themselves can often be resolved by plants that have lived equally under the constraints and freedoms of these loops. The herbal prescription will invariably operate at both terminals to the loop, just as you cradle a baby, sustaining from below and containing from above. This double-handed holding goes some way to explaining the apparent contradictions inherent in a herbal prescription (see Contradictions within the Prescription earlier in this section.) The endocrine loops and all the other features of the matrices (as defined in The Interconnected Matrices in Section 3) are not single chemical circuits but waves of signalling stimuli transmitted from one zone to be received in another. Like harmonic vibrations (and hormones are sent into a fluid) overtones will be generated with the principal harmonic. Quite apart from this shimmer of fractal loops generating these echoes, long and short loops are returned from the receiving organs such as the gonads and adrenal cortex.³¹⁰

Applying the resonance between person and plant will make up the great part of a herbal practice and refreshingly offer successful treatments at a low cost. A personalised therapeutic approach recognises how signal propagation is organised and reflected. Following the S-O-R events in our patients will bypass the need for symptomatic treatments in most cases.

Symptomatic treatments

Claims are made in the training literature offered to herbalists that they should seek to treat the causes of illness and not its symptoms, yet during my years of teaching I observed that no student could resist jotting down a useful herb for a specific indication. It was a claim I probed constantly, not out of mischief but trying to extract some methodology from the avowed principle. We are all empiricists at heart and human technological evolution probably depended upon rules of thumb, trying it and seeing.

There is no need with herbal medicine to dichotomise symptomatic and constitutional treatment. If you treat the former, you cannot help but influence the latter, however unwittingly. Make a concordance between the two, choosing plants that will not confound the terrain. If you happen not to know the patient when called upon to help a person in an emergency, at least sustain rather than diminish, even as you relax the system gently.

Is the medicinal plant an object or a process?

If all objects are nouns and all process is in the verb (a discussion in Boundary Conditions in Section 4 and Things & Events in Section 5), language must be the ultimate differentiator between subject and object, an expression of a view of the context and the agents within it. The name of an illness is a noun, the way we become ill is verbal.

³⁰⁹ Shannon's Theory of Communication (1949) is congruent with the cyclical loops of endocrine systems. Berlo's Model of Communication (1960) stripped this down for use in behavioural top-down business management but is of doubtful use in medicine as it downplays biofeedback and fails to distinguish variance in human personality and belief.

³¹⁰ Llewellyn-Jones, *Fundamentals of Obstetrics & Gynaecology, II*, 51 London: Faber 1986.

Plants have been as alive as we are but when we collect their parts, severed from their originating life, they become as objects. Yet their taste to us conveys something of the process that created the leaf or flower, however obscurely. Sometimes their volatility lives on to our sense of smell. If we know what culture calls them, assumptions and knowledge may accompany our perceptions.

The ingestion of a medicinal plant (depending upon the degree of sensory and cultural priming) is different in kind to other types of medicament and more often than not we partake of a process as much as an object.

Chemical constituents of plants

According to sensory priming and stochastic resonance, plants do not *only* act upon the body directly as a function of their chemical constituents: they modify the terrain gradually as a dispersing ripple of effects. Some plant compounds assuredly *do* affect, and almost immediately, the epithelia with which they come into contact. Indeed sensory priming depends upon this immediacy. The bioflavonoids from plant food and medicine do have an effect (that happens to be benign and helpful) on the microcirculation. There are direct effects and there are many indirect ones where the ingestion of a plant initiates cascades of events. When it comes to eating plants, size matters. Insects do not appreciate polyphenols in the way that we do and our microbiome can tolerate.

It has long been known that certain pharmaceutical preparations, such as those based on the leaves and fruits of species of *Senna*, are ineffective unless the constituents match those found in nature. This has been dismissed as an oddity, and one would certainly not want to build any theory upon an isolated enigma. Phytotherapists have long maintained, far from being an exception, the rule (which may even extend to drug plants) that the whole is greater than its isolated parts. The work of Dr Peter Hylands has shown that some mixtures that contain “active” and “inactive” compounds only produce clinical effects when both are present.

The Multi-Modal hypotheses for the actions of medicinal plants present no alternative to the insights and tested methods of pharmaceutical science. They are meant to be additional and as corrective to the notion that benefits and costs can be measured. These notions don't want to further simplify the un-simplifiable.

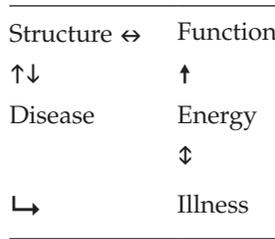
Structure and function

Disease bears down upon our structure; illness modifies our function. Illness generates a sense of internal heat, or poor thermal homeostasis, as do transition states such as puberty and the menopause. Puberty puts some of its surges of heat into glandular secretion while menopause disturbs the S-O-R thresholds by which ACTH, FSH and TSH are switched off. Sensations of internal heat³¹¹ also arise in the patients we see during their sixth heptade and also in the period that shortly precedes it.³¹²

³¹¹ Cf. Chilly Mortals in Section 11.

³¹² See the table in Section 13 entitled: The nodes about which the tides of life swirl.

Structure is informatic and depends upon the coherence of the genome and the integrity of the enzymatic matrix. Function depends upon energy which is the index of Poise.



Note: Structure and Function are variables discriminated in the indexes originated by Christian Duraffourd and developed by Jean–Claude Lapraz and latterly by Kamyar Hedayat. I am not here presuming to reflect upon their uses of these terms in the Biology of Functions, or to obtain any credence for my ideas from theirs.

Animal impulses and plant responses

Mindedness (in the sense of a structural bias, not as an entity) organises life and is in turn reformed by life. All is energy-dependent in an obligatory way but the manner in which we organise our life depends upon a series of balancing channels: the circuitry of the autonomic nervous system, the autocooid intensifiers, the four pituitary conduits. All these can be modified by medicinal plants and will be whether we plan to do so or not.

The temporal scale of these channels ranges from seconds to minutes, hours, days and months. Choose your scale according to the process involved with each patient, most of which will not be at the shorter emergency scale but the herbs, nonetheless, operate at all of them over time. The hypothalamic->pituitary->periphery conduits do not determine personality and behaviour but will correlate with a person’s output and traject at every level. The adrenal, gonadic, thyroid and somatic drives are given in the table below:

HPA	HPG	HPT	HPS+P
Attention	Impulse towards	Digestive impulse	Impulse to act
Arousal	Concentration and marshalling of material	Marshalling of energy	Contrary impulse to control
Short-term action	Long-term building	Archiving and metabolic settings	Short-term texture and finishing
Mounting inflammatory response	(Lacks an active braking system)	Augments or diminishes output from HPG	Negotiation of tolerances

During the course of early development and then at every stage during the life cycle, these axes will initiate, inscribe (in the epigenome and terrain) and implement a person’s activities and choices, redefining them at critical junctures. We have to negotiate daily with a contingent, chaotic world and so must summon up an urge to control which may in certain

personalities convert into a rage for order. Stress is exciting: some like to be excited, others are stimulus-averse.

We have to manage time at the circadian scale but also to manage our long-term view of what has happened, might happen, is inevitable. As a bulwark against disappointment, we can mythologise the past; become unhinged about an unpromising future; feel no sure ground in the present circumstances. Alternatively, we can mercifully forget what has happened (except for certain beacons of light) and look forward to every new day, and deal with the present as it seems to call upon us to do. Finding what will suffice, accepting that there is no finality except in death, cultivating an appropriate level of sadness for what might have been, are among the many indexes that create personality.

What can we do? ...

When we fall short of that heroic philosophy, as most of us mortals inevitably must, if we do not become ill, surely we fall prey to a loss of capacitance and fall from poise. At the level of functional circuitry, events continue to happen while there is a charge on S–O–R: the structure of our life has not crumbled but perseveres under some duress. Life cannot be compartmentalised: all parts of the organism are always involved, but some more in the foreground.

As herbalists we need to identify the loops most involved, those most in the foreground. Where there is a surge for which the capacity to respond is blunted, we both restrain the surge and sustain the capacity. In the next section, I will try to give particular examples of this general approach.