Potentization and the Peripheral Forces of Nature

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By: George Adams, MA (Cantab)

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INTRODUCTION

Projective Geometry and Amnesia

One of the minor pleasures of studying homeopathy is its sense of history, which contrasts so sharply with the ahistoricity of mainstream medicine. Most doctors feel that there was no real medicine before the discovery of Penicillin (but this is little more than a feeling, for there is virtually no teaching of medical history in medical schools). Before Penicillin all seems to have been darkness, pierced only by an occasional brilliant shaft of light associated with a great name—a Harvey, Virchow or Pasteur—but since 1940 all is clarity and reason. This is, of course, a highly distorted image.

In homeopathy, we have a much greater sense of continuity, indeed we rest too much on our laurels, accepting far too readily the opinions of famous teachers of the past. Yet while every word of Hahnemann or Kent is treated with exaggerated reverence, other important historic discoveries originating in homeopathy are almost forgotten. Hering it was who introduced nitrates into medicine (Glonoine)—a fact which was recalled recently in the journal Circulation, but almost forgotten by his heirs in homeopathy. Reilly, in researching his recent work on hayfever, discovered that hayfever was first correctly attributed to pollen allergy by Blackleg, a British homeopath.

Many other episodes of intellectual amnesia among homeopaths could be cited. This seems to be mainly a short-term memory loss; more recent contributions are less likely to be remembered than older ones! It is for this reason that I make no apology for reprinting, from time to time, classical but neglected pieces of work. The paper which follows, "Potentization and the peripheral forces of nature" by George Adams, is based on a lecture given at the 1961 British Homeopathic Congress. To judge from the congress report, and the recollections of those who were present, it aroused great excitement at the time. Certainly it has important implications for the nature of extreme dilutions, implications which are not widely recognized, and have not been developed, but instead have fallen victim to our collective short-term memory loss.

—Peter Fisher, MB, Hon. editor of the British Homeopathic Journal.

Dr. Twentyman, Ladies and Gentlemen:

May I begin by saying that I feel it a great privilege and satisfaction to be invited as a layman to address this Congress. My theme will be to tell of new ideas and discoveries—well founded, though still in their initial stages—which, among other things, should contribute to the long desired scientific explanation of the effectiveness of high potencies in medicine. Let me remind you to begin with where the difficulty lies. For generations past the effectiveness of high potencies has been a fact of experience for the physician and of untold benefit to countless patients. Also in recent decades, in the work of L. Kolisko.1 Boyd 2 and others, it has been experimentally established by biological as well as purely physical and chemical reactions. Yet it is difficult to account for, both in the light of rough and ready common sense and of prevailing scientific notions. The chemist who surmises that a particular component present in small quantities in a solution or mixture, is responsible for some physical or physiological effect, will contrive by distillation, crystallization or the like to concentrate it. His theory is confirmed if the effect increases; thus with Madame Curie, when with endless pains she extracted a few grams of radium from tons of pitchblende. Why, in the preparation of homeopathic remedies, do we dilute instead of concentrating? I am, of course, aware

that potencies are no mere dilutions. "Dilution alone," says Hahnemann, "say when a grain of common salt is dissolved, produces the merest water. Diluted with a vast amount of water, the salt simply disappears. This never makes it into a medicine. Yet by our well-prepared dynamizations the medicinal virtue of common salt is wondrously revealed and enhanced."3 Nevertheless, there is no denying that among other things the potentizing or dynamizing process does dilute the substance and in so doing brings forth its virtue. To quote Hahnemann again: "The homeopathic dilution of medicaments brings about no reduction, but on the contrary a true enhancement of their medicinal virtues; thus our dilutions represent a truly wonderful unveiling, nay more, a calling-to-life of the medicinal and healing spirit of the substance."

The down-to-earth, common sense difficulty of understanding how this can be, is reinforced by the prevailing molecular theories of matter, according to which the number of molecules in a gram-molecule of any substance is of the order of 10 to the 23rd power. The exact figure, variously known as Avogadro's or Loschmidt's number, has been found consistently by several methods. In terms of molecular theory, therefore, starting with a normal solution and with the normal technique of potentization, by the 23rd or 24th decimal potency only a single molecule would be left, and from then onward it is ever more unlikely that even this will be there in the medicine bottle or ampule bearing the name of the substance! Ways of escape from this theoretical dilemma have indeed been suggested by the more recent theories of physics. The Nineteenth Century conceived the molecules or their constituent atoms more or less naively as ultimate and self-contained pieces of matter. The atoms and subatomic 'particles'—protons, electrons, and so on, in terms of which even the chemical affinities and biological effects of substance are today explained—have become purely ideal entities figuring in recondite mathematical equations. Thinking of the mysterious duality of particle and wave, the philosophically minded physicist can even aver with scientific reason that with its sphere of influence each single atom is co-extensive with the entire universe. Some people therefore pin their hopes on a future science of biophysics in which the subtle influences of life will be illumined by the idealized conceptions of atomic physics. Yet it should not be forgotten that the experiments and discoveries on which the latter are based have been increasingly remote from the realm of living things, depending as they do on the deliberate enhancement of conditions—high values, high-tension electric fields and the resulting radiations and 'bombardments'—downright inimical to life. It is therefore better to regard the apparent gulf between the experience of homeopathic medicine and the conventional scientific outlook in a wider historic setting, not only in terms of the ever-changing theories of twentieth-century physics. .

The growth of physical science from the times of Galileo and Torricelli, Newton, Boyle and Huyghens, Dalton, Lavoisier and Faraday down to the present day is a wonderful chapter in the intellectual and spiritual history of mankind. Hahnemann's long life (1755-1843) spans an important period in this development, leading from the celestial mechanics of the Eighteenth to the electro-magnetic theories and growing chemical discoveries of the Nineteenth Century. Still in his youth when hydrogen and the composition of water are discovered, he is in his prime when Dalton enunciates the atomic theory, Cavendish in 1772 confirms the inverse-square law in electrostatics, Oersted and Ohm make their discoveries on the electric current in the 1820s, Faraday's electro-magnetic researches culminate in 1831. In 1828 Wohler's synthesis of urea undermines the old vitalist ideas of organic chemistry which Hahnemann—himself a creative chemist—still entertained in common with his contemporaries.

It is well to remember this when reading Hahnemann's forms of expression, which as I shall hope to show are scientifically important to this day. For the vitalism, inevitably abandoned in its old philosophic form, the vagueness of which stood in the way of true research, can now be reborn on a clear and scientific basis. Hahnemann's vitalism underlies his use of the word 'dynamic' and the noun 'dynamis' which he adopts, or coins for himself. "From the beginning," says Tischner, "his notion of the vital force prevailing in the living body was essentially spiritual."4 He attributes illnesses to immaterial, dynamic causes, and in his essay of 1801 describes the medicinal effects of high dilutions as 'dynamic' rather than 'atomic'—a contrast the literal significance of which will, I

hope, emerge in the course of this lecture. We also have to remember that the clear distinction of energy and matter and the law of conservation of energy were not yet current in Hahnemann's day. The 'mechanical equivalent of heat' was discovered by Mayer and Joule almost exactly at the time of his death (1842-45). Heat, light and other energies—bio- and psycho- logical as well as physical, even including 'animal magnetism,' for example—were until then still being thought of as tenuous if not imponderable substances. The supposed substance of warmth was called 'caloric.' Lavoisier in 1789 still included heat and light among the chemical elements. Rumford's experiment was widely supposed to have released the 'caloric' from the iron made hot by friction. Even in 1824, when in his *Puissance motrice du feu* Carrot in effect discovered the second law of thermodynamics, soon to become a cornerstone of physics, he still interpreted it in terms of 'caloric.' Perhaps this idea of imponderable essences is in the light of present-day ideas no longer quite so wide of the mark as it might have seemed sixty years ago. It should at any rate be borne in mind when reading Hahnemann's expressions, when for example he describes as *feinstofflich*, 'delicately substantial,' or as 'virtual' or 'well-nigh spiritual' the medicinal effects set free from the material during the rhythmic processes of dilution, trituration and succussion.

I have deliberately drawn attention to these aspects. The history of science is not the unidirectional process which neatly finished textbooks lead one to suppose. Many streams run side by side; the most essential discoveries, experimental or theoretical, may lie unnoticed for decades till a fresh aspect emerges to reveal their importance.

Let us consider for a moment in a human and historic spirit what it was that gave the orthodox scientific outlook its strength, accounting too for the intolerance with which the claims of homeopathy have only too often been met. It was the combination of an instinctive and robust materialism with the mathematical clarity and cogency of theories supported by experiment and observation. The instinctive materialism is well illustrated by the story of Dr. Johnson's angry reaction after listening to a sermon in which Bishop Berkeley put forward his idealistic theory of the world. 'I refute it thus,' the learned doctor exclaims, kicking his foot against a stone. In scientific atomism until the close of the Nineteenth Century, Johnson's stone—vastly reduced in spatial but proportionately grown in spiritual dimensions—became the highly satisfying football, better perhaps the baseball, of science. For it is this intuitive feeling of the ultimate reality of tangible material things which underlies the older forms of scientific atomism. It is a very genuine element in the consciousness of Western man throughout the Seventeenth to Nineteenth Centuries, inseparable from the age of exploration, the growth of natural history and of artistic naturalism, the dawn of industrialism. Nor is it out of harmony with the patriarchal, simply believing, strongly Old Testament forms of religion then prevailing.

Yet the instinctive materialism is reinforced by another, more ideal factor—and this alone accounts for the spiritual tenacity of a materialistic science—namely, the confidence born of the intellectual clarity and probity of mathematical thinking. It is too apt to be forgotten how many purely ideal, in other words spiritual, elements are built into the resulting scientific system. Mathematics is an activity of pure thought, and in the past (if not in the extreme formalism and empty nominalism which is now the fashion) was never quite remote from philosophical and even religious thinking. Certainly Isaac Newton, whom we may justly think of as the founder of modem physics, was in his own dominant interests a philosopher, even a theologian, as for example his correspondence with Henry More and the Cambridge Platonists reveals. For all the scientific care and skepticism sincerely voiced in his *'Hypotheses non fingo'* he—who was afterwards to describe his Universal Space as 'the sensorium of God'—built into his Principia, in formal quality if not in intention, an almost theological masonry of thought. The implications of it were but inverted by the French atheists and rationalists! Over a century later, other Englishmen of philosophic and religious disposition brought a like clarity of geometrical imagination and mathematical analysis into the rising science of electric and magnetic forces. I refer, of course, to Faraday and Clerk Maxwell. It is this mathematical element in physics which gives it strength and power—power for technical uses, strength in its influence upon our mental outlook. There is an element of tragedy in this, for the

resulting system becomes a rigid framework barring access to the more spiritual aspects of reality, of which the truths of homeopathic medicine are an example. But the spiritual power of geometrical and mathematical thinking which has helped build this framework can also help in the much needed release. Of this I am about to tell.

Till about half a century ago—the time of Einstein and Minkowski—the space in which the real events of the universe were supposed to be taking place was that of Euclid, the geometry of which we learn at school. It is the space measured in finite and rigid lengths, or areas and volumes based on the measurement of length. It is determined by the well-known laws of parallelism and of the right angle, as in the theorem of Pythagoras or in the statement that opposite sides of a parallelogram are equal. The same type of space was held to prevail down to the smallest and up to the largest dimensions. Inward and outward, the identical scale of length leads to the millimicrons of atomic science and to the parsecs and light-years of astronomical speculation. What happens when a straight line is extended to the infinite, was held to be an idle question, of philosophic interest perhaps, but beyond the effective range of science.

Occasionally, scientists of the Nineteenth Century—W.K. Clifford, for example—reflected that cosmic space might after all be 'non-Euclidean,' its structure differing from the Euclidean to so slight an extent as to escape our instruments of measurement. But neither this nor Einstein's four-dimensional space-time did more than modify the profoundly Euclidean—I might call it earthly—way of thinking about space and the realities it contains. This is so taken for granted as to be difficult to describe; few people realize that there is any other way. Space is conceived as a vast empty container—the Irishman's box without sides, top or bottom—populated (in some regions more and in others less densely) by point-centered bodies sending their forces and radiations to one another. It becomes a field of manifold potential forces, but the real sources of activity are, once again, point-centered— material or at least quasi-material—bodies. Apart from these, there would be emptiness, mere nothing. That, surely, is a fair description, both of the popular idea and of the mathematical analysis.

As against this, I now have to tell of what opens out quite new possibilities, both of pure thought and of insight into the realities of nature. For in the Seventeenth to Nineteenth Centuries, while physicists and astronomers were busily applying to their problems the ancient geometry of Euclid—rendered more handy and more elegant but in no way altered by the new analytical methods of Descartes, Leibniz and Newton—among pure mathematicians a new form of geometry was arising. It is a form which, while including the Euclidean among other aspects, is far more comprehensive, also more beautiful and more profound. I refer to the school of geometry variously known as projective geometry, modern synthetic geometry, or the geometry of position. In the Seventeenth Century its truths began to be apprehended by the astronomer Kepler and the mystical philosopher Pascal, also by Pascal's teacher, Girard Desargues, a less known but historically important figure. It was, however, in the early Nineteenth Century, about the last twenty years of Hahnemann's own life, that the new geometry really began to blossom forth. Once again, French mathematicians—among them Poncelet, Gergonne and Michel Charles—were the pioneers, soon to be followed by a few brilliant thinkers in Switzerland and Germany, England, Italy and other countries. Largely unnoticed save among pure mathematicians, upon whose thought it was to have a deep and lasting influence, it grew into an ever wider insight, which by the end of the century was seen to embrace most if not all of the known forms of geometry, Euclidean and non-Euclidean alike. Today, as I shall presently contend, it opens out new ways of understanding nature—above all, living nature and the subtler, more spiritual forces which the intuitive genius of Hahnemann was perceiving.

Like that of Euclid,projective geometry is not only a discipline of pure thought, resting securelyon its own ideal premises or axioms; it is also related to practical experience, though to begin with in a rather different direction. Our experience of the spatial world is above all visual and tactile. There are indeed other and less conscious senses—senses more 'proprioceptive' of our own spatial body both in itself and in its interaction with the world, such as the sense of movement and that of balance—to which our spatial awareness and geometrical faculty are largely due. But in our

outward consciousness it is the sense of touch and that of sight which reinforce and confirm geometrical reasoning and imagination. Now the geometry of Euclid relates above all to the sense of touch; hence too its natural connection with a scientific outlook taking its start from tangible material things. The inch, the foot, the yard, derive from our own body. We measure as we touch the earth, foot by foot and step by step, or in the rhythmic act of measurement with finger-tip and yard-stick. By tactile experiences we confirm the constant distance between parallels, the symmetry laws of the right angle. We even prove the first theorem of Euclid by the imagined tactile experiment of applying one triangle to another. But our experience of space is also visual, and as such far more extensive, more manifold and satisfying. We see things we can never touch by hand or foot or tool; our vision reaches to the infinite horizon and to the stars. Now in the Fifteenth to Seventeenth Centuries the beginnings of modern science coincided with the increasingly naturalistic art of the Renaissance. Both were inspired by the same love of nature and wish to penetrate her secrets. So as to give an outwardly 'true' picture of the scenes of landscape and the forms and works of men, artists such as Leonardo da Vinci and Duerer studied the science of perspective vision, which from its practical and aesthetic applications presently gave birth to a new purely geometrical discipline—to wit, projective geometry. The latter therefore naturally deals not only with tangible and finite forms but with the infinite distance of space, represented as these are by the vanishing lines and vanishing points of perspective. Thus in the new geometry the infinitely distant is treated realistically, in a way that was foreign to the classical geometry of Euclid and the Greeks.

To include the infinitely distant, sometimes referred to as the 'ideal elements' of space, no less definitely than those at a finite distance, is a bold step in thought, and is rewarded by a twofold insight of an importance hitherto unsuspected for the science of living things.1 Attention is focused no longer on rigid forms such as the square or the circle, but on mobile types of form, changing into one another in the diverse aspects of perspective, or other kinds of geometrical transformation. In Euclid, for instance, we take our start from the rigid form of the circle, sharply distinguished from the ellipse, parabola and hyperbola, as are these from one another. In projective geometry it is the 'conic section' in general of which the pure idea arises in the mind and of which various constructions are envisaged. As in real life the circular opening of a lampshade will appear in many forms of ellipse while moving about the room, or as the opening of a bicycle lamp projects on to the road in sundry hyperbolic forms, so in pure thought we follow the transformations from one form of conic section to another. Strictly speaking, the 'conic section' of projective geometry is neither circle, ellipse, parabola nor hyperbola; it is a purely ideal form, out of which all of these arise, much as in Goethe's botany 5 the ‘archetypal leaf’ is not identical with any particular variety or metamorphosis of leaf (foliage leaf varying in shape from node to node, petal, carpel and so on) but underlies them all. The new geometry begets a quality of spatial thinking akin to the metamorphoses of living form.

The other insight 2 is perhaps even more important. Projective geometry recognizes as the deepest law of spatial structure an underlying polarity which to begin with may be called, in simple and imaginative language, a polarity of expansion and contraction, the terms being meant in a qualitative and very mobile sense. (If I now illustrate by using, after all, some of the more rigid and symmetrical forms, the limitations of which I have just referred to, it is only to make it easier by starting with familiar pictures.) Think of a sphere—not the internal volume but the pure form of the surface. One sphere can only differ from another as to size; apart from that, the form is the same. Now the expansion and contraction of a sphere leads to two ultimate limits. Contracted to the uttermost, the sphere turns into a point; expanded, into a plane. The latter transformation, though calling for more careful reflection, is no less necessary than the former. A large spherical surface is less intensely curved than a small one; in other words, it is flatter. So long as it can still grow flatter, a sphere has not yet been expanded to the utmost limit, which can only be the absolute flatness of a plane.

The above experiment in thought—the ultimate contraction and expansion of a sphere—leads in the right direction. Point and plane prove to be the basic entities of three-dimensional space—that is,

the space of our universe and of the human imagination. Speaking qualitatively, the point is the quintessence of contraction, the plane of expansion. Here comes the fundamental difference as against both the old geometry of Euclid and the naive and rather earthly spatial notions which culminate in a onesidedly atomistic outlook. For in the light of the new geometry, three-dimensional space can equally well be formed from the plane inward as from the point outward. The one approach is no more basic than the other. In the old-fashioned explanation, we start from the point as the entity of no dimension. Moving the point, say from left to right, we obtain the straight line as the first dimension; moving the line forward and backward, we get the two dimensions of the plane; finally, moving the plane upward and downward, the full three dimensions. To modern geometry this way of thinking is still valid, but it is only half the truth—one of two polar-opposite aspects, the interweaving harmony of which is the real essence of spatial structure. In the other and complementary aspect we should start from the plane and work inward. To mention only the first step: just as the movement of a point into a second point evokes the straight line that joins the two, so does the movement of a plane into a second plane give rise to the straight line in which the two planes interpenetrate. We can continue moving in the same line and obtain a whole sheaf of planes, like the leaves of an open book or a door swinging on its hinges. We thus obtain a 'line of planes,' as in the former instance a 'line of points.' In the space-creating polarity of point and plane, the straight line plays an intermediate role, equally balanced in either direction. Just as two points of space always determine the unique straight line which joins them, so do two planes: we only need to recognize that parallel planes too have a straight line in common; namely, the infinitely distant line of either. At last we see that all the intuitively given relationships of points, lines and planes have this dual or polar aspect. Whatever is true of planes in relation to lines and points, is equally true of points in relation to lines and planes. Three points, for example, not in line, determine a single plane (principle of the tripod), but so do three planes, not in line (e.g. the ceiling and two adjoining walls of a room) determine a single point. The planes must again be extended to the infinite and thought of as a whole to see that this is true without exception.

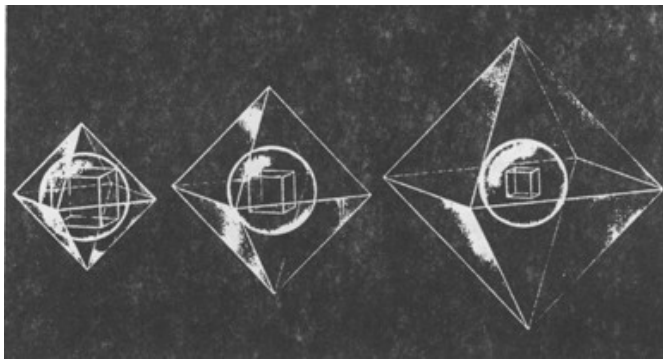
All spatial forms are ultimately made of points, lines, and planes. Even a plastic surface or a curve in space consists of an infinite and continuous sequence, not only of points, but of tangent lines and tangent or osculating planes. The mutual balance of these aspects—pointwise and planar, with the linewise aspect intermediating—gives us a deeper insight into the essence of plasticity than the old-fashioned, one-sidedly pointwise treatment.

The outcome is that whatever geometrical form or law we may conceive, there will always be a sister form, a sister law equally valid, in which the roles of point and plane are interchanged. Or else the form we thought of—as for example a tetrahedron with its equal number of points and planes—proves to be its own sister form, arising ideally out of itself by the polar interchange of point and plane. The principle just enunciated, as it were a master-key among the truths of projective geometry, is known as 'the principle of duality.' It would perhaps have been better had it been described as a 'principle of polarity' from the outset, for in its cosmic aspect it is also one of the essential keys to the manifold polarities of nature. The recognition of it leads to a form of scientific thinking calculated to transcend one-sided atomism and materialistic bias.

A simple instance is shown in Figure 1. A sphere is placed inside a cube just large enough to contain it. Touching the six planes of the cube, the sphere picks out six points of contact. Joined three by three, the latter give eight planes, forming the double pyramid of the octahedron. Octahedron and cube are sister forms, in polar relation to one another. The structure and number relations are the same, only with plane and point—the principles of expansion and contraction—interchanged. The octahedron has eight planes, each of them bearing a triangle or triad of points and of the lines that join them; so has the cube eight points, each of them bearing a triad of planes and lines. The octahedron on the other hand has six points or apices, each with a four-fold structure, answering to the cube with its six four-square planes. The number of straight lines or edges is the same in each; namely, twelve.

The sphere is only one of many spatial forms which evoke the polarity of plane and point—

qualitatively speaking, of expansion and contraction. It does so not only by actual contact as in Figure 1. For any given plane in space, the presence of a sphere evokes a point; for any given point, a plane. I cannot stop to explain the comparatively simple construction by means of which this happens. The mutual relation is literally one of expansion and contraction, as shown in Figure 2.



Here, on the left, we see the positions of cube and octahedron reversed as compared with Figure 1. The sphere is just large enough to fit inside the octahedron, touching the eight planes at the mid points of the triangular faces. The points of contact obviously mark the eight comer-points of a cube, which is now inside the sphere. In the middle corner-points of a cube, which is now inside the sphere. In the middle and right-hand pictures the size of the spheres is left unaltered, while in imagination we have deliberately caused the cube to contract towards the center. The sphere preserves the mutual relation of cube and octahedron, only the octahedron now has to expand. For in the same proportion as the eight points of the cube recede, inwards from the surface of the sphere toward the center, the corresponding planes hover outward, causing the octahedron to expand even as the cube contracts. In the right-hand picture the cube is in linear dimensions half, the octahedron twice as big as on the left.

We can imagine the same process continued 'to the bitter end.' The octahedron quickly grows outward into the spatial universe. For when the cube is a hundred times smaller, the octahedron will be a hundred times bigger than before. And when at last the cube disappears, its eight corner-points merging into the single centre, we must imagine the eight planes of the octahedron coalescing in a single plane—the infinite periphery of space. For the infinitely distant taken as a whole in all directions—as it were, the infinite sphere of space—being of infinite radius, is no longer a sphere at all in the ordinary sense (just as a sphere contracted to a point is no longer a true sphere); it is a plane. We thus arrive at another of the basic concepts of the new geometry; namely, the single infinitely distant plane qua infinite periphery of space. It is the presence of this unique plane which from the indeterminate and ever mobile forms of pure projective space helps to produce the more rigidly determined space of the physical world, in other words the space of Euclid. We need only think of parallelism. Parallel lines and planes are those that meet at an infinite distance. Now as the crystals in nature and human works of architecture show, parallelism plays an essential part in all the laws and measures of the physically spatial world. To the laws of parallelism must be added those of the right angle and of angular measure generally. These, too, are determined from the infinite periphery inward. The way in which this happens would take too long to explain in the present context, but the fact is evident, for we bear witness to it in every act of mensuration, when we take our sightings from the most distant points available—to be exact, from infinitely distant points.

Now my contention is that these ideas—the fundamentally planar and not only pointwise structure of universal space, and the mutually balanced relation of contractive and expansive, or centric and peripheral qualities, known to pure mathematicians for well over a hundred years—should at long last be taken seriously in our understanding of real nature. The same thing was suggested a few years ago by Professor H.W. Turnbull, 6 editor of Newton's correspondence now in course of publication. "In the realm of growth and form," writes Professor Turnbull, referring to the pointwise and planewise aspects, "both analyses are significant. The seed, the stem and the leaf of a plant

suggest two ways of studying the three-dimensional shape, the one pointwise microscopically and the other planewise." He also draws attention to the fact that the relative completeness of a pointwise analysis, reached at a certain scientific stage, neither excludes nor is vitiated by the polar opposite aspect which may still be awaiting discovery. "This mathematical duality is not a case of competing theories, where one is right and the other is wrong ... The characteristic description of their relationship is that of in and through, but not of for or against." It is only a deeper and fuller insight which we may expect along these lines. Surely it is not unreasonable to suppose that nature is built on the same principles which light up in the mind of man when he exercises one of the noblest of human faculties—that of clear geometric thinking and imagination.

Let us now turn from the world of pure form to that of active forces. Here once again, since Newton, Faraday and Clerk Maxwell, clear geometrical and mathematical thinking has enabled us to master the play of physical forces, such as the force of gravitation, the momentum of heavy bodies, the electric and magnetic forces. Primarily, we know of these not by dint of thought alone, but by experiment and observation. Unlike that of velocities or of accelerations (though some of the text-books fail to make this clear), the 'parellelogram of forces' cannot be proved by any reasoning or definition; it is a fact of experience, confirmed as accurately as we like by many kinds of experiment. But though we only know of them empirically to begin with, nature reveals that in their interplay and balance the physical forces obey mathematical laws. When we discover these laws and bring our minds into harmony with them, we learn to understand and master the play of forces. Hence all the power of our applied science and technology. Now it is characteristic of nearly all the forces known to physics that they are point-centered. These are the kind of forces which emanate from heavy matter; it is only natural that we have found them first, since physical science took its start from mechanics—from the investigation of the cruder properties of matter. But this was also due to the prevailing forms of thought. Man naturally notices what he is wont to think, and things escape his notice even if he sees them if the idea that is in them is foreign to his mind. Through his Euclidean schooling, the spatial thinking of the scientist has hitherto been one-sidedly centric and pointwise. He has the mental equipment for understanding centric forces; no wonder if he finds them.

For the sake of brevity may I now put as a categorical statement what I certainly do not intend thus dogmatically, for like any other scientific proposition it is only stated to be put to the test. The forces of nature, manifesting in the world of space and time, are not only centric; there are peripheral forces also. Even as the pure form of space is in the light of modern geometry balanced between point and plane, so are the forces that prevail in nature; they are not only pointwise or centric but peripheral or planar. Moreover, as in the domain of centric forces the central point of the material planet on which we live, in other words the center of gravity of the earth, is for us a center of primary importance, so in the realm of the peripheral or planar forces, what we experience as the infinitely distant plane—in simple language the vast periphery of the blue sky—is a most important source of the peripheral forces.

This, I shall now endeavor to explain, is an ideal key to what you are really doing when you enhance the power of your medicaments by the rhythmic process of expansion or dilution. But let me first point out that the idea of peripheral forces is not altogether new. Under the name of 'ethereal forces' or by other kindred forms of description they have been known since time immemorial. In the East, their reality has never ceased to be recognized. They only need to be re-discovered in terms of modern science. In the Seventeenth Century a more or less instinctive knowledge of them still lingered on traditionally, but had grown so confused that the new science, based on experiment and reason, could make nothing of it. Tradition undoubtedly helped give rise to Huyghens' idea of a 'luminiferous ether,' but this too was interpreted in terms of physical and centric forces and was to that extent a misunderstanding, which has in any case been abandoned by twentieth-century physics. The new geometry on the other hand, grown to maturity during the Nineteenth Century, gives us the possibility of understanding the ethereal qua peripheral forces in a strictly scientific sense. They are forces related above all to the realm of life, just as the centric

forces—gravitational, electro-magnetic and so on—manifest most strongly in the sphere of inorganic matter. By sensitive and spiritually developed people, though often called by different names or not named at all, they can be known from direct experience.

The late Rudolf Steiner,7 to whom I am most indebted in this connection, was always at pains to integrate with scientific method what is experienced by subtler and more spiritual modes of cognition. Thus in his medical work *Fundamentals of Therapy*, written in conjunction with Dr. Ita Wegman, he described the ethereal formative forces of the human and other living organisms as in their essence 'peripheral forces.' He distinguishes between the forces—manifested above all in the lifeless realm—emanating from material centers, and another kind of force, working not outward from any earthly center but inward from the periphery, generally from the surrounding cosmos. In spatial character he describes them succinctly as 'forces which have not a center but a periphery.' They tend indeed towards the material bodies of living things—above all towards the germinating centers of fresh life—but the relative center towards which they work is not their source, rather their infinite receiver. We must invert the accustomed functional notions of center and periphery to get the right idea. A physical force emanating from a center needs the surrounding space into which to ray out. The infinite periphery has to be there to receive it. So does an ethereal or peripheral force need the living center towards which it works. It springs from the periphery, from the vast expanse, and tends towards the living center which it endows, just as the physical force springs from a center, from a place of concentration, and works outward. 8 In lectures to scientists towards the end of his life, Steiner himself referred to projective geometry as a valuable pathway along which such ideas could be elaborated.

The ethereal or peripheral forces, in the nature of the case, have more to do with living growth and development, with the 'becoming' of things. If there were only rigid and finished forms the old Euclidean geometry might suffice us. To understand the genesis and metamorphosis of living forms we need a more mobile thinking, and one that reveals the balance between the centric and peripheral, architectural and plastic aspects. Yet even the most rigid of nature's forms, that of the crystal, is understood in a far deeper way (as any crystallographer with an elementary knowledge of projective geometry may confirm) when we perceive how the crystal lattice derives from an archetypal pattern in the infinitely distant plane—the infinite periphery of universal space.9 In the realm of living form, once the new geometrical idea has been awakened in the mind, morphology and embryology confirm what is known to us by simple everyday experience from the world of plants—how life on earth is sustained by forces flowing inward from the surrounding heavens. Biology has hitherto been trying to understand these things with concepts derived from the inorganic world, where centric forces predominate. As has been said by Bertalanffy among others, it has in some ways been a hindrance to biological thinking to have to borrow its basic concepts from the non-biological sciences of physics and physical chemistry. Ideas no less scientifically exact should be derivable directly from the study of living phenomena, even as the ideas of mechanics and electromagnetics have been derived from the study of non-living things. Far from implying a gulf between the living and the non-living, it would then be found that the ideas derived from the world of life reveal the non-living too in a deeper aspect. A corpse is understandable as the remnant of a once living body. To try to comprehend the living with the science of the dead is in an almost literal sense to put the cart before the horse.

To open-minded contemplation, nature reveals on every hand the forms and the signature of active forces, not only centric but peripheral and planar. Once this is recognized, the enhancement of medicinal virtues by the potentizing process becomes intelligible. There is a passage in the Organon 10 where Hahnemann distinguishes between the raw state of matter and what becomes of it "by ever higher dynamization when at long last it is entirely sublimed (or subtilized) into its spirit-like medicinal virtue ... It is most probably that in the dynamizing process the matter is in the end entirely resolved into its individual spirit-like essence - and that in its crude condition it should in any case be regarded as consisting of this spirit-like essence in a latent, undeveloped state." (Hahnemann uses the word *Wesen*, which I have here translated 'essence.' One is reminded that in

former times the most volatile and fragrant effusions of a living plant were taken to be a physical manifestation of the ethereal forces and virtues; hence the traditional names which still survive. In English we call them 'essential oils,' and the equivalent in German is *aetherische Oele*, i.d. 'ethereal oils.' We come near to Hahnemann's meaning when we realize that the ethereal, peripheral forces of life, working in towards the earth from the surrounding heavens, are the means of bringing into the physical world the purely spiritual essences to which the specific virtues of living things are due. I think this, too, is the significance of Hahnemann's often repeated phrase, 'well-nigh spiritual!)

Let us pursue the thought a little further. If crude matter alone were concerned—if stress were laid on the domain of centric forces, expressed in material quantity and weight—it would be natural to expect that an effect, comparatively feeble in a dilute solution, would be enhanced with increasing concentration. We reduce the volume; in other words, draw in towards the center. But if the substance is the bearer of ethereal virtues of which the origin is peripheral, experience will show—and it is equally natural to expect, once we get used to the idea—that the effect will be enhanced, not by concentration but by expansion. Admittedly this notion is too simple; for it is the rhythmic sequence of dilutions and successions or trituration which renders the potency effective. This too, however, is understandable in terms of centric and peripheral or physical and ethereal spaces, and our attention is thus drawn to a principle of great importance which we could scarcely approach at all, but for these ideas.

May I explain by a familiar comparison from physics. Again and again we see rhythmic phenomena taking place along and about a line stretched between two end-points—a violin string, for example, a monochord, even an organ pipe. Or again, between the poles of a Wimshurst machine—it is well known that the spark is not a simple but a rhythmically alternating discharge. Tension between two poles begets a play of forces giving rise to rhythm. But in these purely physical examples either pole is of point-like centric nature. I believe science will presently discover a deeper and more primary source of rhythmic activity—no longer between two point-centers or the two ends of a line, but between center and periphery, or point and plane, in concentric spheres, of which there may be many forms. The tension is no longer between two foci of like kind, competing with one another as in a tug of war, but between entities polar opposite in nature, physical and ethereal respectively—related to the polarity of point and plane, of which the mental picture is evoked in its simplest form by the geometrical function of a sphere, illustrated in Figures 1 and 2. I would suggest that a polarity of this kind is latent in every chemical substance, and that there is no physical material that has not ultimately arisen from the interplay of centric and peripheral forces—forces of earthly and cosmic origin. The finished substance lying there in its crude and quiescent state is the ultimate precipitation of an activity between center and periphery—qualitatively speaking, between earth and heaven. I think the number-relations of valency and chemical constitution, also the wonderful rhythms of the spectral lines, will prove to be an expression of this fact. The words of the poet, 'Out of the everywhere into here,' apply not only to the human child but to all living things, and in its ultimate origin to the very substance of the earth.

Even the simplest facts of science point in this direction, though one will only see this if one's idea of space derives from the new geometry. Think of a body radiating light and heat, say a candle-flame, a glowing ember. Purely as a phenomenon—a fact of everyday experience confirmed by exact experiment—the radiation expresses itself in concentric spheres about the source. In the one-sided thought forms of the old geometry and physics, the whole activity is attributed to the visible, point-centered source of the radiation, with the surrounding space a mere emptiness into which it spends itself as it falls off with increasing distance. But in the light of modern geometry the figure of concentric spheres only has meaning as a mutual relation between center and infinite periphery. The center is the answering point or 'pole' of the infinitely distant plane; spheres are concentric if this point is the same for them all. It is only by virtue of their common relation to the cosmic periphery that the spheres are concentric. Thus in the simple phenomenon of radiation nature is bearing witness to the fact that in some way the periphery is an active partner.

Incidentally, something like this appears to have been known in earlier times; perhaps it is only

waiting to be re-established in a more scientific form. I spoke of Newton's relation to the Cambridge Platonists. Another of Newton's contemporaries who also moved in these circles was Thomas Vaughan, brother of the better-known poet Henry Vaughan. Like Newton himself, Vaughan was an alchemist and wrote books not very easy for us today to understand. In his *Lumen de Lumine* 11 he tells of a 'spiritual fire-earth', by which he evidently means something of the quality of a circumference, a cosmic periphery enveloping the earth. He who attains to the great secret, says Vaughan, will come to know "how the fire-spirit hath its root in the spiritual fire-earth and receives from it a secret influx." Nay, more, he will know "why all influx of fire descends—against the nature of fire—coming downwards from heaven ... and why the same fire, having found a body, ascends again towards heaven and grows upwards." Such paradoxical ideas as are suggested to us by the clear and cogent thought forms of the new geometry seem here to be expressed as an immediate outcome of mystical communion with nature.

Admittedly the thought I have put to you concerning radiation is purely geometrical to begin with: nature alone can show whether and how it is relevant to the real play of forces. Yet in the light of your own experiences ladies and gentlemen, this is precisely the suggestion which I now venture to put forward. In homeopathic remedies, insofar as rhythmic potentization plays an essential part in their preparation, you are already dealing with a realm to which this kind of thought applies. The substance you are potentizing was originally formed from the cosmic periphery inward, by an individually rhythmic, not to say musical, relation between the cosmic periphery and the earthly center. True, it has come to rest in the earthly place where it abides—in root or leaf of plant, in metal or crystal mineral, or even in the bottle on the apothecar's shelves. But this is only its last resting place. In the precise earthly locality where it was first precipitated, it came into being through a specific and individual relation between the earth-planet and the vast spheres of the cosmos. In this relation lies the secret of its chemical individuality qua substance, and of its vital nature if still embedded in the living realm. The formative rhythm is still latent in it, and when the careful hand of the pharmacist, guided by experience and inspired by the will to help, subjects it to the rhythmic process of expansion, mingling it by trituration or succussion with the spatial medium which is to receive it, an opportunity is given for the formative rhythm of its origin to be re-born and for its latent connection with the healing essences of the cosmos to be restored. One is reminded of the saying of Novalis: "Every disease is a musical problem and every cure a musical resolution"... Moreover, is not the picture I have been giving in harmony with Hahnemann's own words quoted above, when he speaks of the spirit-like individuality of the substance which in the crude material lies latent and concealed?

If I am right in the main thesis I have put before you, a new chapter will be opened out, tending to bring our science nearer to life—to human life above all. Work in the new direction is progressing, both in its biological aspects and in its bearing on the facts of chemistry and physics. 12 The concept of ethereal space as the natural field of action of living, formative forces, which I have had to put forward all too briefly in this lecture, can be worked out with all mathematical precision. And as so often happens when an idea is really fertile, in doing this one finds that one is not alone; that what is seemingly new has been divined and adumbrated and was implicit in much of the specific work that has gone before. The seemingly insurmountable division between an orthodox scientific outlook and realms of human skill and experience which find no place in the accepted system of the day, is overcome without injustice to either party when a fresh aspect springs into focus. This I believe is about to happen, and in it your profession too, ladies and gentlemen, will find new life and vindication.

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