Orthomolecular Medicine in the Universe

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Abstract

For over four and a half decades Orthomolecular Medicine has sought to justify its continued existence in the face of hostility from the orthodoxy in Medicine, even though the evidence is overwhelming that it works, often better than the offerings of the orthodoxy. This paper is an attempt to find a new justification for Orthomolecular Medicine, that it is a reflection of the origin and evolution of the Universe. Further, the principal complaints against it are not justifiable in this, the Relativistic-Quantum Universe.

Introduction

I became active in Orthomolecular Medicine in January 1974. I felt forced to do so, but have not regretted my involvement at any time since. I knew about Hoffer's and Osmond's work on schizophrenia[1] since 1956 when my father became involved with them. His role, being in the field of Administration, was to inquire into the administrative aspects of Psychiatry, later evolving into an inquiry into the administrative aspects of medicine as a whole[2], not to mention nursing[3]. I was in high school at the time but was kept informed of progress over the subsequent years as I proceeded through medical school at the University of Glasgow, receiving ample exposure to the conventional view.

There was no opportunity nor perceived incentive for me to try Orthomolecular techniques as I worked for two years as a General Practitioner in the East end of the city of Glasgow. I emigrated to Canada in 1970 and have remained in General Practice in Creston ever since.

The turning point came with my dissatisfaction with the psychiatric opinions provided by the sole psychiatrist in the region in the early 1970s. The vast majority of patients referred by myself, and other local doctors, returned with the diagnosis of "catatonic schizophrenia" no matter what the situation might actually be. I could not believe this. There had to be something better. I remembered what I had learned through my father, and made contact with Dr. Hoffer who kindly invited me to spend a few days with him at his office in Saskatoon in late 1973.

Soon after the first chance came for me to apply what I had learned. By 1976 I had accumulated enough experience to present my preliminary results to an international meeting in Denver in March of that year. I reported that, as a G.P., I could help about 78% of schizophrenic patients to be come symptom-free with orthomolecular techniques. My subsequent experience has been similar, provided that the patients followed the advice given to them.

Shortly after, by my early involvement with the dawning Space movement, I began to realize that orthomolecular medicine had freed my mind to take a new approach to many common medical conditions. I realized that this was a new medical paradigm, which, in time, I came to call Extraterrestrial Medicine (ETM). I looked at the known physiological changes experienced by astronauts, better cosmonauts, and applied those changes to the illnesses commonly seen by myself in my practice. It became apparent that most of them could get better if the patients could enter space[4]. A slight shift of perspective made it clear that ETM was a not merely a subset of orthomolecular medicine, but might actually be its future[5].

I have continued to re-examine ETM from different viewpoints since and remain satisfied that it may be a valid concept[6-11]. Despite the experience of many spaceflights afterwards, and the ease by which the predictions of ETM can be dis-

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proved, ETM remains unrefuted as yet[12,13].

Returning to my father, as he looked further and deeper into the fundamentals of his work, of which the medical and psychiatric aspects were a very small part, it became apparent that the concepts he was developing, the forms of authority, how decisions are made, how the organizational structures are built up to make decisions, how the types of personalities have evolved to play roles in society, as summarized in a paper of mine recently[14], might reflect basic properties of the universe[15]. Specifically it became harder and harder to conceive of a Universe containing intelligences such as our own which did not operate along the lines which he described. In an analogous fashion it has become apparent to me that, over and above the concepts of ETM, orthomolecular medicine might better reflect the fundamental properties of the universe better than orthodox medicine.

The Early Evolution of the Universe

The universe is very big. It is bigger than we can know. However powerful our observing instruments can become there is an insurmountable barrier to our observations. Remembering that when we look ever further out in space we look further back in time, we cannot see beyond the distance equivalent to the time when the universe was about three hundred thousand years old, the transition between when it was opaque to radiation and transparent to radiation. This has been reached by observing the cosmic background radiation. The probability is that the observable universe is very small indeed compared with the total universe.

The universe is very old. Unless there is a drastic revolution in atomic physics changing our understanding of how matter behaves and hence how stars evolve, the lowermost limit is some 15 billion years. This has been determined by studies of the evolution of the globular star clusters–the oldest known structures in the universe. Clearly the universe cannot be younger than they are. The upper limit is about 20 billion years.

The universe is a well-integrated physical system, its laws and properties being the same wherever we look, even places which cannot have had any contact with each other since a small fraction of a second after the instant of creation. The universe is expanding. This is known from measurements of the relationship between the distances of galaxies and the rate at which they are receding from us, as known since the work of Hubble in the 1920s.

It is this last which has given us a tool to study the early universe. If it is expanding, then we can work out its history in reverse mathematically, arriving at the idea of the universe being in a hot, dense state in its earliest eras, as predicted by George Gamow in the 1940s[16]. The cosmic background radiation is the echo of this state and was also predicted by Gamow. Its discovery founded modern cosmology. Extending the process further has allowed studies of *The First Three Minutes* [17], taking us to a time within 10^{-43} second of the instant of creation.

Some problems (albeit seeming minute) with inconsistencies between theory and observations have focused attention on the era between 10^{-34} and 10^{-32} second from creation. The solution seems to be what has come to be called the inflationary era[18] during which there was an exceptionally rapid expansion of the universe, making it as big as was indicated above.

As far as the instant of creation itself, that is at present unknowable. But there are two general hypotheses covering that situation. The first is that it happened spontaneously, perhaps as a consequence of the inflation theory. The second is that it was a deliberate act of some powerful, external agency, the creator hypothesis. At the moment, there is no evidence to distinguish between the two, and no one can be criticized for choosing one over the other.

What is known is that hydrogen was, and still remains, by far commonest ele-

ment born in the early universe. There were whole orders of magnitude lesser quantities of the heavy isotope of Hydrogen (deuterium), helium-3 and helium-4, lithium-7, and, in even very much lesser quantities, beryllium-7. The temperatures and pressures were too high for any other elements to exist long.[19] Then how did the other elements come into being?

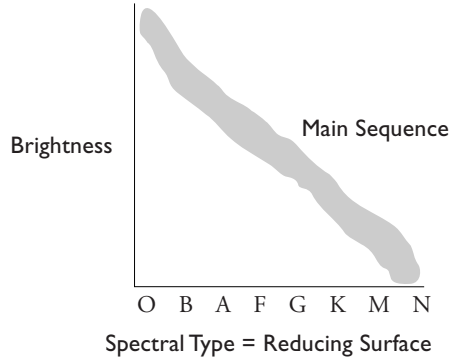
The Source of Biological Molecules

Orthomolecular medicine is defined, paraphrasing Linus Pauling, as the treatment of illness by the provision of the optimum quantities of molecules which are already present. The existence of those molecules and their coming to the Earth was a staged process.

A. Stellar Evolution and Nucleosynthesis

Apart from the hydrogen and lithium mentioned above, none of the elements involved in biological processes existed in the early universe. They had to be created by other means. The key to understanding how they came to be lies in the stars of the globular clusters, the earliest bodies to form, as far as we know, as the universe began evolving into the form we know today. In the early spectroscopic studies of the nature of the stars there came to be recognised two general types, Population I and Population II. Population II stars are typical of those in the central bulge of the galaxy, the stellar halo surrounding the galaxy and of the globular clusters. It is possible that the core and halo stars arose in globular clusters which were gravitationally disrupted by the development of the early galaxy. They are characterised by a marked sparcity in their spectra of lines corresponding to heavier elements than those mentioned above. Population I stars are typically those found in the galactic arms and in active star forming, H II, regions. They are very much younger and are also characterised by the possession of lines indicating heavier elements in their spectra. Stars can be classified in other ways. Subramanian Chandrasekhar, at the age of 19, set off for Cambridge University from India by steam ship. By the time he had arrived in England he had solved, in general lines, the evolution of stars, the more massive, brighter stars in particular. He derived a limit, now known not surprisingly as the Chandrasekhar Limit, which amounts to 1.44 times the mass of our Sun. Above that limit, a star has to under go that most violent of eruptions, the explosion known as a Type II Supernova. Below that limit stars evolve a great deal less violently. The most powerful tool for studying the evolution and fate of stars, en masse and individually, is the Herzsprung-Russell Diagram, (**Figure 1**). This relates the brightness to the surface temperature, and is

Figure 1. The Herzsprung-Russell Diagram



dominated by a gently curving, diagonal band known as the Main Sequence. All stars, Population I or II, massing below or above the Chandrasekhar Limit, have to spend some lesser or greater time on the main sequence, having emerged from the clouds of gas out of which they formed above and to the right of the Main Sequence in the form of T-Tauri stars and migrating into the Main Sequence.

When stars form, they do not do so individually but as members of a cluster within a cloud of collapsing gas. As the stars ignite into the T-Tauri stage they blow off the gas unused in star formation. If the originating cloud is very massive and lots of stars are formed, the stars tend to remain bound together, which seems to have been the prevailing situation in the early universe, resulting in globular clusters. More recently the clouds seem to be less massive resulting in less gravitationally bound clusters, which tend to disperse.

But the masses of the stars which form in any cluster is randomly distributed from the heaviest, O, to the lightest, N, early or late in the universe, in Population I or II stars. The more massive the star the greater the gravitational force on its core, the brighter it is, the faster it burns its nuclear fuel, and the sooner it evolves back off above and to the right of the main sequence again. For the most massive stars this can happen within a few hundred thousand years, for the least tens of billions of years.

The stars in each of the globular clusters, of which the nearest and most visible example is the Omega Centauri cluster in the southern skies, are presumed to have formed at the same time. There is no evidence to the contrary. In no such cluster are there any known examples of massive, bright stars. All of them have suffered their destructive fates billions of years ago. What are now observed are stars of the M and N types, or their counterparts evolving off the Main Sequence as red giants. Only recently have white dwarf stars been detected by the Hubble Telescope in the globular clusters, and these are the cinders of the bright, massive stars.

What role does the Chandrasekhar Limit play in all this? Stars at or below this mass have a less spectacular fate than the ones above. Once they have begun exhausting their hydrogen fuel, their cores shrink and heat up to start burning the helium which is the ash of nuclear burning of hydrogen. Because of the much higher, albeit less efficient, energy output, the outer layers of the stars are pushed outwards and appear red, forming the Red Giant stage of a star's life. This stage is not simple at all because, as a side effect, a wide variety of subatomic particles are produced. The result is the synthesis of all the elements of the Periodic Table up to the noble gas Argon. This includes carbon, nitrogen, oxygen, fluorine, sodium, magnesium, aluminium (aluminum to North Americans), silicon, phosphorus and chlorine[20]. Of course hydrogen and lithium are still present. In other words, some of the most important elements for biology are formed in this fashion, but not all. After helium burning is exhausted in its turn, the stellar core collapses again. The rising heat blows the outer layers of the star off into Space, leaving behind a white dwarf star.

A white dwarf star shines not by nuclear reactions but by the slow radiation of its accumulated energy trapped in the degenerate matter of which it is composed. Eventually, after many billions of years, what is left is a black dwarf. But the universe is too young for any examples of black dwarves to have appeared.

The heavier elements form in stars more massive than the Chandrasekhar Limit. everything they do happens faster than in the case of the lighter stars. They quickly exhaust the hydrogen fuel and enter the helium burning stage, forming the above noted elements, and becoming red giant stars. Under the concealing red envelope more spectacular events are starting to happen. Unlike the lighter stars, when the helium burning starts to become exhausted,

their cores collapse even further, and progressively hotter, burning reactions take place rather like the layers of an onion.

In summary the layers of the stellar onion are, from outside in, Hydrogen Burning, helium burning, carbon burning, oxygen burning[21] (by which time the red, outer atmosphere of the star is being blown off, revealing a smaller but very much more luminous supergiant star), and silicon burning[22] (a term not accepted by all astrophysicists). The "ash" from this last phase is iron predominantly, and iron-like elements. Also mixing in all the layers are the elements up to iron. An important point is that nucleons are most tightly bound in the Iron nucleus, which leads to catastrophe.

There is no iron burning. As the iron accumulates, the core continues to collapse because there are no further nuclear reactions to hold it up. As it collapses the temperature rises, until it reaches the order of about ten billion degrees Kelvin. At this temperature the structure of the Iron nucleus breaks down into simple nucleons again, electrons and protons (which almost immediately recombine into neutrons), neutrons, and neutrinos (which are the only particles which can escape)–a reaction which is a net absorber of energy. The core implodes, and then "hardens". As the implosion happens, the layers of the star above the core fall inwards, compress and hit the outer boundary of the hardened core. A shock wave races through the substance of the star, a process which is not as simple as it sounds. When the shock wave reaches the surface, it is so energetic that for about one tenth of a second the dying star outshines all the stars of a major galaxy put together. A Type II supernova has erupted.

In this immense explosion the storm of nucleons is so fierce that all the elements heavier than argon may be synthesized[23] and be blown into the interstellar gas in the forms with which we are familiar. This includes such orthomolecularly important elements as potassium, calcium, chromium, manganese, iron and cobalt, copper, zinc, selenium, iodine, gold, mercury, and lead, not to mention immense additional quantities of the elements formed from the evolution of lighter stars. Along with them are formed transplutonian elements which break down long before we can become aware of their presence. Most supernovas leave behind neutron stars as their corpses. A few are so massive that their corpses are in the form of black holes. Type I supernovas, much less violent, occur when a clump of matter falls on to a neutron star or into a black hole.

Returning yet again to the globular clusters, the formation of the heavy elements began with their early massive stars erupting as supernovas and spreading these elements into interstellar space. No stars hotter than M or N stars exist in any globular clusters. The enriched interstellar gases, compacted by the criss-crossing shockwaves, form clouds out of which new generations of stars appear, a significant proportion of them repeating the cycle of heavy element synthesis. It may be that the Sun, and the planets of its family, are of the fourth generation of this cycle of nucleosynthesis.

B. Formation of Pre-biotic Molecules

Perhaps about five billion years ago the pressure wave from a supernova explosion passed through an extensive cloud of gas and dust, triggering localised concentrations within the cloud. This began the sequence of events which brought about the birth of a new cluster of stars. As what seems to be an inevitable part of the process planets (also asteroids and comets) formed along with the stars. Among these planets was the Earth, a hot place under the fierce radiation of the early Sun in its T-Tauri stage, inhospitable to life, even to the very chemicals from which life could emerge.

The young Sun cooled as its nuclear reactions settled into a quasi-steady state and evolved into the Main Sequence as a G5 star. Once it had done so the surface of the primitive earth could begin cooling to the temperature at which the basic

chemicals, from which life could develop, could survive.

Yet none of the those chemicals were present on the Earth. They had to be brought to the planet. Where from? As far back as the 1950s Fred Hoyle suggested that they might originate in the cloud of gas and dust out of which the solar system formed,[24] a speculation which could not be confirmed until the golden age of radio astronomy began at least a decade later.

With access to the radio bands astronomers began to find an increasing list of complex molecules in the types of clouds of gas and dust out of which stellar systems form. One such cloud is the familiar M42, the Great Nebula in Orion, a rich star forming region.

Before star formation actually begins such clouds form excellent environments for the synthesis of increasingly complex molecules. The basic atoms are there. The environment is cold, but star light and random motion bring the atoms into contact with each other to build the simplest molecules. Similarly the simple molecules come in contact with each other and react to form more complex molecules. The low temperatures make for a low probability for thermal break-up of such molecules.

One exceedingly important point not mentioned in the astronomical literature is that the very dust grains which exist in such colossal profusion in the clouds may act as highly effective catalysts. They carry on their surfaces very reactive forms of various metals such as magnesium, calcium, chromium, manganese, iron, cobalt, copper, zinc (implicated in the form of zinc based clays as the basis for the start of true biological activity), and selenium — all familiar to orthomolecular physicians. Also of importance are likely to be metals of the Periods 5 and 6 of the Periodic Table which include such elements as Silver and antimony, platinum (and the platinoid group of catalysts), gold, mercury and lead. As bioactive elements their importance continues today as co-factors for various enzymes, or as poisons.

How complex may the molecules become? The problem is a technical one. If we do not know what the spectral, specifically radio, signature of a particular molecule might be, we cannot even begin to try to identify it in the interstellar clouds. For example, we do not know the signature of the ring molecule benzene.

But the benzene ring seems easy to synthesize under the conditions in interstellar clouds, and is the precursor of may other organic compounds, single ring molecules like niacin and niacinamide (two forms of vitamin B_3) or the ascorbate radical, and multi-ring compounds like the steroids. For another example, considering the biosynthetic process by which cholesterol is formed biologically from simpler molecules, it is easy to conceive how it , and molecules similar to it, might by formed from various combinations of molecules already identified in interstellar clouds.

For similar reasons I believe that most of the monosaccharides, simple fats and oils, amino acids, and the bases later to be incorporated in nucleic acids, were formed in the interstellar clouds. It merely remains to determine how to find them, and then I believe we will find them.

Certainly the list of complex chemicals found in the rare carbonaceous chondritic type of meteors suggests that this account might be correct, but too often they have been contaminated by the earthly environment to be sure. Such meteors have been found spectroscopically to be identical with one of the classes of asteroids, a class which might include "burned out" comets.

The total mass of interstellar clouds is many times the combined masses of the stars and planets which will ultimately condense out of them because much of that mass will be blown away when the stars ignite in their T-Tauri stages, as is still happening in the well-known Pleiades cluster. While proportionately a small fraction of the total mass, the accumulated mass of

each type of molecule is still very great.

In other words there is reason to believe that most, but not all, of the substances important to orthomolecular physicians, organic chemicals and the so-called "trace elements", pre-existed the very formation of the Earth and were active during this period.

Once star formation begins the temperatures in the clouds rise and the molecules begin to break down. But the same mechanisms which create the stars and brings about the temperature rise, also creates an environment in which the vulnerable molecules are protected–comets.

C. The Bringers of Life

Comets have been likened by the astronomer Fred Whipple to dirty snowballs. Their principal constituent is water ice, mixed liberally with dust grains and organic chemicals. They are of low density and strength. The familiar appearance of comets, the head and the tail, are due to both the heating effect on the comet by the Sun and the pressure exerted by the Solar Wind. They may have a diameter as little as ten metres or as large as several thousand kilometres, e.g. the twin bodies of Pluto and Charon (now known to be unlike any other planets in the Solar System and may be the innermost and largest representatives of the newly discovered Kuiper Belt of comets, named after Gerard Kuiper who first suggested such a disk of comets.

They are the physical remnants of the origin of the Solar System, appearing as part of the processes which created the Sun and the planets. By far the majority lie beyond the orbit of Neptune in two immense groupings. The outermost is as yet theoretical, named the Oort Cloud (named after Jan Oort who first suggested its presence), a vast halo of tens of trillions of comets whose innermost boundary might be about ten thousand Astronomical Units (an Astronomical Unit is the distance from the Earth to the Sun) out from the Sun. Infrared telescopes have detected halos around other stars which seem to correspond to equivalents to the Oort Cloud. Oort suggested such a cloud as the source of sporadic comets which enter the inner Solar System from any direction, perhaps disturbed from their distant orbits by a passing star some considerable time ago. In from that, formed into a disk by the gravitational influence of the planets, is the Kuiper Belt as mentioned above. This is the source of the long period comets, such as Comet Yakutake which recently passed the Earth and has an orbital period of about fifteen thousand years. Equivalents to the Kuiper Belt have also been detected around other stars.

There are other comets, the intermediate and short period comets. An example of the first is Halley's Comet, and of the second is Comet Swift-Tuttle which is the source of the Perseid meteor shower seen every 11th, 12th and 13th of August. Both types began as members of either the Oort Cloud or the Kuiper Belt, but, because of gravitational interactions with the planets, Jupiter in particular, have been diverted into such lesser orbits.

In the early history of the Solar System the comets were far more common. They brought life to the Earth. I do not agree with Hoyle and Wickramasingh in their assertion that they brought living organisms. But what they brought was prodigious quantities of water and the organic compounds from which earthly life originated. The molecules already identified, with difficulty, in comets are listed in **Table 1.**[25] Even though the same rain of comets poured upon the other planets, for local reasons the processes which led to life on the Earth were aborted on them early on, except possibly on Jupiter in some very alien form or under the ice layer of Jupiter's moon Europa.

No signs of the earliest stages of the development of terrestrial life remain, but the first fossil remnants of life on Earth date back to about 3.5 billion years ago. Considering what unlikely combination of

Table 1. Molecules in Comets[25]

Two Atoms	CH	CH^+	C_2	CN	CN^+	CO	
	CO^+	CS	NH	N_2^+	OH	OH^+	S2
Three Atoms	HCN	H_2S	NH_2	C_3	CO_2^+	H2O	
	H_2O^+						
Four Atoms	H_2CO	NH_3					
Five Atoms	CH_4	C_3O_2					
Six Atoms	CH_3CN	CH_3OH					

Adapted with kind permission of G.L. Verschuur. Remember that these molecules have been detected in the clouds of gas surrounding the nuclei of the comets and in the tails, all driven off and at least partially degraded by light from the Sun.

circumstances lead to the formation of any kind of fossils, it is truly remarkable that such ancient signs of life should have been found at all. As a result it has been estimated that life appeared within a hundred million years, i.e. 4.5 billion years ago, of the cooling of the surface of the Earth sufficiently to allow the presence of free, liquid water–the essential prerequisite to the development of life.

For reasons given above I believe that many of the substances familiar to and used by Orthomolecular physicians in their practices arrived on the Earth with the comets. I remind you that as the comets were the bringers of life to the Earth, they also are potentially the bringers of death to our species. The impacts of the fragments of Comet Shoemaker-Levy on Jupiter in July 1994 ought to speak unimpeachably to that lesson.

The Individual and Disease in a Relativistic-Quantum Universe

Having linked the tools of orthomolecular practice to the origin and evolution of the universe, I find it necessary to consider why the resistance to orthomolecular medicine continues. Some time ago I wrote in the following terms:[26]

"Science is built up around the assumption that observations can be made which are divorced from the bias of the observer. Medicine, in particular, although it deals with that most subjective of topics the variability of human beings, aspires to the same standards of objectivity.

Is that possible? We try. Unfortunately we may try in particularly harmful ways. For example nearly all general practitioners, and many specialists, have had dealings with such organizations as workers compensation boards, insurance companies, and pension boards over the issue of whether or not a patient is in pain. A so-called independent physician is asked by the organization to give another opinion. And that 'independent' physician may include in his/her report the phrase "no objective signs of pain."

How quickly we forget what we are taught in medical school. Pain is a symptom. As such it is entirely subjective perceived as such by the sufferer. A perfect example of this is the pain of migraine. Does anyone seriously doubt that migraine is real? Migraine is, however, a condition for which there are no objective signs and no confirmatory tests.

But the 'independent' physician is violating something even more fundamental. Before I get to that, let's deal with something even more prevailing as current medical dogma. To be respectable, a medical study has to conform to the standards of the 'double blind controlled study'. Summarizing, in such studies patients are

divided into groups which, because of the numbers involved, hopefully individual variability disappears. To one group a placebo, allegedly an inactive substance, is administered to eliminate the possibility of a placebo effect–where people respond to a substance by suggestion–making the unproven presumption that all conditions are placebo responsive. To another group is administered the old, standard treatment. To a third group the new, and supposedly improved, treatment is administered to see whether it brings about an advance in therapy. Under 'ideal' circumstances, there is a fourth group to whom nothing is administered to see how the natural history of the condition evolves–but this is seldom done. The patients are assigned to the groups according to a code which is, supposedly, only broken at the conclusion of the pre-set test period. The purpose of the code is to remove all observer bias. Again, is that actually possible? Of course there are many criticisms of this scenario. The numbers are seldom large enough for proper matching of the groups, because of human individuality and variability. The codes are often broken ahead of time, which is seldom confessed to the medical journals in which the results are published. The placebos are seldom actually inactive. Sometimes it becomes obvious, because of other effects by the drugs involved, which patients are getting which active medication.

But these are not the main problem which I have with orthodox Medicine's attempts to be objective. I am an amateur astronomer. As well as trying to keep up with medical 'literature'–an oxymoron–I also try to keep up with what is happening in modern astronomy. That means having some understanding about the dominating theories of modern physics–the Theory of Relativity and Quantum Theory. Much to my surprise they are both highly relevant to modern medicine's attempts to be objective. The essence of both the Special and General Theories of Relativity is that every observation entirely depends upon the viewpoint of the observer. The theories specifically deal with the effect of the states of motion, steady motion, acceleration, and motion under the influence of gravity (Einstein showing how this was equivalent to acceleration), upon what the observer actually observes. But these were only examples of observer bias. Any alteration of the state of the observer altered what was being observed. Einstein's great conclusion was that it was not possible to observe anything objectively. The state of the observer(s) always brought in a bias. Since Relativity has been confirmed to the magnitude of 10^{-27} (the order of Planck's constant), this conclusion has to be granted to be valid even in our day-to-day experience.

But Quantum Theory is even more relevant to considerations of medical objectivity. This theory had its origin in the work of James Clark Maxwell, who explained Michael Faraday's experimental results by a short series of equations. Erwin Schrödinger refined these in his 'Wave Equations'. These equations had testable consequences which made them the foundation of the most successful theory in history, Quantum Theory.

Imagine a perfect black body — no such thing occurs in nature. But, if it did exist, how would radiation be absorbed or emitted by it? Common sense tells us that the radiation would be emitted quite arbitrarily. Quantum Theory states that it happens in discrete energy states, particles (quanta), mathematically related to each other via the Wave Equations. "That Quantum Theory is right is confirmed by the very existence of transistors, junction diodes, masers, lasers and super conductors. And it allows us to understand what happens to atoms, subatomic particles and energy itself. It even is the basis for all of chemistry as Linus Pauling demonstrated as long ago as 1936 for which he won his first Nobel Prize.

Unfortunately it also has some nasty consequences, exemplified by the famous 'Slit Experiment'. If you have a light source

and allow radiation from that source to pass through a single narrow slit to be observed on a screen beyond, you get the image of that slit. In other words the light is being transmitted through the slit as particles, traveling in a straight line. If they had been waves traveling through the slit, the image would have been smeared out. Now suppose you send the light through two narrow, parallel slits, the image on the screen is of a series of light and dark bands parallel to each other. This can only happen if the light is not particles at all, but waves interfering with each other — the lines on the screen being called interference fringes. Then suppose you arbitrarily obstruct one of the slits. Again you see the clear, particle generated image of the slit. Open the obstructed slit and the interference fringes reappear, reflecting the wave nature of the light. In other words the choices you make determine whether or not you see the light as waves or particles. But you can never see them as both simultaneously — one of the many consequences of the Heisenberg Uncertainty Principle.

Now that's pretty bad. Modern astronomy makes it worse. Quasars, extremely small, but extraordinarily bright objects, have been detected very far away in the universe — billions of light years away. Because they are so far away, their light has taken billions of years to reach us. A few of them appear to be double, twinned. In fact what they have turned out to be is single quasars with massive galaxies lying on the line of sight between us and the quasars. Because of Relativity the light from the quasar is bent around the massive galaxy along two different paths to reach us as two images — gravitational lensing. If we study the twin images of the quasar using a photographic plate or other imaging technique then we are observing the light in the form of particles, photons, quanta. But we can also get interference fringes by other techniques, such as recombining the images with a prism, effectively using the intervening galaxy as a double slit. But we cannot observe the light simultaneously as photons/quanta, and waves. In other words the choice we make now in how we observe the twin images of the quasar determines how the light passes by the massive, intervening galaxy billions of years ago as particles, or as waves, but never both. This means that the choices we make govern how the universe behaves through all of space and time, and, in turn, the outcome of any observations, including medical.

The objection to this is that we seem not to see how our choices affect the universe. It does not accord with common sense. And 'of course' this can have no application to what we do in medicine. Of course there was a time when common sense led us to believe that the Earth was flat. That was disproved by Ptolemy. Common sense is no guide to anything.

Our choices do alter the state of the universe. Our choices still change what it is we observe. And no coding of the patients in double blind studies can alter that fact that what it is we observe changes according to the viewpoint of how we observe it. We have changed how the patients respond merely by the very fact of making our observations.

The proof lies in the fact that very few double blind controlled studies have ever settled any issue in medicine. Furthermore they appear to conceal the reality of the place of any treatment. So we find ourselves in a conundrum. To find the best treatment for our patients we have to try to be as objective as we can be. Yet the very nature of the universe makes that impossible.

What can we do? We can accept the limitations that the Universe imposes upon us. We can accept that every interaction with a patient is a series of N=1, hence the phrase 'practice of medicine'. And we can pool our accumulated experience with patients, using the tool that we all now ought to be using for our practices, the computer. And we can stop pretending to do things

which are inherently impossible."

In other words, orthomolecular medicine functions not by following the accepted paradigms of orthodox medicine, but within the constraints of the most powerful theories governing the very basic functioning of the universe.

Conclusion

I have tried to show how most of the basic substances used by orthomolecular physicians were born as an intrinsic part of the processes by which the Universe was born and evolved. In other words they are truly natural in the deepest sense of the word. While the "toximolecular" agents used and advocated by the orthodox medical establishment are permitted to exist by the same processes, it is striking that they do not seem to be available in the crucible of the interstellar clouds, and, hence, cannot be said to be natural. Using the "natural" substances in the subjective arena of individual human beings is compatible with the theories by which the origin and evolution of the universe is studied. No such relationship has been claimed by the orthodoxy. In other words the medical orthodoxy is totally out of tune with mainstream science, while orthomolecular medicine is fully compatible with it. Sooner or later main stream medicine will find itself forced to encompass orthomolecular medicine.

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Trials and Tribulations of a Three Year Old

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The patient is a three year old white male who was seen at the Center for symptoms of severe abdominal pain, painful, irregular bowel movements, failure to thrive, rectal prolapse associated with bowel movements and anal fissures. The abdominal pain and irregular bowel movements started two years previously. This child had been under treatment for two and a half years by various physicians.

History revealed that the patient had a normal birth. He was described as a "difficult feeder" - he cried and screamed during and after breast feeding. He was switched to Similac™ with no improvement, then to "Soy formula", which made the condition worse. Enfami™ was tried and was better tolerated; however, the patient still cried at each feeding. Between the third and sixth month, the patient's weight dropped from the 55th percentile to the 45th percentile. Between the sixth month and ninth month, the weight dropped from the 45th percentile to the 15th percentile. When the mother expressed concern at the infant's weight and appearance, she was told by the pediatrician "You are thin, your husband is thin, and your son is also going to be thin." The parents also told the physician that the infant always seemed to have a rash, or irritated red patches of dry skin on his face. The physician's response was: "It's nothing to worry about, just dry skin." They also mentioned that the infant seemed to develop hives after starting on solid foods at four months of age. Again, they were told it was nothing to worry about.

Further history revealed that the patient had been kept at home, had never been at day care, and only had contact with an older sister. There was no travel out of the city or out of country by the family. The child experienced Otitis Media at five months of age and was treated with antibiotics, which seemed to cause diarrhea. He was later diagnosed with a severe sinus infection and treated with Amoxicillin.™ His recovery was uneventful. At two years of age, the abdominal pain with cramping and painful bowel movement became more severe. The parents were told (over the phone) he was constipated and were instructed to treat the patient with fruit; if no improvement, to increase fruit and push fluids. After one month, the pain was still present and bowel movements were every four to seven days. When seen at the physician's office, the child was diagnosed with constipation, and one tablespoon of mineral oil in ice cream per day was prescribed. With no improvement of the condition, the mineral oil in ice cream was increased to three tablespoons per day. The child was now 29 months of age, and his condition continued to deteriorate. His weight was now in the 10th to 12th percentile, and his height was approximately in the 75th percentile. He had lost so much weight and tissue that rectal prolapse would occur during bowel movements.

When the parents asked for a referral to a local pediatric gastroenterologist, they were told the earliest appointment possible was in six weeks. The parents then (on their own) arranged an appointment (in two days) with a pediatric gastroenterologist at a children's hospital in a bordering state. After several visits to the hospital, the patient was diagnosed with failure to thrive and Eosinophilic Gastroenteritis (after a sigmoidoscopy, endoscopy and biopsy). He was placed on Zantac ™ and Atarax™ and referred back to the local pediatric gastroenterologist with the com-

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ment that the hospital was investigating the additional diagnosis of some type of allergic reaction or parasitic infection.

With no examination of the patient, the local specialist made the diagnosis of viral Eosinophilic Gastroenteritis. As the patient's condition continued to deteriorate, a barium enema was ordered and the patient was referred to a pediatric surgeon. The parents were told by the surgeon that he had no idea why the patient was referred to him since the barium enema was normal! By this time (since the age of two), the patient had been seen numerous times by a pediatrician, two pediatric gastroenterologists and a pediatric surgeon. Not only did the patient not get better, his condition deteriorated.

Frustrated with their experience with this medical treatment of their son's condition, the parents brought him to the Center for evaluation. The child was now three years and four months of age. A complete physical, history and laboratory examination was conducted. A rectal swab was positive for Blastocystis hominis and the patient was treated with pediatric Flagyl.™ Results of the cytotoxic food sensitivity test showed sensitivity to 44 different food antigens out of a total panel of 90. He was sensitive to all wheat products, white flour, peanuts, cow's milk (note that he was being treated with mineral oil in ice cream), all the food dyes, rice and most cheeses. He had a 3+ (very strong) reaction to cabbage, chlorine, oats and soybean (this fact could explain why the soy formula tried earlier exacerbated his condition). Other significant laboratory findings were an elevated ESR (sedimentation rate), a low serum total protein, elevated serum IgE of 156 μ/mL (normal is 0 to 99), mild anemia, slight elevation in the white blood cell count and an elevated platelet count. No eosinophils were noted in the WBC differential.

Treatment consisted of restriction of all sensitive foods and chewable vitamin C to bowel tolerance (to loosen stools, provide nutritional support, strengthen the immune system and antihistamine action). He is now taking 6000 mg per day and has still not reached bowel tolerance. Armour Thyroid (1/4 gr per day) is given to help stimulate bowel smooth muscle action. He also takes a multivitamin each day. The patient's response has been very good. He started to gain weight, two pounds very quickly, and continues to gain. There is no more abdominal pain or cramps. He sleeps much better now, is eating well and his energy level is increasing at a steady rate. There has been no repeat of the rectal prolapse and bowel movements are becoming regular at every third day. The skin rash, red, dry skin and hives have all disappeared.

The only lingering problem seems to be a psychological one. The pain the child associated with bowel movements in the past has caused a fear of having a bowel movement. Pediatric Fleets™ enemas are given when the fear becomes great. Counseling may be needed when the child gets older.

This rather lengthy case study illustrates several points. For one, some physicians do not, or will not, listen to patients (or their parents). If a disease or condition does not fit their own conception of the problem, they look upon it as an annoyance and wish it to go away, instead of treating it as a challenge to be solved. This three year old must be dreading the rest of his life if the first three years are any indicaiton of what is in store for him. Another interesting aspect of this case is the question of reimbursement. All during the child's trials and tribulations through traditional medicine channels, the parents' medical insurance company paid all bills associated with the treatment, even though the patient did not get well. After diagnosis and treatment at the Center, the same company refused to pay the bills because of the experimental and/or preventative nature of the treatment. This in spite of the fact that the patient is well on his way to recovery. The authors would like to suggest a novel approach to any new health care plan, insurance payment for getting patients well or keeping them healthy, not just payment for treating the patient!