

THE PSILOCYBIN SOLUTION

Prelude to a Paradigm Shift

By Simon G. Powell



Some genuine review quotes from potential publishers [here](#)

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continually integrated and organised. It thus emerges that a smart algorithmic code be inherent in the very contextual fabric of Nature. Upon reflection, it would appear that we have never had it so good, especially once we begin to apprehend our true situation at the hands of Natural Intelligence.

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The following are positive quotes from publishers who
nonetheless turned down the book:

"...I found myself pleasantly carried along by a pretty fluent
script...very readable....I have to admit I enjoyed it."

Fourth Estate

"This book has the potential of being a groundbreaking work for this
time and the author has many attractive qualities... Although not
original in many of its specific elements, [the book] nevertheless
pulls it all together in a way that I have to admit is a remarkable
unity of focus and ...is quite original in itself, and very much
cutting edge."

Inner Traditions International

"...fizzing with ideas and original thought..."

HarperCollins

"I thought the author was intriguing - and the book fizzing with
fascinating ideas."

Rider (Random House)

"...a fascinating manuscript...clearly argued..."

Thorsons

"...I found myself fascinated..."

The Psilocybin Solution: Prelude to a Paradigm Shift

By Simon G. Powell

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PROLOGUE

WHO OR WHAT KILLED EINSTEIN?

It might be a strange question to ask, but ask it nonetheless. Who or what killed Einstein? What entity or force ended the life of perhaps the greatest mind of our era, that scientist whose name is synonymous with intelligence? Well, it was clearly not a butler who did it, nor, as far as we know, was it an assassin belonging to some sinister governmental agency. To put it bluntly, it was the *reality process* which killed the great Einstein. Now, although this deceptively simple answer may seem reminiscent of a Woody Allen joke, what I mean to convey is that all of us, regardless of age, sex, race or creed, are born out of, and are destined to die, within a massive on-going process consisting not only of the evolution of life on Earth but the evolution of the Universe also. It is this relentless, all-encompassing, and outrageously complex process within which we are all so intimately embedded which we term 'reality'. We might also call such a process Nature. Thus, another obvious way of answering my unusual question is to say that 'natural causes' killed Einstein. Which means that Nature killed him. Well, to be sure about it, Nature gave birth to him, gave him 76 years of existence and then summarily dispatched him.

Call it Nature or call it reality, either way they are but small words for one vast process which flows inexorably onward. Whatever one's preferred term, it most certainly is a process, a word whose Latin roots mean 'to advance' or 'move forwards', and there can be little doubt that reality is, at heart, a single universal process which has been running non-stop for some 15 or so billion years. Not bad. Pretty impressive in fact.

So what? you might ask. Well, what this book is concerned with is the ultimate point of this creative but fatal reality we find ourselves in. To put it bluntly once more, are we biologically woven into an accident or is reality somehow directed? This is quite some question, perhaps the most profound we can ask in our short earthly sojourn, and one we know to have crossed Einstein's mind while he lived. Consider, for example, a famous remark of his which went something like:

"The most incomprehensible thing about the Universe is its comprehensibility".

What Einstein meant by this sublime statement (of which there are many paraphrased versions) is that it is astonishing not only that Nature is intelligible, and not only that Nature works so well, but that Nature has somehow conspired, through a process of organic evolution, to build biological brains endowed with minds capable of understanding these things. Why? Why exactly should Nature be that way? Why should the Universe have been endowed with such a staggeringly creative capacity to construct and organise itself, even to the point of eliciting conscious human beings? Could it have been otherwise?

Whatever the case, should we believe the reality process to be essentially a mindless accident or even a series of mindless incidents, then we might conceive ourselves to be hapless mortal prisoners entrapped in the process. Or, if we instead believe reality to be purposeful and meaningful in some way then we might consider ourselves fortunate functional components of the process. Whatever you may have read let me assure you that this issue has most definitely not been settled. It is neither completely obvious that reality is a purely accidental affair, nor is it at all clear that reality is purposeful. Neither science nor religion - arguably the two dominant strands of thinking which tend to confront the fundamental nature of reality - have absolutely conclusive evidence at hand.

But if we look to science for clues - since science has enjoyed more evident practical success than religion - then clearly over the last 300 or so years since the time of Newton and the development of classical physics, science has made great headway in elucidating *how* reality works; not why it works but how. Because the process of reality is so obligingly intelligible and comprehensible, then we see that science has enjoyed a kind of dialogue with Nature in which information is accessed through scientific experiment. In this way, scientists like physicists, chemists, biologists, and cosmologists have acquired a wealth of information concerning the sub-atomic, chemical, biological, and astronomical aspects of reality and have subsequently built elaborate models detailing them. However, how one *interprets* the

informational language of Nature, how one translates the objective data collated by science into a theory about the ultimate nature of reality is a subjective affair very much up for debate. Thus, our 'big question' awaits a satisfactory answer and Einstein's killer remains very much on the loose.

At heart, if we wish to know what, if anything, the reality process is really up to, we can do no more than assess all the relevant information revealed by collective science and the information or intuitive wisdom accrued via personal experience, and then attempt to form some viable theoretical overview. Absolute truths, it would seem, are all but inaccessible, and thus the true nature of Einstein's creator and killer might forever remain a mystery. But, whatever we believe about the reality process, we are, willy-nilly, most definitely all 'in it together' whether we like it or not, and it is for this terrifying or wonderful reason that I have taken it upon myself to explore by *any means necessary* just what it is that is driving reality, whether the driver is blind or has vision.

Before I reveal to you my particular mode of investigation, let's briefly review the status of science in relation to such a decidedly daunting issue. As it is, current scientific thought definitely veers towards a purposeless and mechanistic account of how the reality process works, an account which is, with all due respect, depressing and devoid of spirit. Although our scientific knowledge of the world reveals its microscopic and macroscopic complexity and highlights the universal mathematical precision of things like physical law, such knowledge has in effect reduced the Universe to a kind of reasonless mechanism devoid of high intelligence apart from our own. Everything from a cell to an orchid to the emergence of our species is generally reduced to a set of 'merelys'. Indeed, the more successful a scientist is in reducing whatever facet of Nature he or she is working on to 'merely this' or 'merely that', then the more warmly is their work received. To argue otherwise by, say, suggesting that Nature is purposeful in some way, is to ostracise oneself from mainstream science. Certainly it is the case that nobody will win a Nobel prize for planting purpose in Nature despite the uplifting appeal that such an intentional theory of reality would undoubtedly carry.

But is it valid to build a new and overtly optimistic theory concerning the ultimate nature of the reality process solely because our current theories are not uplifting enough? Obviously not. Such a new theory would represent whim, an artifice whose lax roots lie in an imagination galvanised into action because the consensus 'truth' about reality is perceived to be too gloomy and unpalatable. Indeed, to enthusiastically infer that the human species has some kind of special purpose in the reality process, that we are somehow at the centre of an intentional Universe, smacks of the pre-scientific beliefs confined to the pages of history books, to a time when supernatural thinking governed the minds of men. Such anthropocentric religious ideology has now been all but crushed by rational scientific thought which firmly places our kind on a mere satellite circling a mere star amongst billions. We are no more than the

product of evolution, one particular species out of countless millions whose only real claim to fame is our big brains with their ability to think and direct complex behaviour.

Over a few centuries, in particular from the seminal publication of Darwin's **The Origin of Species** in 1859 (which can be cited as the definitive turning point in our concepts of man's place in Nature), the ideological pendulum has thus swung through 180 degrees, from a position in which humanity was the crowning glory of creation to a position in which we are but speckish organic bystanders in an essentially pointless Universal exercise of physics and DNA-orchestrated biochemistry. Life is accidental, mostly hard and then you die - a tough fact, best swallowed with a large brandy.

To revert to the ancient view in which human life, and in particular human consciousness, is considered to be somehow significant therefore seems completely out of the question, a futile move serving only to stir up false hope in a Universe that basically 'just don't give a damn'. This is especially so if our only motivation is a dislike of current scientific reasoning. Only if such a new theory were driven primarily by direct conscious experience could it possibly hope to possess validity. And not just wishy-washy conscious experience either. The experience, if it were to bear upon notions of the ultimate nature of reality, would have to be remarkably compelling and potentially accessible to all. It would have to provide incontrovertible evidence that we have some significant role to play in the reality process. But could a direct conscious experience really afford us such an insight into the 'big question'?

Well, if we keep in mind that science proceeds through verifiable experimentation in which information is gained via perceptual experience and that we depend upon our conscious experience *however it should arise* to build models of reality, then it would indeed appear to be a possibility. Which is to say that new forms of conscious experience might well offer us a glimpse into the biggest questions that face our mortal existence. Which brings me to the central fact permeating this book, namely that conscious experience is *entirely mutable*. And herein lies the hope of any new optimistic theory concerning the significance of human consciousness within the reality process.

The mutability of consciousness. What does such a concept imply? Well, first of all we should consider the fact that consciousness, whatever it is exactly, is the 'stuff' which mediates all science and, for that matter, all types of reasoning and all of our theories about the world. Consciousness can therefore be understood as the very ground of our being, the 'factor x' which makes us what we are. In order to fully engage the reader in the important point I am here trying to convey, consider the following simple thought experiment.

Imagine, if you will, that all scientists wore identical spectacles and that these spectacles determined the perceptual view of the things being scrutinised by the scientists. All the data amassed by these scientists would be related in some intimate way to the effects of their spectacles since all their perceptions will have passed through the self-same lenses. Now, it isn't pushing credulity too far to suggest that the scientists would do well at some point - possibly over their morning coffee break, or perhaps at a stage when their theories are proving to be inadequate - to reflect upon the characteristics of their shared state of 'bespectacledness'. In other words, it would be quite a breakthrough for these scientists to suddenly cease their traditional research in order to focus upon the nature of the factor mediating their research, namely, their glasses. What they would soon come to realise is that their glasses represent a subject worthy of analysis since they are, in a sense, the closest thing to them.

This imaginary situation is not unlike the real world, only this time it is our consciousness, or rather our *state of consciousness*, as opposed to glasses, through which we view and experience Nature. For simplicity's sake, we can call this 'normal consciousness', a kind of shared lens through which science and scientific interpretation proceeds. Thus, it is quite legitimate to reflect upon this 'lens of normal consciousness' and ask whether, perhaps, it could be altered or *enhanced*. In other words, one might well wonder if it is possible to improve upon the lens of normal consciousness and attain a state of mind in which the essence of Nature is more clearly discernible.

Although one cannot escape these rather odd facts about consciousness and its role in interpreting Nature, science has had little to say about it, preferring to place the human mind safely outside of the theoretical picture of reality. Put simply, the phenomenon of human consciousness is a scientifically slippery and vexing anomaly that is in stark contrast to the more empirically approachable phenomena of, say, stars and molecules. Yet, since we are conscious beings whose minds literally interface with the external world, then until we understand the nature of the 'mindstuff' carried by our brains we will not be able to fully comprehend the nature of the reality process. This must be so since, as we have just established, consciousness is itself as much a part of reality as are the things perceived by consciousness such as the aforementioned stars and molecules. Indeed, if we were not conscious beings, then we would not be in a position to seek explanations about the nature of reality in the first place. It is only because we are conscious and because we stand in a definite relationship to the reality process that we feel compelled to account for our existence. Our conscious minds long for knowledge about the Universe so that we might understand both our place within the totality of existence and the natural forces which led to our being here. Hence the enterprise of science (which means 'to know').

Now, as I will show throughout this book, the reason why consciousness is mutable is because it is mediated by chemistry. Which is to say that mutable or transformable chemical processes underlie consciousness. In effect, this means that our normal ways of thinking are arguably *constrained* due to the chemical hardware (or wetware as it is sometimes called in neuromantic circles) of the brain. It is therefore conceivable that certain aspects of the world with which we interface remain hidden to us because of the limitations of our everyday type of consciousness and that if we wish to grapple with the ultimate questions concerning the nature of our existence then it is surely worthwhile to attempt to seek out *new forms* of perception, forms for instance in which all of perceived reality is grasped at once, holistically as it were, and not in the piecemeal fashion of science which, it must be said, tends to focus upon isolated parts of the world.

Historically speaking, altered forms of perception in which an overall view of reality is immediately discerned and felt in a kind of joyous flash of insight, are the sole domain of the religious mystic, those persons who claim, rather controversially and often with alarming vigour, to have directly experienced 'ultimate truths' about reality. Since most mystics and religious visionaries have employed various techniques with which to foster their insights like fasting, yoga, meditation, perceptual isolation etc, than this again testifies to the fact that the normal human brain is somehow constrained in its mindful activity and that the chemical system which does the constraining can be overcome or be bypassed by engaging in various so-called spiritual disciplines. For most of us, such esoteric endeavours, regardless of whether or not they *do* actually yield valid knowledge, are perhaps a little beyond our normal way of life, and we might therefore wish to stick with less suspect non-mystical science for answers to the big questions about reality.

However, there is another more immediate route to such *transcendental knowledge* as it is termed in philosophy. This route involves *the deliberate ingestion of naturally occurring entheogenic (psychedelic) plant and fungal alkaloids in order to access information inaccessible to the normal mind*. Traditionally, this little documented enterprise is engaged in by *shamans* or native healers who employ such psychoactive flora in order to gain transcendental knowledge which they then use for the benefit of their culture.

To this day, aboriginal shamans in places like Amazonia and Mexico still utilise the powerful effects of indigenous entheogenic plants and fungi in order to fulfil their shamanic healing role within their native culture. So strong can the revelational effects of such plants and fungi be upon the human psyche that they generally come to be deified. Such entheogens become a sacred link to divinity, almost as if they represent an organic modem directly on-line to the Gods. This was what luminary Aldous Huxley was writing about some 40 or so years ago in his cult classic *The Doors of Perception* in which he poetically

describes the fantastic perceptual enhancement which accompanied his ingestion of mescaline, an entheogenic alkaloid derived from the peyote cactus.

It is precisely because such entheogenic plants and fungi facilitate new forms of consciousness, and because this altered consciousness comes to experience reality in a radically new way, that convinced Huxley at least that they were genuinely useful epistemological tools (epistemology is the study of knowledge) with which to forge a deep understanding of the nature of the reality process. But, more than this, such illuminating changes in consciousness (perhaps the most illuminating) also offer us a way to understand consciousness itself, since one can analyse the subtle chemical changes accompanying the altered state of mind and then attempt to use such data to comprehend how normal consciousness works.

Thus, the virtue of investigating the perceptual effects of entheogenic agents is twofold. Firstly, through their dramatic action within the brain we might come to perceive Nature in a new and arguably more enhanced way. Secondly, we might come to understand more about the underlying chemistry which is bound up with normal conscious processes i.e. the *modus operandi* of entheogenic substances reveals the delicate chemical mechanisms which govern consciousness and our perceptions of reality. If through the study of entheogens we can understand more the interface between the mind and the 'world out there', then we shall know more clearly what consciousness is, how it is formed, and how it can come to experience transcendence. And if the transcendental information accessed in the altered state of consciousness has any truth value - and native shamans all testify to this - then we will be one step closer to an overall conception of what is driving reality. Only then might we apprehend Einstein's creator/killer, for then we would have begun to establish its ultimate nature. At least it sounds promising.

It is my contention throughout this book that naturally occurring entheogenic plants and fungi are indeed the key to solving the twin mysteries of consciousness and reality. Once ingested, they are intimately involved with the bridge between consciousness and the world around us. The numinous experience that they can induce, no matter how bizarre it might appear in the context of the mundane world and no matter what brain mechanism underlies it, is a real thing; it exists, potentially at any rate. As we shall see, what emerges when one investigates entheogens is that the archetypal tale of transcendence conveyed by the entheogen-using shaman results from a direct and verifiable experience.

It is on the basis of such verifiable experience that this book rests. The apparent capacity of the human mind to transcend 'normal' reality demands investigation, for it must surely be a tenable step toward reclaiming a significance for the existence of human consciousness in the Universe. However, if such an

enterprise is spurious and built of no more than ephemeral imagination then it will only point to the fact that the human imagination under certain chemical circumstances is extraordinarily creative. But it is my belief that entheogenic agents unleash a form of consciousness better able to grapple with the ultimate questions about the reality process than our normal frames of perception, that they truly offer us a glimpse of some great meaning hitherto the sole domain of the shaman and the mystic, a meaning only alluded to in the conventional religions of the world.

As I see it, if we are genuinely interested in the decisive nature of reality and the decisive nature of human consciousness then we are obliged to follow all and any paths of enquiry, and I would suggest that the untrammelled path laid out by entheogenic plants and fungi is, perhaps, the last viable route to evidence that shows that human consciousness is somehow central to reality. If instead this unusual path should prove to lead nowhere then we will be led back to the commonly accepted position in which human consciousness is not deemed to be of any prime significance. This book can therefore be read as an alternative user-friendly guide to the nature of reality which, should it prove to hold truth, can be seen as very good news. Very good news indeed.

So stand by for a controversial tale of a recently (re)discovered and naturally occurring consciousness-enhancing substance native to most parts of the Earth's Temperate Zone and what this substance reveals to us about the human mind and about the creative impetus driving the reality process. Fasten your seatbelts because if I have done my job correctly you are poised for a roller coaster ride into the heart of the mystery of existence. As the chapters unfold we will be gradually climbing up to a peak, from which we will suddenly race into a series of new and exhilarating ideas about human consciousness and about the nature of the Universe. By the end of the book I hope to have shown that the reality process is essentially *smart* through and through and that we conscious beings do indeed have a privileged role to play in its intentional unfolding. I assure you that this will become crystal clear as the chapters progress.

[Go to Chapter One](#)

CHAPTER ONE

CONSUMING GOD'S FLESH

On the 10th of June 1957 the international edition of *Life* magazine carried a groundbreaking article that was to profoundly alter the West's attitude towards the wilder side of the natural world. For here was the first ever personal account written by a European describing the extraordinary psychological effects induced by a mushroom deified and ritually worshipped by native Mexicans. Consumption of the sacred Mexican mushroom allowed one to contact the Gods, experience profound visions, and gain mystical knowledge. Or at least these were the most extravagant of the native Mexican beliefs about the mushroom being reported by anthropologists during the first half of the 20th century.

In pre-Columbian times the mysterious mushroom had been known by the Aztecs as 'God's flesh' testifying to its divine potency. Such veneration ensured the mushroom a cult status amongst native Mexicans despite the violent cultural upheavals wrought by the Spanish Conquest in the 16th century. Thus, although the once mighty Aztec culture was eventually destroyed, the sacred mushroom continued to be used in and around Mexico throughout the Spanish occupation. Yet despite the legendary effects of this peculiar species of fungus, it remained right up until the middle of the 20th century for an outside investigator to finally acquire and eat of the mushroom and hence verify the native's somewhat fantastic claims.

Transmitted solely by word of mouth since the time of the Spanish Conquest, detailed knowledge of the revered mushroom had lain principally in the hands of jealously guarding shamans or native healers who were loath to disclose their botanical secrets to outsiders. For they feared, perhaps justifiably, that the sacred mushroom's supernatural power would be diminished or be used profanely should the untrustworthy white man gain full admittance into its living mystery. Therefore the 1957 *Life* article in which the secret of the mushroom was openly exposed, dramatically symbolised the West's bypassing of this long-standing cultural security system. The sacred mushroom had now been forcibly plucked from its localised shamanic niche and thence presented to the Western world in the form of mass-circulated print with colour photographs and specimen drawings to boot.

Despite its exposure to the prying eyes of the West, the status of the Mexican mushroom remained as lofty and as tantalisingly ethereal as ever, more so even since the Western psyche was just as stunned and awed by its transcendental visionary effects as were the indigenous Mexicans. In the following decades a psychedelic mushroom cloud of fascination would slowly expand and loom beyond Mexico, eventually extending its magical influence as far away as Europe and North America.... but at this initial stage in its sudden growth, the strange mushroom remained a purely Mexican phenomenon.

On the front cover, *Life's* simple headline read *The Discovery of Mushrooms that cause Strange Visions*, a rather unusual claim from such a traditionally conservative magazine. The article was included as part of *Life* magazine's series of *Great Adventures*, and was written by Robert Gordon Wasson, vice-president of a Wall Street banking firm who, with the aid of his wife, had spent some 30 years of part-time study creating a new scientific discipline - ethnomycology - the study of the cultural and historical use of fungi.

Although such a science is clearly specialised and seemingly remote from the affairs of modern culture, it was only due to their dedicated ethnomycological investigations that the Wassons learned of sacred Mexican mushrooms, sought to find them, experienced them first-hand, and thence gave psilocybin (the as yet unnamed active constituent of the mushroom, pronounced either 'silla-sigh-bin' or 'sigh-le-sigh-bin') to the West. Once discovered, ethnomycological science suddenly acquired a distinctly mystical edge allowing it to breach the domains of religion and psychology. It also provided a new impetus to mankind's enduring quest to access transcendental knowledge and there can be no doubt that Wasson's discovery and vivid description of the effects of the psilocybin were crucial in generating the subsequent cultural wave of psychedelic experimentation that soon followed in the 60's. Moreover, as we shall eventually see, the mushroom also reveals itself as the key to unveiling the secrets of consciousness and the hidden riches of Nature. Theophany, mind, and reality; these three most profound of topics are all met in some way through use of the psilocybin mushroom. But, before we jump into the deep end who, pray, was this Wasson fellow, this financier-cum-adventurer, and how had he come to penetrate the Earth's secret psychedelic dimension? Who was he to bring news of sacred fungi into the Western world?

In effect, Wasson's *Life* article was timed to coincide with the release of his magnum opus 2-volume book *Mushrooms, Russia, and History*, co-written with his wife Valentina. It is this work which fully reveals the extent of Wasson's long-standing interest in the cultural use of fungi and how he finally came to be at the door of perception marked 'psilocybin'.

With only 512 handcrafted copies luxuriously bound and printed, *Mushrooms, Russia, and History* stands as a rare piece of art. Indeed, by the late 70's its value had reached some \$2500 making it the most valuable book in existence at that time whose author was still alive. It is a highly polished book, written in a lively style that reflects the love of ethnomycology borne by the Wasson's. It represents the distilled wisdom drawn from their extensive studies into the role that various species of mushroom played in different cultures and culminates in their discovery of the sacred mushroom ceremonies still being conducted in Mexico, a discovery important enough to warrant the further account in the more accessible pages of *Life* magazine.

A TRAIL BEGINS

The event that originally launched the Wassons on their mushroom crusade was simple, almost trivial, yet it was enough to provoke them into a three-decade-long bout of invaluable research. The Wassons married in 1927 and one day during their honeymoon decided to take a casual stroll in the Catskill mountains of New York. At some stage Valentina, who was Russian by birth, had stopped to pick some wild mushrooms, delighting in such a fortuitous find. Her husband on the other hand, being true to his Anglo-Saxon heritage, was appalled at his wife's avid interest in lethal fungal abominations, especially since she planned to cook and eat them later. After all, were not all fungal growths poisonous toadstools to be avoided like the plague? With growing dismay, Robert Wasson imagined himself waking up the next morning with a corpse instead of a wife.

This pronounced and deep-rooted difference in attitude between the two of them over the culinary virtues of fungi led them to suspect a cultural rift, that there were mycophobic peoples (sensible mushroom haters like the Anglo-Saxons) and mycophilic peoples (reckless mushroom aficionados like the Russians). Furthermore, the Wassons reasoned that there must be some historical reason for these diametrically opposed traditions, due not to something like food availability but rather to cultural and psychological factors. Thus began the Wasson's academic quest to explore this seemingly minor cultural anomaly. From the start both figured that religion somehow played a causal role.

Their intuition proved correct. Research soon unearthed the Siberian cultural history of the *Amanita muscaria* or fly agaric mushroom, that extraordinary bright red and white-spotted autumnal fungus found throughout the Northern hemisphere and often charmingly depicted in the illustrations adorning the pages of children's books. Indeed, it has been suggested that Lewis Carrol was influenced by knowledge

of the Siberian use of the fly agaric and used the information to great effect in his *Alice's Adventures in Wonderland* in which, you might recall, Alice nibbles on a mushroom which subsequently alters her size.

As we shall see, compared to the psilocybin mushroom, the fly agaric's psychoactivity rates a poor second though it is potentially entheogenic due to the presence of an alkaloid named muscimole. Despite muscimole's entheogenic inferiority to psilocybin, the cultural role and use of the fly agaric mushroom amongst Siberian shamans is beyond dispute and the Wassons uncovered a wealth of literature testifying to this fact. The historical data concerning the shamanic use of the fly agaric mushroom proved to be a link to primitive religion just as the Wassons had originally foreseen, and it soon became clear to them that psychoactive fungi were no small feature of cultural history.

ECHOES OF A SHAMANIC BEAT

Since the time of Tsar Peter the Great (1672-1725), the Kamchatka Peninsula, the most Eastern part of Russian Siberia, had been visited by travellers, political exiles, explorers, fur traders, and anthropologists. All were to bear witness to the nomadic reindeer herders who ritually ingested fly agaric mushrooms (their only intoxicant) in order to obtain contact with the spiritual dimension. The word 'shaman' itself derives from the Siberian Tungus 'saman' which means diviner, magician, doctor, creator of ecstasy, the mediator between the human world and the supernatural.

The Siberian fly agaric user would sun-dry the mushrooms and later ingest them either alone or mixed with milk or water. If taken alone, the mushroom would first be moistened in the mouths of women who would produce a kind of pellet for the men to swallow.

The effects of consuming this mushroom included convulsions, delirium, visual hallucinations, perceptual distortions of size, feelings of superhuman strength, and a perceived contact with a numinous dimension, this last effect being the most important for the practising shaman whose predominant function is to access the spiritual realm in order to attain supra-mundane knowledge for the good health of his or her tribe.

The most bizarre aspect of this shamanic tradition however, was the habit of.... (readers of a frail disposition should skip the next few sentences).... urine-drinking. Somehow, the Siberians discovered that the active ingredient of the mushroom, muscimole, passed through the body without being metabolised so that by drinking fly agaric-spiked urine one could prolong intoxication. Possibly the Siberians learned of this odd fact by observing reindeer who not only reputedly eat the fly agaric themselves with much gusto, but also have an equal passion for human urine, so much so that the Siberians reindeer herders considered it dangerous to pee out in the open!

The rather disturbing and unpalatable practice of drinking psychoactive urine attained great significance in Wasson's later work in the 60's since urine-drinking is mentioned in the *Rig Veda*, the ancient religious scripture of India. Written in Sanskrit and derived from the oral traditions of the Indo-Europeans who migrated down into the Indus Valley some three and a half thousand years ago, the *Rig Veda* eventually went on to influence the development of Hinduism.

Of the 1000 holy hymns in the *Rig Veda*, over 100 are dedicated solely to the divine plant Soma and it's spectacular psychological effects. Because urine-drinking is clearly alluded to in these hymns deifying Soma and from analysing its poetic description, Wasson came to the conclusion that the fly agaric mushroom was the sacred Soma worshipped by the ancient Indo-Europeans. Indeed, in some parts of India, followers of the Vedic tradition still perform a religious ceremony in which Soma is ingested only they now utilise an inactive surrogate species of plant. Wasson's identification of Soma was, at the time he made the claim, one of only a handful of serious attempts to explore and name the legendary Soma plant, and his identification has generally come to be accepted by Vedic scholars to this day.

MUSHROOM LORE

The shamanic use of fly agaric mushrooms by primitive Siberians seemed to date far back into history as there were various legends that spoke of its mythical origins. For instance, a Koryak legend tells of a hero named Big Raven who was able to attain immense strength by eating spirits given to him by the god Vahiyinin - the god of existence. By spitting upon the earth, Vahiyinin caused the necessary spirits to grow, these being fly agaric mushrooms with their ability to provide supernatural strength and wisdom.

The Wassons theorised that it was this archaic shamanic practice of fly agaric ingestion, so well reflected in legend and mythology, that had eventually lead to the mycophobic pre-Christian taboos against eating mushrooms which were still evidently shared by most of the peoples living around the shores of the North Sea. In other words, since the mushroom was used mainly by shamans in a ritual context, cultural injunctions and taboos would conceivably have begun to evolve in order to stop others wantonly utilising it's strange power. Or, it is just as likely that through migrations and invasions misinformation spread regarding the true nature of the mushroom's effects. Through such typical cultural mechanisms as these, the psychoactive fly agaric mushroom gradually came to attain a mythical status, guaranteeing it cultural immortality as it progressed as the stuff of legend from generation to generation.

As it's shamanic use diffused out from Russia, whilst some peoples gradually came to eschew the mushroom, others embraced it's effects. Not only did the Aryan people who migrated down into the Indus Valley 3500 years ago bring with them their religious cult of Soma, later still, some 1000 years BC., we find artistic representations of mushrooms on Swedish, Norwegian and Danish Bronze Age objects. On bronze artefacts like razors have been found mushroom motifs (generally stylised cross-sectional views of a mushroom) which depict the mushroom in a way that suggests that it was an object of worship. Since the fly agaric mushroom abounds in Scandinavia, these motifs are thought to represent a similar fly agaric-worshipping cult to those of Siberia.

Apart from Siberian folklore many European folktales also testify to the enigma of the fly agaric mushroom, providing an echo of the distant cultural interconnections of the past. Yugoslav peasants take the mushroom's supernatural origin back to the time of pre-Christian Nature gods. The legend relates that Votan, chief of all the gods and a potent magician and healer, was riding his magical horse through the countryside when suddenly demons appeared and started chasing him. As he fled, his horse galloped so fast that flecks of bloodied foam flew from its mouth. Wherever this bloody foam fell, fly agarics sprang up.

Hungarians call the fly agaric 'boland gamba' or the 'mad mushroom'. Austrians and Germans used to speak of the 'fool's mushroom' and were wont to paraphrase British comedian Tony Hancock's "have you gone raving mad?" with "have you eaten crazy mushrooms?"

The Wassons also analysed the vast array of words used to describe mushrooms in different cultures and the latent metaphors that such words conveyed; words like 'toadstool' for instance which links the toad to the mushroom, the toad being a creature much maligned in myth and folklore. The Wassons also

conjectured that the 'fly' in fly agaric was not due to its supposed insecticidal effect but because the fly used to be associated with demonic power (Beelzebub is 'Lord of the Flies'), and was thus fearfully associated with the mysterious mushroom.

In short, the Wassons uncovered a vast cultural diffusion of homogeneous mushroom lore indicative of a common origin, the psychoactive fly agaric mushroom most likely being the instigator. Wasson later summed up his views in the following way:

"Death will come if the layman presumes to eat this forbidden fruit, the Fruit of Knowledge, the Divine Mushroom of Immortality that thepoets of the Rig Veda celebrated. The fear of this 'death' has lived on as an emotional residue long after the shaman and his religion have faded from memory, and here is the explanation for the mycophobia that has prevailed throughout Northern Europe, in the Germanic and Celtic worlds."

At this point the Wassons might well have ended their mycological investigations, an interesting enough climax since they had left the fungal world and ventured into the domain of primitive religion. The plot however, was going to thicken as the fly agaric became overshadowed by the far more powerful figure of the psilocybin mushroom, a mushroom whose living mystery Gordon Wasson would eventually confront within the inner sanctums of his soul.

INTIMATIONS OF A SACRED MEXICAN MUSHROOM

In 1952 an acquaintance of the Wassons, the noted poet and historical writer Robert Graves, wrote a crucial letter informing them of a supposed secret mushroom cult still in existence in Mexico. Graves included in his letter a clipping from a Canadian pharmaceutical journal which discussed finds made by Richard Evans Schultes years earlier. It transpired that Schultes, one of the world's leading ethnobotanists attached to Harvard had, in 1938, identified a species of *Panaeoleus* mushroom as being the sacred sacrament allegedly employed by Mexican Indians. At that time, only this one entheogenic species had been identified by Schultes and although a few European people had observed a native Mexican mushroom ceremony, no outsiders had been permitted to partake of the mushroom itself. This is significant, for without actually personally experiencing the psilocybin mushroom, one can only guess at its effects and therefore the early anthropological observations passed by without much interest.

Once the Wassons learned of these beckoning facts, armed as they were with an already detailed knowledge of fly agaric mushroom history, it was only natural for them to heed Graves' investigational indications and focus their attention upon Mexico. If mushroom ceremonies were still being practised there then it would be testimony to the shamanic use of fungi not limited to the pages of history.

Through associates, the Wassons were soon in avid correspondence with one Eunice Pike, an American linguistic student and bible translator (which is short for missionary) who had been living amongst Mazatec Indians in Huautla, Mexico for over 15 years. Having become familiar with the native customs and beliefs about certain sacred mushrooms, she was only too willing to share her knowledge with the Wassons.

Miss Pike informed them by letter that one Indian boy had referred to the mushroom as a gift from Jesus, no less than the blood of Christ. The Indians also said that it helped 'good people', killing 'bad people' or making them crazy. Furthermore, the Indians were sure that Jesus spoke to them whilst in the 'bemushroomed' state. Everyone whom Pike asked agreed that they were seeing into Heaven itself through the mushroom.

As well as highlighting the on-going integration of the Christian faith into native Indian culture, the Indians' claims indicated that the mushroom was highly powerful in its psychological effect, able to induce a radical alteration of consciousness still relatively new to Western science. It was also clear that the normal procedure was for a 'wiseman' or shaman to eat the mushroom on behalf of another usually in order to heal, this being the classic social function of the shaman found in most of the world's native cultures.

Miss Pike ended her initial informative and tantalising letter by wishing that the natives would consult the bible instead of resorting to consumption of the strange mushroom, a remark natural enough to anyone concerned with preaching the bible and unfamiliar with the psychological territory accessed through psilocybin. But still, is it not odd that someone so obviously religiously inclined, as this woman was, should not have detected something of spiritual importance in the Indians' claims? If so many of them readily attested to the virtues of the sacred mushroom why did she not try them for herself? After all, she mentions no harmful effects apart from the dangers of possessing a 'bad heart'.

What is the nature of this fear which would prevent a single open-minded experiment with such fungi? How can one claim to be fully religious and not take the testimonies of shamans seriously? This was an anomaly which was to continually crop up in the relations between the Western psyche and the mushroom. Psilocybin would come to generate absolute awe or absolute rejection in those who confronted it, which is evidence that something significant is at work in the actual experience. If there was nothing of real interest to be gained from such visionary substances, if the experiences were purely limited personal fantasies, then there would be no stimulative force with which to generate enduring fascination. However, as I will show, many have claimed that psilocybin does offer some great knowledge about our existence, that it can yield soulful insights about reality. This is why the psilocybin mushroom experience has remained such an abstruse phenomenon and why opinions are so divided.

Sensing in the letter of Miss Pike's that there was indeed some great revelational discovery to be made, the Wassons decided to travel as soon as possible to Huautla, and in 1953 they did so. There could be no mistaking the aroma of the ethnomycological Holy Grail as they neared its living presence. As an aside, they also realised that to judge from Miss Pike's description, the mushroom being used by these Indians was not the *Panaeolus* species previously identified by Schultes, and this was a further reason for scholarly investigation.

GETTING WARMER

By August 1953 the Wassons had managed to enlist the help of a Mexican curandero or shaman and this was an achievement in itself since the Indians were reluctant to discuss the mushroom with European outsiders. Under the pretence of wanting supernaturally inspired news of their son, the Wassons were permitted to take part in a mushroom rite in which the shaman would ingest sacred mushrooms in order to gain the requested information. Unfortunately the shaman was the only person allowed to consume the fungi and the Wassons were forced to remain uninitiated.

The shaman, under the effects of psilocybin, made 3 specific predictions concerning Wasson's son which, at the time, he (Wasson) politely humoured as he had no real inkling into psilocybin's latent ability to produce feats of clairvoyance. His interest was, after all, still predominately academic and any kind of supernatural utterances were to be taken with a large pinch of salt. As it later transpired, all 3 of the

shaman's predictions were borne out and Gordon Wasson was at a loss to explain this. Was it coincidence? Or was it a genuine case of the paranormal? Whatever it was, the mysterious mushrooms demanded closer scrutiny for they seemed to promise much more of interest. Wasson was being drawn ever nearer, as his lifelong adventure drew to an epic climax.

A fully detailed witness account of the above mushroom ceremony was to be the culminating chapter of *Mushrooms, Russia, and History*, though just as the book was going to press in June of 1955 a new breakthrough was made. In fact, it was the ultimate breakthrough and became the highlight of Gordon Wasson's scholarly career. It also generated another chapter in the book and the seminal piece for *Life* magazine. The middle-aged New York banker-turned-ethnomycologist became the first white man on record to deliberately consume sacred Mexican mushrooms and thus taste the entheogenic glory of natural psilocybin. He had sought and finally accessed one of the most remarkable experiences to be had upon this Earth, and thanks to his lifelong persistent efforts our enduring quest to uncover the true nature of reality and the true bounds of conscious experience became suddenly enhanced as psilocybin made it's extraordinary psychedelic presence felt. Indeed, for our purposes, it is rather apt that our man Wasson be provided with such an informative and illuminating meal at this time - almost an Earthly calling-card in fact - as only a few months earlier Nature had consumed the great Einstein. At least it was apt in a relative kind of way for anyone deeply interested in the subtle-yet-never-malicious force of such a wily killer/creator as Nature...

THE MYSTERY EXPLODES INTO LIFE

In telling of his experiences in *Life* magazine, Wasson comes across as a kind of Prometheus figure, bringing the world news of a hitherto secret gift of the Gods. Amongst dreamy 50's Technicolor photographs and numerous advertisements for miracle filter cigarettes and brands of alcohol, Wasson's article shines out like some otherworldly beacon signalling the awesome visionary power latent within the Mexican mushroom. We can only guess at the amazement that this article must have evoked in the psyche of a reader soaked in 1950's thinking and values. This was the decade of Cadillac's, rock'n roll, television, and electronic gadgetry, a decade in which the post-war generation could live happily upon the bountiful fruits of consumerism. Having recently conquered both Everest and the secret of the atom, Man seemed truly on the ascent. Unlimited atomic energy and unlimited material growth were on the cards. Nature had been tamed and set to work for our own ends.

Of course, what no-one realised at this time was the devastating effect upon the environment that such a

material culture would wreak. As yet unconceived in holistic organismic terms, the natural environment was a place to take the kids at the weekend, not the grounds for concern let alone the grounds for a bizarre shamanic consummation. And, after all, weren't shamans just primitive witchdoctors who spouted all sorts of unsophisticated nonsense? It must therefore have been with some surprise that *Life's* readers found themselves being informed about visionary fungi, a facet of the environment still wild and untamed which spoke of a very different kind of reality to that of the American dream.

Deep in the south of Mexico in a small village in Oaxaca, Wasson recounts to the readers of *Life* how he had once more gained the confidence of a local shaman, a woman named Maria Sabina under whose guidance he was allowed to ingest sacred mushrooms. Judging from the photographs included in his account, the house where the ceremony took place was small and sparsely furnished, with various Christian icons on display. The paucity of modern furnishing however, was to belie the luxuriousness of the visionary experience that followed the ingestion of the mushrooms, the surroundings all but melting into insignificance.

At 10.30pm Wasson received six pairs of mushrooms from Maria Sabina as she commenced the auspicious rite. At long last he held the elusive mystery in his trembling hands. Tangible and open to physical analysis the fungi were no native myth or figment of the imagination. But what of their legendary effect? All theory and hearsay became vanquished as Wasson ate his destiny.

Like all good empiricists Wasson determined to remain objectively aloof and ward off any major psychological effects in order that he study more clearly the nature of the legendary shift in consciousness engendered by the mushroom. As noble as such efforts are however, they generally prove futile in the face of potent entheogens as one is forced to wholly succumb to the emergent global alteration in mentation.

As he lay in the dark confines of the hut, the power latent within the mushroom gradually introduced itself to Wasson's consciousness. Visions began to unfold before his eyes, visions so intense and so profound that they breached the ineffable realms of religious mysticism. They began as vividly coloured art motifs of an angular nature as found on textiles and carpets. Then the visions began to evolve into resplendent palaces and gardens laid over with precious stones. At one point, Wasson perceived a great mythological beast drawing a regal chariot. Still later it seemed as if his spirit had broken free from the constraints of his body and lay suspended in mid-air viewing vast mountains rising up to the Heavens. Wasson confessed that the sights were so sharp and clear as to be more real than anything that he had

previously seen with his eyes, somewhat akin to archetypes and the Platonic realm of Ideas.

In *Mushrooms, Russia, and History*, Wasson's description of his visionary experiences is more explicit than in the *Life* piece. What had started out as a unique work of ethnomycology touching upon ancient Siberian shamanism, had now transformed itself into a personal testimony to the mystical shamanic experience. Coming from a man normally concerned with the world of finance, this is a truly remarkable turn of events, even the more so since he was not overtly religious. It was also the case that any of Wasson's residual mycophobia had now been utterly obliterated as the incontrovertible truth of psilocybin-induced shamanic ecstasy seized his soul. The sense of awe, the sense that he had been witness to an event of staggering cultural significance radiates these more detailed accounts, the book subsequently ending as a veritable religious treatise.

At one point during the mushroom ceremony Wasson thought it as if:

"...the visions themselves were about to be transcended and dark gates reaching upward beyond sight were about to part, and we were to find ourselves in the presence of the Ultimate. We seemed to be flying at the dark gates as a small swallow at a dazzling lighthouse, and the gates were to part and admit us. But they did not open, and with a thud we fell back gasping."

Although the visions lasted only a minute or so by watch, Wasson noted that he experienced them as having an aeonic duration as though he had passed out of the confines of normal time. He was also certain that the visions originated from either from the Unconscious or from an inherited source of racial memory, concepts borrowed from the work of Carl Jung with which Wasson was obviously familiar. He readily conceded that the intense visionary episodes arose within him, yet they did not recall anything previously seen with his own eyes. He wondered if maybe the mushroom visions were a subconscious transmutation of things read, seen, and imagined, so much transmuted that they appeared to be new and unfamiliar. Or, mused Wasson, did the mushroom allow one to penetrate some new realm of the psyche?

I assume here that Wasson was referring to something more than a personal Unconscious, and more like an organised field of intelligence or a transcendental sentience of some sort, interpreted by native shamans as a Great Spirit or God. Wasson failed to elaborate upon this matter, preferring to stick to more acceptable ideas and he ventured no further than Jungian territory in his enthusiastic speculation.

Wasson was also struck by the fact that the dazzling visionary material engendered by the mushroom must reside somewhere within the mind, in a kind of latent state until the mushroom's psychoactive constituents stirred them into activity. But how, he wondered, could it be that we could all be carrying around an inventory of such wonders deep within us, wonders that the mushroom could unleash so spectacularly? Perhaps, he suggested, some creative faculty of the brain was stimulated by the sacred mushroom and that this capacity for creative thought was somehow linked to the perception of the divine.

The visionary effects of the mushroom, so clearly related in some way to the experiences of religious mystics, also suggested to Wasson that such fungi might be connected in some significant way to the very origins of the religious impulse, an idea he first introduced in the *Life* piece and which he would constantly return to for the rest of his life. Wasson asks us if perhaps the idea of a deity arose after our primitive ancestors first consumed psychoactive mushrooms, surely a compelling scenario if we are pushed to explain the origins of religious mysticism in essentially physical terms. He was later to help coin the contemporary word entheogen to refer to these sorts of plants and fungi, a word which, although devised to mean 'becoming divine within', is more often considered to mean 'generating the divine within'.

Readers of the *Life* article were also informed as to what the Mexican Indians themselves had to say about the mushroom. The Indians claimed that they "carry you there where God is". Always the mushroom was referred to with awe and reverence. They were not some common drug like alcohol to be taken at the drop of a hat in order to drown one's sorrows or deaden oneself to reality. On the contrary, the Indian shamans used the fungus for oracular reasons in order to cure and prophesy. Wasson was intimately familiar with the Indian's sacred traditions and he was at pains to portray this cultural phenomenon to his readers in the respectful light it deserved. No Indian ate the mushroom frivolously for excitement, rather they spoke of their use as "muy delicado", that is, perilous.

A deeply inspired man, Wasson was not only the first Westerner to document the psilocybin experience, he was also the first to try and account for the mysterious effects in reasonable psychological terms, his tentative speculations all remaining valid today. It is remarkable to think that had he not had such a profoundly spiritual experience, or had his mind not been able to cope with the onslaught of a visionary dialogue, then the Mexican mushroom might well have remained a buried phenomenon to this day. Fortunately for us, this was not so and the entheogenic mystery is very much alive and 'unleashed', and,

as will later become clear, is nearer to us than we might suppose.

Regarding Wasson's brave attempts to provide a reasonable explanation for his experiences, I will deal with what is currently known about 'the neuropsychological how' of psilocybin in later chapters. For now it is enough to recognise that the mushroom had proved itself to be the psychological analogue of physical fire, its dazzling effects able to brush and enliven the very soul of *Homo sapiens*.

To simply dismiss Wasson's visionary encounter as no more than the drug-induced fantasy of a middle-aged man is to miss the point completely. The significance of such a natural entheogenic experience for psychological science alone is enough to warrant our attention since psilocybin is clearly able to galvanise highly constructive systems of thought and emotion into action - that much can be said at the absolute least. Any substance able to evoke an organised flow of symbolic information seemingly issuing from somewhere outside of one's sense of self, or ego, has got to be worth studying, especially if the experience appears more real than real. And as far as the roots of the religious impulse and the actual experience of sacred transcendence is concerned, if we are truly interested in such things, if we are truly concerned with perceiving our existence in a way that is beyond the confines of a culturally-conditioned secular perspective, then we should surely have cause to consider the visionary mushroom experience. Whereas the most limited explanation for this psychological phenomenon, say in terms of creative imagination on an unprecedented scale, is still immensely important and fascinating, the more radical and speculative scenarios - which seem compelling when one has personally tasted such exhilarating forms of consciousness - offer an even greater and more brilliant conceptual view of reality.

It is here, in the personal impact of the psilocybin experience upon one's perceptions of reality, that the importance of Wasson's work resides, for he was able to verbalise his psychedelic encounters in a way that captured their compelling and alluring character. Wasson had evidently shown how sacred realms of experience were not to be found in churches or in the blessings of popes and priests, but could be accessed through the consumption of entheogenic fungi. Wasson had effectively lain such a natural option at the feet of the modern world.

At the end of his seminal account, Wasson discusses the accessibility of the mushroom-induced visionary realms to large numbers people whose psychological disposition was perhaps not in the same league as traditional visionaries like, for example, the poet William Blake. If Wasson was able to briefly become a visionary through eating a simple mushroom then no doubt others would want to follow suit. This inevitable social consequence of his tale was to become manifest in the next decade to a degree that he

could never have anticipated, for his news of visionary fungi was instrumental in attracting the West's interest toward entheogens. As Blake had written, once the doors of perception were opened then the infinite beauty of reality could be perceived. Whether he had planned it or not, Wasson, like his contemporary Aldous Huxley, now had his foot firmly set between those perceptual doors.

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As yet unnamed, its chemical structure still unknown, psilocybin thus began its gradual infiltration of the modern technological world, flowing for the first time in and out of European human nervous systems, facilitating a spectacular kind of cerebral information processing in which the blazing divinity of Nature was potentially discernible. The world would never be the same again, as intellectuals, artists, and spiritual seekers with the aid of the psilocybin mushroom began scratching away at the restricted surface of normal everyday awareness. Such intrepid peering beyond the confines of routine perception seemed to reveal much, much more in the way of reality, allowing access to information of the most stimulating and enchanting kind, as if the mushroom was able to offer up all of Nature's best kept secrets.

However, despite the widespread interest generated by his *Life* piece, Wasson later chose, perhaps wisely, to distance himself from the 60's psychedelic hippy culture revolving as it was around synthetic LSD. Instead, he concerned himself with investigating the role of the fly agaric mushroom in ancient Indo-European Soma cults. He also went on to make invaluable contributions to our knowledge about the use of psilocybin mushrooms by the Aztec and Mayan civilisations of ancient Mesoamerica, and we shall now step briefly back in time in order to view these historical entheogenic traditions before bringing the history of psilocybin fully up to date.

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CHAPTER TWO

AN ANCIENT FORM OF COMMUNION

The discovery of the shamanic use of psilocybin amongst contemporary Mexican Indians was indicative of a sacred tradition that, although almost buried, had its roots firmly set in the glories of past civilisations. In particular, the great Aztec empire had been familiar with the mushroom and the various documents written by Spanish Conquistadors almost 500 years ago which mention mushroom use by the Aztecs, can be re-analysed according to what we now know of the actual entheogenic experience. Psilocybin emerges as no mere incidental feature of the natural world restricted to secretive and isolated use, rather its ritual role as a potent sacrament was overtly established within the very fabric of ancient Mesoamerican society. Until, that is, it came under the merciless gaze of the Catholic Spanish conquistadors.

The Aztecs were an immensely powerful civilisation whose cultural achievements are ranked by some in the same league as those of ancient Egypt and Babylonia. Religious ideology permeated all aspects of Aztec society, driving them to conquest and expansion and giving rise to their infamous bloody human sacrifices on a scale that cannot fail to shock.

Located in the Central Valley of Mexico, the Aztec capital Tenochtitlan (now Mexico city) reached its peak of power and magnificence immediately prior to the arrival of Hernán Cortés and his gold rushing Spanish army in 1519. With the advent of the Spanish conquest, all aspects of Aztec religion including the use of the psilocybin mushroom were systematically wiped out, being condemned as devilish heresy.

To the invading Spanish clergy, the Aztec's claim that certain mushrooms (some two dozen psilocybin-containing species are indigenous to Mexico) were *teonanacatl*, or 'God's flesh', was to admit to some blasphemous unholy communion. In the Roman Catholicism touted by the marauding conquistadors, communion with the divine was not based upon personally revealed knowledge or gnosis. Absolutely

not. Rather it was the case that 'inside' information concerning the divine was considered acceptable only if one was connected to a formally established religious hierarchy within which accepted, without question, its most cherished doctrines.

In other words, the organised drive of Catholicism which descended upon the Aztec nation derived its power structure through force-feeding religious dogma to its adherents. To openly question such dogma, or to criticise it, could and did mean death 500 years ago. One is therefore hard pushed to conceive of a more heretical act than that of the Aztecs consumption of supposedly divine fungi. The Catholic Spanish clergy, eager to spread their faith, would have been utterly appalled at the concept of eating some foul and unsightly fungus in order to commune with the Gods. As we shall see, this negative reaction was clearly reflected in the lively written Spanish accounts of Aztec customs.

The intense disgust generated within the orthodox religious minds of the Spanish priests echoes the hatred meted out to the women accused of being satanic witches in medieval Europe as they too were found guilty of possessing heretical botanical knowledge. Whereas the Aztecs employed psilocybin mushrooms in order to induce numinous states of awareness, the witches of the Middle Ages achieved similar states using plants like henbane and belladonna. Historically it would seem that all such occult practices with plants and fungi unfortunately generate the same type of response in the male psyche of the dominator culture eager to perpetuate its own ideology, namely, unremitting persecution. The Aztec religion succumbed to just such a fate.

THE CATHOLIC CONSTABULARY TAKE NOTE

The Aztec's use of psilocybin is clearly revealed in many of the records made by Spanish chroniclers at the time of the conquest who diligently recorded their observations and began translating Aztec historical documents. For instance, during the coronation of Montezuma the second in 1502, we learn that teonanacatl was consumed during the celebrations. Many war captives were slaughtered to honour the new king, their hearts torn out and offered to the gods. After the grisly sacrifices, the celebrants were bathed in blood and then given raw psilocybin mushrooms to eat.

Perhaps it was this kind of terrible juxtaposition that helped the finger of heresy point toward the mushroom. After all, a mass bloody sacrifice followed by some strange ritual fungal inebriation is a

hellish concept to the West, yet it was bound up to the Aztec's desire to supplant their pantheon of gods. Blood spilled in the name of religion whether through war or sacrifice is, unfortunately, a kind of pious tradition that highlights the immense power of the religious impulse over the minds and souls of men. The gods of the Aztecs were deemed real, they had to be worshipped and placated.

At any rate, the Aztecs utilised psilocybin in their religious rituals as well as engaging in various other rites that would have appeared horrendously alien to the invading Spanish who were unlikely to react in the manner of refined social anthropologists. The excessive sacrifices together with the deliberate intoxication with mushrooms must have sorely confused the Spanish invaders. For whilst they were at once amazed at the glorious wealth and regality of the Aztec cities that they encountered, they were less enthusiastic about the underlying psychological forces which had lead to the physical magnificence set in stone.

Further accounts from the occupying Spanish clergy reveal the Aztec's use of psilocybin. Diego Duran, a sixteenth century Dominican friar translating a Nahuatl (the language spoken by the Aztecs) document, writes of the coronation of Tizoc in 1481:

"And all the lords and grandees of the provinces rose, and to solemnise further the festivities, they all ate of some woodland mushrooms, which they say make you lose your senses, and thus they sallied forth all primed for the dance."

On the aforementioned coronation of Montezuma, Duran tells us:

"The sacrifice finished and the steps of the temple and patio bathed in human blood, they all went to eat raw mushrooms; on which food they went out of their minds, worse than if they had drunk much wine; so drunk and senseless were they that many killed themselves by their own hand, and, with the force of those mushrooms, they would see visions and have revelations of the future, the Devil speaking to them in that drunken state."

Because of his own personal experiences with psilocybin, and in the light of his historical research which clearly shows the Aztec's reverence for teonanacatl, our mushroom expert Wasson came to the conclusion that Duran was imposing his own views on the matter in order to further abominise the mushroom practice. Which is to say that to identify the Devil at the heart of the psilocybin experience was an interpretation peculiar to the psyche of this 16th century friar. With his particular theological training he would have had no choice but to sniff the sulphurous traces of the Devil in the Aztec's unusual entheogenic rites. Duran's reading of psilocybin-inspired suicides from the Nahuatl texts is therefore more than likely exaggerated translation than actual fact.

Another friar, the Franciscan Bernardino de Sahagun, also left us an account of native mushroom use. In the *Florentine Codex* he writes of a merchant's celebration:

"At the very first, mushrooms had been served. They ate them at a time when, they said, the shell trumpets were blown. They ate no more food; they only drank chocolate during the night. And they ate the mushrooms with honey. When the mushrooms took effect on them, then they danced, then they wept. But some while still in command of their senses entered and sat there by the house on their seats; they danced no more, but only sat there nodding."

On the face of it, this would seem to be a less biased portrayal of psilocybin use, though in the following report, also by Sahagun, he soon slides into the familiar tabloid-like sensationalist mode whilst describing mushroom use:

"It is called teonanacatl. It grows on the plains, in the grass. The head is small and round, the stem long and slender. It is bitter and burns; it burns the throat. It makes one besotted; it deranges one, troubles one.... He who eats of them sees many things which make him afraid, or make him laugh. He flees, hangs himself, hurls himself from a cliff, cries out, takes fright."

Such scare stories are parodied by the rumours that surrounded LSD use in the sixties. People were supposedly hurling themselves from high-rise apartments and foolishly attempting to stop motorway traffic by the power of thought alone. In actuality, of all the millions of doses of LSD taken in the 1960's there were only a handful of deaths through misadventure resulting from LSD's effects. It appears that any psychedelic substance with a powerful mystique seems to instil fear in those who are unfamiliar with

its effects and who are easily threatened by the unknown. Moreover, such fear often precedes persecution and the spreading of inaccurate information, which is why it is so important to have an unconditional flow of informed, hysteria-free knowledge regarding the psychological action of visionary plants and fungi. One hopes then, that we live in more enlightened times. The fact remains however, that the Aztec's use of psychoactive agents, which included the use of other entheogenic agents like the morning glory plant (whose seeds contain LSD-related compounds), proved to be so abhorrent to the Spanish that they sought to drive the all such practices to extinction.

That they were successful in forcibly burying the mushroom is made clear by the academic events in the early part of this century, since it was erroneously believed that there never were any intoxicating mushrooms to be found in Mexico in the first place. It was assumed by scholars that a confusion had been made by the obviously dim-witted Spanish historians, and that dried peyote cactus buttons (containing the visionary alkaloid mescaline) were the legendary teonanacatl. At the time of this botanical conjecture, or blunder as it was, in 1915, it went completely unchallenged by the academic fraternity and remained unchallenged until a species of hallucinogenic mushroom still being used in Huautla was identified in 1938.

Perhaps then, we should conclude that mycophobia is not merely a cultural phenomenon but a remorseless genetic trait, an idea Wasson would certainly have appreciated since he was to come across much in the way of scholarly disregard as to the religious role of psilocybin within ancient Mesoamerican culture. It is only since Wasson's work has come to be acknowledged, that historians have begun to realise that psychedelic agents like the Mexican mushroom have the power to move people, that their tremendous psychological impact was significant in shaping the belief systems of those cultures who used them. The point that Wasson was continually at pains to make was that one should never underestimate the cultural and historical role of entheogenic flora, although, of course, he came to this conclusion by way of his own personal psychedelic experiences. Alas, such personal insights are not shared by most other Mesoamerican scholars.

ILLUMINATING FLOWERS

One of the most remarkable pieces of evidence testifying to the exalted role conferred upon the psilocybin mushroom by the Aztecs, is in the form of an early sixteenth century statue of the god Xochipilli or 'The Prince of Flowers'. The significance of this magnificent piece of art was first recognised by Wasson and thereafter the real message that it conveyed became glaringly apparent.

The statue represents a cross-legged male figure - the god Xochipilli - caught up in an ecstatic trance. There can be no mistake. The very essence of ecstasy has been captured in stone. The arms, legs, and base of this stone-carved ecstatic prince carry stylised engravings of flowers, and on each of the four sides of the base of the statue are carved mushroom motifs. These mushroom motifs also appear upon the subject so enraptured.

Until these carvings came under the attentive gaze of Wasson, they had never been botanically identified. Wasson realised that the stylised flowers were the key to deciphering the true meaning of the Aztec statue and, moreover, the very meaning of 'flowers' in classic Aztec literature. As soon as Wasson intimated the statue's full *raison d'être*, he immediately contacted noted ethnobotanist Richard Evans Schultes at Harvard's Botanical Museum, who was the obvious man to consult regarding botanical analysis of the motifs.

Schultes was subsequently confident enough to identify the carved 'flowers' as; *Nicotiana tabacum* - the common tobacco plant considered sacred by almost all native American cultures; *Turbina corymbosa* - a species of morning glory whose hallucinogenic seeds are known to have been employed by Mesoamerican cultures; and another identified as *Heimia salicifolia* - also a psychoactive species. Wasson noted that these species were representative of the Aztec's most revered plants, hence there were no depictions of less esteemed plants such as were employed by the Aztecs to make pulque or maize beer.

Wasson believed that previous ignorance of the statue's true nature reflected the aforementioned widespread failing of historians to acknowledge the important role that psilocybin mushrooms and other sacred flora played in Mesoamerican history. He writes:

"Our statue of Xochipilli serves us as a touchstone, as a cultural Rosetta Stone, bypassing the friars encumbered with their theological preconceptions, speaking to us directly with the voice of the pre-Conquest Aztecs."

It appears then, that the Spanish clergy were ultimately unsuccessful in silencing the claims made by their subdued and conquered subjects; messages in stone speak louder than words and provide rock-hard testimony to the Aztec's sacred links to the natural environment, with its varied potent botanical offspring. What exactly the Aztecs experienced through psilocybin remains debatable, although we can be sure that their psychedelic visions were vivid and convincing enough for them to regard the mushroom as being a link to the divine realm, no less than the appearance of God's flesh upon the Earth.

Wasson also went on to study pre-Conquest Aztec poetry written in the native Nahuatl language. When this poetry first became accessible to the West, it had been noted that 'flowers' were referred to often. Peculiarly often in fact. Moreover, the oft mentioned 'flowers' were seldom, if ever, distinguished from one another. Like the statue of Xochipilli, Wasson realised that the 'flowers' referred to visionary plants, most notably the psilocybin mushroom.

For instance, the poetry speaks of 'the flowers that inebriate', 'the joyous flowers', 'the flowers without roots', 'the precious flowers', and so on. Careful study shows that Nahuatl poetry is teeming with such embellished references to 'flowers'. This makes sense only if we accept that the Aztecs worshipped the mushroom and other entheogenic plants because of their transcendental psychological effects and thence set their praises to poetry. As in the sculpting of the 'Prince of Flowers', the Aztec poets who wrote of 'flowers' were producing their art from direct experience, their works channelling their deific respect.

As a final testimony to the Aztec's use of psilocybin, mushroom motifs are also to be found in pre-Conquest codices (the existing pictorial records of the Aztecs themselves) in particular within the pages of the *Vienna Codex*, an historical document rich in pictographic information on the mythological Origin of Things. One page of this Codex depicts the famous Mesoamerican god Quetzalcoatl being tutored in the use of mushrooms. There is no ambiguity in the depictions - an entire page clearly portrays ritual mushroom use.

PSYCHEDELIC TEMPLES

Prior to the Aztec's rise to dominance and before the time of the Toltecs reign previous to them, the premier ritual centre of pre-Columbian Mesoamerica was the mighty city of Teotihuacan located in the north-eastern Valley of Mexico, near Mexico city. Dating from 150 BC. to A.D.750, little is known about

the Teotihuacans although Aztec legends equate this city with the birthplace of their deities. Its very name was given by the Aztecs who had discovered it 600 years after its mysterious collapse and means 'Place of the Gods' in Nahuatl.

Due to the immense scale of Teotihuacan's religious architecture which includes the spectacular Pyramids of the Sun and Moon and highly sophisticated wall paintings rife with ornate serpent motifs, it can be reasonably assumed that it was the centre of an important religious cult. The overt presence of serpent motifs upon the architecture is a strong indication of religious worship since the pantheon of almost all Mesoamerican cultures include mythical serpentine entities, such as the feathered serpent god Quetzalcoatl. Elaborately stylised serpents were used both to represent gods and to symbolise divine power penetrating the mundane world. Their fearsome presence on and around temples signified that the temple was a sacred place to be guarded from profane intrusion.

Of most concern here are the style and content of the numerous mural paintings which adorn most of Teotihuacan's temples and shrines. In these murals we once more find depictions of various flowers, one of which is the morning glory (either *Turbina corymbosa* or *Ipomoea violacea*). As stated, the seeds of this plant species contain LSD-related compounds known to have been used by the Aztecs for religious communion. It is therefore reasonable to assume that the temple-goers at Teotihuacan knew of, and thus utilised, the psychedelic effect of the morning glory.

Whether mushrooms are depicted in the temple murals is a somewhat contentious issue. Whilst Wasson affirmed this and pointed out what he considered to be mushroom symbols, these same motifs have been identified by other Mesoamerican scholars as representing the water-lilly. Although various related African species of water-lilly are thought to be psychoactive, it has not been established whether the New World variety are equally as potent. Either way, Wasson conjectured that the various temples of Teotihuacan, decorated as they are with depictions of psychedelic plants (the morning glory at least), were sacred sites where the ritual ingestion of entheogens took place.

SECRET PSYCHEDELIC LEGACIES

Such an historical concept in which indigenous visionary agents are consumed ritually in order to induce

theophany and religious solidarity should come as no surprise. In ancient Greece the classic Eleusinian Mystery cult echoes the inferred scenario occurring at Teotihuacan. The mystery rites which took place each year at Eleusis near Athens, centred around the drinking of some secret potion that granted a numinous vision to initiates, the entire sacred ceremony taking place within the guarded confines of a hallowed temple.

Recent theories have proposed that this Eleusinian drink was made from ergotised barley which would mean that it contained entheogenic substances since ergot, a tiny plant fungus which grows on wheat and barley, contains a number of LSD-related compounds. Though this psychedelic scenario has not been confirmed and remains merely an engaging hypothesis (ergot is also potentially toxic), the point is that the potion was almost certain to have contained some form of entheogenic alkaloid with the capacity to engender the type of mystical experience attested to in Greek historical literature. Wasson thus assumed that Teotihuacan was a Mesoamerican equivalent to Eleusis, that is, that both were sacred places where visionary agents were administered in a ritual context.

Clearly the morning glory plant was utilised for its psychoactive effect by the Teotihuacans (assuming of course that they did not just like the look of it) as the various murals testify, and it would follow that psilocybin mushrooms would also have been ingested had their properties been known at the time.

THE BIRTH OF THE RELIGIOUS IMPULSE

Claims which infer that psychoactive plants and fungi played a major role in ancient religion might be considered to belittle religion in some way, as though one were reducing everything to 'damnable drugs'. Nothing is further from the truth. Far from reducing the religion, the religion becomes firmly entwined with the unequivocal numinous effects of vision-inducing fungi and plant species. That is the strength and force of such species. They cannot fail but have a dramatic impact. Anyone like Wasson who has made the sacred connection within their psyche through the action of natural psychedelics knows of their profoundly religious/spiritual impact.

Ultimately one comes to suspect, like Wasson, that the very historical source of *Homo sapiens'* religious impulse lies in our ancestor's primeval encounters with raw entheogenic species like the psilocybin mushroom which are effective without the need for elaborate preparation. This scenario does not lessen

religion, it empowers it, giving it an unstoppable impetus created through the effect of visionary alkaloids in opening up the boundless capacities of the human mind. God becomes connected to a level or *state of consciousness*, an inwardly felt presence mysteriously welling up from the depths of the psyche and not from some abstract religious dogma. However, religious dogma might well allude to the experience, and indeed testify to the reality of entheogen-induced theophany. Yet, once a detailed knowledge of the plant or fungus in question is lost in the hazy mists of time, then any lingering memory of it's original entheogenic power will be no more than words, an echo of a once living mystery.

The greatest reason to embrace an entheogenic fungus or plant-orientated explanation for the rise of the religious impulse however is that it is couched in wholly naturalistic terms, therefore lending itself to scientific study. If a man claims to have had a life-changing theophany then that is one thing. But if he bears in his hand the very method whereby he attained such an experience then you are obliged, if you wish to determine the man's claims, to explore and verify the means. In more ways than one, psychedelic plants and fungi must be taken seriously in their role in the development of religious ideology. As stated, their historical influence can never be overestimated.

MUSHROOMS AND THE MAYA

Psilocybin mushroom use has also been associated with the spectacular Mayan civilisation of Mesoamerica, whose Classic period held sway from 250 to 900 AD.. At the turn of this century Guatemalan 'mushroom stones' came to the attention of archaeologists. These Mayan relics, of which hundreds have been found, some dating as far back as 1000 BC., were initially considered to be phallic representations though the current consensus is that the mushroom stones reflect a Mayan religious mushroom cult.

To bolster support for this theory, it has been noted that some of the stone mushrooms are carved emerging from human figures with trance-like facial expressions. Others are linked to kneeling female figures at a metate, a kind of work surface upon which plant items are crushed. When Wasson first explored mushroom use in Huautla in the 1950's, metates were still sometimes used in order to grind mushrooms so that an entheogenic infusion could be made. Still other of the mushroom stones carry 'toad' effigies at their base, and this creature has always been mysteriously linked with psychoactive fungi the world over, perhaps because of knowledge that certain toads exude hallucinogenic alkaloids from their skin glands (incidentally, this odd 'toady' fact might also account for the fairy story The Frog Prince since magical events happen after a frog has been 'kissed').

Is there any other evidence that the Maya employed psilocybin mushrooms in their religion? A look at Mayan codices might help on this matter, yet our not-so-delightful conquering Spanish priests have hindered such study due to their blundering haste in burning everything that stood in their theological way, including virtually all Mayan scriptures. As an example, consider the fact that in 1562, one Diego de Landa, a hardened Spanish priest of some frightening zeal, seized thousands of Mayan 'idols' and books, burning all and sundry as though it were worthless. Among the treasures destroyed were 27 roles and signs of hieroglyphics, invaluable sources of knowledge about the Mayan civilisation. Landa commented:

" We found among them a number of books written in these characters and as they contained nothing in which there were not to be found superstitions and devilish lies, we burned them all, which they regretted to an amazing degree and caused them great affliction."

Such a foolish and insensitive act has left the world with only a handful of Mayan codices on which to assess Mayan customs and beliefs. Within two of these remaining works, the *Popul Vuh* and the *Annals of Cakchiquels*, are references to psychoactive fungi, but there is no indication as to the extent of their role within Mayan belief systems. In the *Books of Chilam Balam* there is mention of trance-like states, though no mention of hallucinogenic plants. Again, in many Mayan relief carvings, which seem to possess a psychedelic air about them, are found scenes depicting visionary ecstasy though plants are not explicitly shown. Some scholars have therefore rejected the notion that the Maya employed natural entheogenic agents in their religious rituals (despite the existence of the many mushroom stones) and have opted instead for the alternative view that the Maya, unlike the martial psilocybin-using Aztecs who were to follow, were of a radically different nature and temperament. However, recently discovered Mayan mural paintings have depicted fearsome looking battle scenes so that it is not absolutely certain that these two cultures were so different.

It is worth looking more closely at the actual similarity in religious belief between the Maya and Aztecs, as it demonstrates a common historical thread connecting the two cultures. Both peoples divided the cosmos into upper worlds and lower worlds with their respective gods. Both believed in the cyclical destruction and regeneration of the Earth, and both followed a ritual 260 day calendar. Bearing in mind these cultural similarities, it has been reasonably suggested that the Maya also utilised the mushroom as well as other psychedelic agents and that this practice influenced the nature of ancient Mesoamerican cosmology.

It has also recently come to light, as many Mayan vases and pieces of pottery attest, that the classical Mayan elite used enemas. The objects which depict scenes of enema use date from the first millennium AD.. The daunting practice of administering enemas has been well documented in South American native peoples. In particular, it has been established that the Incas introduced hallucinogenic infusions into the body via enema, using bulbed syringes made from local rubber sap. Apparently, the use of an enema to introduce psychoactive compounds into the body is almost as effective with regard to speed of action as is the method of intravenous injection. It's effectiveness with hallucinogens occurs because the colon is the receptive site of the enema and this is where absorption by the bloodstream occurs. A number of scholars have therefore claimed that hallucinogenic brews were involved in these Mayan enema rites and thus psilocybin might well have been employed in this manner.

We should also be aware that much Mayan artwork is given over to portrayals of 'vision serpents' manifesting themselves before entranced members of the Mayan nobility. As I stated earlier, to the Mayan mind serpents represented the entry of divine forces into normal reality, and to depict fantastically decorated serpents hovering above an enraptured individual signified a communion with the gods. Such individuals are often shown holding a special receptacle. This object is believed to either hold blood from a bloodletting rite or an hallucinogenic brew, both alternatives offering an effective avenue for attaining a desired visionary state of consciousness.

Taking into account all of this data, particularly the hundreds of elaborately carved mushroom stones so far uncovered, many historians are compelled to accept that the Maya utilised entheogenic flora including psilocybin mushrooms, and that the visionary realms made accessible by these plants and fungi influenced the development of the Mayan cosmological and religious outlook on reality.

SOME COLOMBIAN TREASURES ALSO RING A BELL

Psilocybin mushroom use has also been inferred in prehispanic Colombia due to the discovery of 100's of beautiful gold objects belonging to the Sinú culture, dated circa 1200 AD. These are decorative anthropomorphic works of art which characteristically carry two bell-shaped forms atop the head and were originally referred to by historians as 'telephone-bell gods'. Some of these bell-shaped forms are tipped with a small peak whilst others are soldered onto the main body of the anthropomorphic figure by

a thin 'stem'. Harvard's ethnobotanical expert R.E.Schultes has therefore suggested that the bell shapes are representations of the psilocybin mushroom, which would seem reasonable since several species of psilocybin mushroom are known to flourish in Colombia, some of which possess thin stems and whose caps are also topped with a small peaked tip or umbo.

It is also worth noting that these mushroom objects are often adorned with toad effigies as is the case with many of the Mayan mushroom stones. Schultes sees this as further evidence that these objects were made in veneration of entheogenic agents, since, as you will recall, certain toads, including South American species, excrete hallucinogenic substances from their skin. The evidence is overwhelming then that the historical use of psilocybin fungi and other entheogens extended well beyond Mexico and Guatemala, and that wherever they were employed they were deified and incorporated into works of art.

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Viewed in the historical light of the Aztec and the Mayan empires, and to a lesser extent in prehispanic Colombian culture, the psilocybin mushroom thus emerges as the conductor of a sacred legacy. These once powerful native peoples knew its worth as an entheogen; a naturally occurring device for communicating with the spiritual domain. This is the botanical Holy Grail that Wasson had long quested for and eventually found half-buried in a remote Mexican village. An unlikely Grail knight, he nonetheless recovered the power of the psilocybin mushroom from more than 400 years of subjugation and presented it to the modern world. Once unleashed, the psilocybin mushroom helped initiate a tremendous cultural change, only to fade once more into a period of obscurity. Before its departure however, psilocybin had inched its way into the very heart of the West's academic establishment leaving a profound impact upon all who came its way. We now return to the wake set by Wasson's fortuitous discovery.

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CHAPTER THREE

PSILOCYBIN FLOWS IN AND OUT OF THE WESTERN MIND

Wasson's *Life* story sits like a glowing spiritual ember in the tinder-dry secularity of America's 50's culture. The USA, caught up in a burgeoning but banal materialistic dream, could not fail but be ignited by such a soul-stirring otherworldly tale. Alongside Aldous Huxley's *The Doors of Perception* written a few years earlier which detailed the entheogenic effects of mescaline, both accounts were seminal in terms of their slow-fuse cultural impact. Each captured the brimming psychedelic Zeitgeist that was about to erupt upon the world's stage, Wasson and Huxley emerging as the founders of a cultural movement that would eventually blossom into the 'psychedelic sixties', with its colourful burst of artistic creativity, mind expansion, and inspired lunacy.

However, psilocybin, although initially sparking the psychedelic fire, soon left the scene of the divine crime, once more to fade underground from whence it mysteriously originated. By the mid-sixties, its synthetic rival d-Lysergic acid diethylamide, or LSD/acid, a substance whose structure and psychoactivity are distinct from psilocybin, had taken over as the prime mover, demonstrating the popular appeal of laboratory produced pills and tabs.

Easily manufactured, packaged, sold, and swallowed, pills are what the public come to expect, and even demand, in a technological consumer age, and therefore mass-produced LSD was quick to fill the ever-growing market for psychedelics. More significantly, the synthesis of substances like LSD allowed the power of production to lie in our hands and not the Earth's. In this way, the natural and 'earthy' shamanic aspect of entheogenic species was lost. Which is to say that the potential of entheogenic plants and fungi to forge an informative relationship between our species and Nature was not fully realised. Thus from the discerning vantage point astride the third millennium, we can look back to the dreams and quixotic idealism of the 1960's and understand that without an appreciation for holistic theories about the planet (like Gaia theory for instance - a popular hypothesis generated by scientist James Lovelock which views the Earth's biosphere as a single living system) and without an insight into the history of psychedelic shamanism, a new world vision was unlikely to take a firm cultural hold.

What this speculation boils down to is the concept of naturalness and the intimation that Nature is smarter than we. In particular, I would argue that the realisation that entheogenic plants and fungi are part of the ecosystem inevitably effects the significance and import of the entheogenic experience. Which means that the concept of naturalness acts as an important *context* for the entheogenic experience should that experience derive from a natural plant or fungus.

It was precisely this natural Gaian context that was sorely lacking in the early wave of popular interest in psychedelics. For without acknowledging the botanical environment as the original supply line for the entheogenic agents which started the psychedelic sixties rolling, the acid gurus, despite their vocal enthusiasm for a positive psychedelic world revolution, were still stuck with themselves, caught in a sort of anthropocentric loop and thereby isolated from an intimate union with the natural homeostatic systems of the Earth. As I eventually hope to show, the Gaian connection to the natural entheogenic experience represents the newest phase of psychedelic history, an interesting turn of events full of profound implications for our species.

Unsurprisingly then, although the psychedelic pioneers of the early 60's were originally turned on by the psilocybin experience - most notably the members of Harvard's psychology faculty - they soon became completely embroiled in acid and the media, and never really picked up upon the Gaian shamanic pulse of the mushroom. Perhaps this is why Wasson remained highly aloof of the whole hippy counter-culture. He quietly pursued his academic research into ancient mushroom use, whilst other researchers like R.E.Schultes continued to meticulously document visionary plant use among fast dwindling native peoples. Indeed, the academic work of both these scholars remain as invaluable sources for our knowledge of native psychedelic shamanism.

BUGGED BY THE CIA

Before recounting Harvard's brief scientific flirtation with psilocybin, I should like to alert the reader to a rather sinister twist to the events which led up to the isolation and naming of psilocybin in 1958. In particular, one of Wasson's trips to Mexico unfortunately carried a counter-current to psilocybin's holy mystique. Just when you thought it was safe to proclaim a spiritual renaissance of sorts, who should arrive on the scene but the CIA. These disturbing mischief-makers who so profane history with their presence, will seemingly do anything to maintain a grim state of affairs in which the dour 'we was

miserable in our day' archetype is nourished.

In his *Search for the Manchurian Candidate*, a book describing the CIA's involvement with drugs, John Marks tells us of the CIA's covert involvement with our hero Wasson. In its relentless and arguably psychotic search for evermore effective weaponry, the CIA had, by the 50's, initiated a massive \$25 million dollar long-term program called 'MKULTRA'. True to its suspicious sounding name, project MKULTRA concerned itself with finding chemical and biological materials for use in 'mind-kontrol' and other psychological unpleasanties. Despite the morally-questionable nature of such an unsavoury federal project, its dogmatic pursuit meant that it was soon to pick up upon rumours of sacred Mexican mushrooms.

After learning of Wasson's 1955 experiences with the mushroom, an unscrupulous chemist named James Moore immediately began to work undercover for the conspirational agency. Presumably dollars changed hands surreptitiously. At any rate, in 1956 Moore craftily wrote to Wasson informing him that he knew of a foundation willing to finance another Mexican trip in order that he and Wasson bring back some of the legendary mushrooms. Moore innocently claimed that, as a chemist, he simply wanted to study the chemical structure of the mushroom's active constituents. The foundation was the CIA-backed Geschwicker Fund for Medical Research and they were offering a \$2000 grant. Would Wasson be interested?

Naturally he was, and so it came to pass that the CIA's secret quest for the sacred mushroom became Subproject 58 of the MKULTRA program, possibly representing the most crass approach to psilocybin to date. It was as if the CIA were throwing stones at angels.

It is not with regret to learn that the double-dealing Moore was out of his depth in Mexico and loathed the entire episode. Wasson later recalled that Moore had absolutely no empathy for what was going on. Whereas Wasson was sensitive to the customs of the native Mexican Indians and respectful of their cultural beliefs about the mushroom, Moore was there merely as a CIA pawn.

Once again, all those who were in Wasson's party took part in a mushroom ceremony hosted by the shaman Maria Sabina, though it was Moore alone who had a bad experience. Despite this, Moore was still able to bring back some of the fungi to the United States in the hope of isolating the active

ingredient. However, he was thankfully beaten in his pharmaceutical pursuit by the infinitely more powerful GIA, the Gaian Intelligence Agency, one of whose secret unknowing members was Roger Heim, the eminent French mycologist and co-worker of Wasson, who managed to grow a supply of the mushroom from spore prints that he had taken in Mexico. He sent his newly cultivated samples to Albert Hofmann of Sandoz laboratories in Switzerland, and it was Hofmann, a highly distinguished chemist who had originally synthesised LSD, who, in 1958, first managed to isolate and thence name the hallucinogenic alkaloid within the mushroom. Psilocybin was thus officially born, a name devoid of the weaponry connotations the CIA would invariably have conferred upon the substance had they successfully isolated and named it first.

Having failed in his allotted task, Moore was not terminated but later applied directly to Sandoz for a supply of psilocybin, as the CIA still maintained their clumsy interest in using this compound as an agent for mind-control. Indeed, the CIA soon began to covertly test psilocybin on unsuspecting American prisoners, not the best of subjects when it comes to being in possession of a stable healthy psyche. As the prisoners reported some rather bizarre experiences it became clear that psilocybin could not enter the CIA's arsenal - it was just too darn unpredictable. Thankfully, the CIA then turned their belligerent attention elsewhere.

THE PSYCHEDELIC INFILTRATION OF HARVARD

After Hofmann had begun to synthesise psilocybin from extracts of the mushroom, the door was open for properly conducted scientific investigation to commence. Apart from the rather dismal CIA attempt, it was 1960 which marked the beginning of the brief affair between the scientist and the mushroom. This occurred at no less a place than the psychology department of Harvard University, that bastion of academic respectability.

What happens when the professional psychologist comes up against the phenomenal power of psilocybin? One of two things generally result. They either experience the substance personally and divine its profound implications for humanity in terms of knowledge acquisition, psychotherapy, self-knowledge, and personal growth, or they refuse to take it and instead interpret psychotomimetic (literally psychosis-mimicking) symptoms in those who do take it. A rather sharp division therefore occurs, as it did at Harvard. On the one side stood the infamous and lanky figure of Dr. Timothy Leary heading a scholarly band of psychedelic intronauts, whilst on the other side stood the unimpressed 'establishment' who only tolerated systematic experimentation for a few years.

If one pinpoints Leary as the man-of-the-moment at the start of that turbulent decade, able to seize the media and galvanise the American youth into rebellion, then we can zoom in on the actual experience that launched his prolific psychedelic career. It was, of course, a direct mushroom experience.

DR. LEARY GETS TURNED ON

For 40 year-old Leary it began, as ever, in Mexico. Already an established and respected psychologist at Harvard, he spent the summer of 1960 with some friends at the Mexican resort town of Cuernavaca. During his stay an anthropologist associate at the University of Mexico, who had come across references to sacred mushrooms whilst studying the Aztecs, suggested that Leary try some.

At noon one Saturday Leary gulped down six obnoxious-tasting local Mexican brand mushrooms which had been obtained with much more ease than those consumed by Wasson five years earlier. Through this strange lunch, Leary's fate was effectively sealed for, as he later wrote in his autobiography, whilst the psilocybin coursed its way through his 'virgin' Irish bloodstream he enjoyed the most awe-inspiring religious experience of his life.

Leary was convinced that in four hours under the influence of psilocybin he had learned more about the mind and the brain than in the fifteen years that he'd been a professional psychologist. This gives good measure to the strength and psychological impact of his first psilocybinetic encounter. Under the right conditions the mushroom is able to restructure one's culturally determined concepts about reality, and proffer an entirely different set of beliefs with which to navigate oneself through life.

Being a keen and responsive practitioner of psychological science alert to new fields of discovery, Leary immediately requested funds in order that he could set up a research program into psilocybin. In no time at all the Harvard Psilocybin Project was initiated, commencing at the end of 1960 when a handy batch of psilocybin arrived from Sandoz. Already the natural mushroom had been replaced with jars of precisely-dosed pills, thereby subtly altering the context of the psilocybin experience. How different

might the implications of psilocybin have been at Harvard had the scientists had to go out into the wilds in order to pick their research material by hand....

One of the most impressive projects undertaken was the systematic study of 175 subjects given psilocybin, where the experimental emphasis was upon providing a relaxed and supportive setting. This important notion of set and setting - the subject's mental and physical environment prior to taking the psilocybin - can never be stressed enough as they are crucial factors determining the subsequent psychedelic experience. Leary and his co-workers had already established these facts amongst themselves prior to their official experimentation and they were at pains to point out how set and setting played a key role in whether the psilocybin experience proved well or ill. It is almost certain that had someone without Leary's temperament and intimate knowledge of psilocybin organised the experiments instead, then more negative experiences would have been reported.

As it was, most of the subjects reported a pleasant or ecstatic experience, that the psilocybin experience had changed their lives for the better. No psychological casualties were reported even though more moderate doses had been used than in previous experimentation. There was no evidence for psychological or physical addiction, although 90% wished to repeat the experience. No hangovers were reported and presumably no-one awoke the morning after to rooms strewn with empty bottles and cans. In a six-month follow-up study none of the subjects developed enduring psychotic or neurotic symptoms. The experiment was a success in demonstrating that under favourable conditions, ordinary people were able to have an inwardly enriching experience with psilocybin. Things on the psychedelic front were looking good. Gaia's special mushroom, albeit in pill form, was showing promise.

These findings were eclipsed however by the legendary Good Friday experiment of 1962, surely one of the most radical and far-reaching psychological studies ever undertaken. In their general approach to research and the collection of data, psychologists, particularly up until the fifties and sixties, had always had a rather special affinity for rats, more often than not placing them in specially constructed boxes where behavioural phenomena like classical conditioning (you remember Pavlov's dog salivating to the sound of a bell.....) can readily be observed. Go into any academic psychology department and you will likely find and smell a rat or three, so beloved are these furry creatures to the ardent psychologist. They are cheap, easily maintained, and behave in a remarkably reliable way (like small machines) in their reactions to the manipulating advances of experimental psychologists. Explanations about human behaviour can then be extrapolated (so they say) from the results of these rattish experiments on the reasonable but limited assumption that all mammalian brains run on similar principles.

Such 'ratomorphism' as the writer and philosopher Arthur Koestler cynically termed it, used to dominate psychological science, and topics like mind and consciousness were banished from the scientific arena like some forbidden fruit unfit for empirical consumption. Even though, of course, the science of psychology is itself mediated through the stuff of consciousness. Today things are fortunately beginning to change and a kind of philosophical psychological approach to mind and consciousness is emerging, a topic I will later explore in much detail.

Back in 1962 the Good Friday psilocybin experiment was as far removed from rats as is possible, stretching empirical science to its limits. It was the type of experiment that our controversial psilocybin demanded and its results remain significant.

A DIVINE INVASION UPSETS THE STATUS QUO

A psychology student named Walter Pahnke, working for his PhD, arranged the experiment with the help of Leary and other members of the Harvard Psilocybin Project. It was an attempt to capture the psilocybin-induced mystical experience in quantitative measures via questionnaires. Although such questionnaire studies fall foul of a number of methodological criticisms, it is the only viable scientific approach to measuring the reported subjective effects of drugs. It is not enough for someone to claim that psilocybin is a wonderful substance that elicits transcendental feelings of awe. Rather one must obtain objective measures if one wants to bring entheogens under the analytical eye of science. If, that is, you are scientist who believes science offers the best approach to psilocybin - a moot point to be sure. If you've tried the stuff yourself and you've travelled to those divine realms, then you are one who knows. Leary knew, as did the other members of the project, but though they had tasted superconsciousness they were still caught in the unenviable position of trying to document the psilocybin experience with the relatively cumbersome tools provided by the science of that era. Understandably perhaps, Leary was soon to don a kaftan, abandon academia and hijack the media instead. Yet the Good Friday experiment, or 'miracle at Marsh Chapel' as it became known, still stands out as the classic psychology experiment of that pre-LSD period.

Five rooms in the basement of Boston University chapel were reserved for Pahnke and the psilocybin project team. Twenty subjects, all of whom were theology students and therefore at home in the chapel building, took part in the study which employed a double-blind methodological approach. This meant that only half of them received psilocybin whilst the other half received a mildly psychoactive placebo.

No-one knew who got what, not even the experimenters, though it soon became clear who had been given the mushroom pills.

Leary recalls that the ten psilocybin subjects began to act rather unconventionally. Some began to wander around the chapel murmuring prayer. One lay on the floor, some lounged on benches, whilst another began playing strange music on the chapel organ. The most intense effects however, were occurring in the depths of the subjects' psyches, and analysis of the subsequent 147-item psychological questionnaires completed by the subjects soon revealed what had taken place therein.

The questionnaires were designed to probe various aspects of the induced mystical experience. Parts of the subjects' reports were then rated by naive markers who had to compare this psilocybin phenomenology (phenomenology is the study of direct conscious experience) with mystical phenomenology taken from various religious scriptures, without knowing which was which.

Incredibly, the results showed that the psilocybin group had mystical religious experiences *indistinguishable* from those reported in religious literature. This was a decidedly controversial finding. A naturally occurring substance, although in pill form thanks to Sandoz, had been shown to be capable of generating a full-blown mystical experience within the religiously ripe minds of theology students. The implications were enormous, and, as we shall see, many a storm was to brew over the validity of chemically-induced religious mysticism. Traditionally cherished beliefs about mystical enlightenment and the religious impulse were being threatened by, of all things, a drug, and this was guaranteed to cause uproar and dissent amongst those members of the priestly elite who serve to police communion with the divine.

Despite the beginnings of heated controversy, Pahnke's thesis on psilocybin was uneasily approved, though he was not allowed to continue his line of work and his requests for government funds were denied. Something was obviously amiss. The nature of psilocybin - this wild alchemical product of Nature - was becoming a threat to long established power structures both in academia and in the realm of traditional religious beliefs about divine communion. Psilocybin's inherent power, dormant for so long, was once more on the loose, this time in the very heart of the Western establishment, an unstoppable wave of inspiration breaking over the souls of all those who willingly stood in it's way.

In one sense, it was as if the Good Friday study could be viewed as the last experiment that the scientist keen on ascertaining the nature of consciousness and reality needed to perform. The message seemed clear. Humanity could transcend its secular level of being and raise itself to a new order, an idealistic dream shared by many early Western psychedelic explorers. Psilocybin could be carefully used as a source of knowledge and wisdom, allowing people glimpses of a transcendental reality lying a mere perceptual step away.

As it was, the lofty psychedelic dream shared by so many at the time never quite materialised, although I would argue that this was mainly due to the lack of an explanatory framework for the psilocybin experience, and not because the idealism of the dream was untenable. Indeed, at this early stage in psychedelic research, almost nothing was known of psilocybin's mechanism of action, and, apart from Jung's notion of the Collective Unconscious, there were little in the way of speculative psychological theories able to capture the full import and impact of the psilocybin experience in a non-reductive way. In a real sense, language let the scientists down, or at least the lack of descriptive terminology and lack of conceptual sophistication meant that psychedelic phenomenology remained an abstruse anomaly. And such anomalies, even if they might contain the essence of some new ways of understanding the nature of reality, are more often than not deliberately buried out of sight, or at least the conceptually uncomfortable data are all too easily lost somewhere at the back of the scientific community's filing cabinet. Such a fate did indeed meet the psychedelic experience, and by the late 60's almost all of the world's known psychedelic substances had been deemed a dangerous social threat and were therefore promptly illegalised. Scientific research into psychedelics was halted, and almost all personal psychedelic experimentation became a criminal offence. However, this was not a big and final full-stop. As we shall see later, the cessation of psilocybin research was more of a comma.

UPDATE: JUST HOW GOOD WAS THAT FRIDAY?

As further evidence of psilocybin's vivid effect upon those fortunate theology students, and so that I can build support for my enthusiastic contention that the psilocybin mushroom represents a Goddess-send medicinal soul-food with which to reconceive the nature of reality, I can recount the follow-up study of nineteen of the twenty original subjects of the Good Friday experiment. This was undertaken by Rick Doblin, president of the Multidisciplinary Association for Psychedelic Studies, in the late 1980's when, by this time, many of the subjects were practising Reverends.

Doblin administered the same questionnaire used in the original experiment and found that there was still

a significant difference between the two groups as to the reported effects of the experience. After 25 years, the psilocybin group's characterisation of their mystical experiences had actually strengthened (or matured). Also, whereas the control subjects who had received the placebo could barely remember the day in question, the psilocybin group still had clear memories of that eventful day. For instance, Reverend K.B. remembered:

"It left me with a completely unquestioned certainty that there is an environment bigger than I am conscious of. I have my own interpretation of what that is, but it went from a theoretical proposition to an experiential one."

Reverend Y.M. recalled:

"I closed my eyes and the visuals were back....it was as if I was in an ocean of bands, streams of colour, streaming past me. The colours were brilliant and I could swim down any one of these colours."

More from Reverend K.B. who is more specific:

"...with my eyes closed I had an unusually vivid scene of the procession (from the Passion of Christ). A scene quite apart from any imagining or anything on my part....kind of like watching a movie or something, it was apart from me but very vivid."

And further:

"I've remained convinced that my ability to perceive things was artificially changed, but the perceptions I had were as real as anything else."

That this Reverend viewed psilocybin as an artificial catalyst is to be forgiven. Careful consideration reveals that psilocybin is a legitimate natural product of Nature; an unusual piece of Gaian fabric to be sure but no more artificial than the oxygen we breathe. Rarer perhaps, and not absolutely essential, yet certainly not artificial.

The Reverend's description of the visionary experience as a kind of movie issuing from somewhere apart from his sense of self is one of psilocybin's hallmark effects and could not be put more clearly. This is the overwhelming impression gained whilst in the psilocybinetic trance-like visionary state that arises with eyes closed. One is confronted with a powerful communicatory flow of organised symbolic information that compels one to infer an intelligent presence of some kind as the issuer of the information. Although after such a profound experience one might question the grounds for inferring such an 'Other', during the visionary trance itself one might well be utterly overwhelmed by a sense of intentional communication, leaving no room for doubt.

In a way, these animated superdreamscapes, charged as they are with almost blinding metaphorical imagery, are akin to those vivid everynight dreams we occasionally experience and which leave us momentarily in awe as we recall them before they invariably fade away. However, during psilocybin-induced visions one is still very much conscious - more conscious and attentive in fact than normal - so that the visionary scenes are not forgotten, or at least their overall message, impact and urgency are not forgotten, though words usually fail to fully convey such an experience.

Remarking upon the sense of eternity that often accompanies the effects of psilocybin, Reverend S.J. remembers:

"....all of a sudden I felt sort of drawn out into infinity....I felt that I was caught up in the vastness of creation....I did experience thatclassic kind of blending....the main thing about it was a sense of timelessness."

Again, these quite simple reminiscences show that psilocybin carries epistemological value as it seems to elicit a special kind of knowledge not ordinarily available but which is of immeasurable value to us in terms of spirit and soul. Even the most dogged sceptic must concede that, at the very least, psilocybin

taps deep realms of the Unconscious or imagination that reveal a hitherto unknown creative potential.

My bold claim is that an organised source of intelligence and wisdom is indeed accessed through the mushroom. Whether this source issues from some non-personal Unconscious, that is, that deep within the psyche lie vast realms of highly organised fields of information that are 'released' into personal consciousness during the psychedelic state, or whether this information arises from a communicating sentient presence - the numinous Other as we can call it - is open to question, although both suggestions might be linked in some way.

For the time being, whatever we suspect that it is that underlies the visionary state, we can see that the psilocybin experience reveals itself as a compelling area of study since consciousness and perceived reality, the very ground of our lives, have the potential to exfoliate like some new exotic flower. Our everyday awareness is seen to be constrained and bounded, as if we were sub-routine prisoners in some vast computation that surges ever onward. Psilocybin temporarily dissolves these constraints, conferring upon the experiencer an increased set of degrees of cognitive freedom, facilitating new directions of thought that are not normally available. The inner world becomes subject to pictographic myth, whilst the outer world reveals itself as the living structure of some divine being, even the most mundane objects suddenly acquiring a holy aura. This is the latent promise of the mushroom; to reveal psychological realms that can enrich our collective existence as living, breathing hominid creatures bound up within the Gaian system. Natural psychedelic agents like the psilocybin mushroom enable a particular type of knowledge to come to an individual, a type of knowledge that science and philosophy can barely approach, but which nonetheless bears heavily upon our most inner nature.

The Good Friday experiment took science as close as it is likely to get to mysticism apart from analysing the actual brain during the mystical state. Yet even this latter hi-tech approach will dodge the main issue which is the experience itself and what it tells us about consciousness and reality. One has a choice. One can wander off and try and map the psilocybinetic brain to the n'th degree or one can simply plunge into a direct confrontational experience. The mushroomic miracle at Marsh Chapel indicates the latter endeavour as being the most attractive, rewarding, and adventurous option befitting the human spirit. At least to start with....

Objectivity forces me to disclose a mild downside to the aforementioned study. The long-term follow-up showed that eight of the ten psilocybin subjects reported some negative aspects to their experiences in the way of 'psychological struggles'. Indeed, such struggles are somewhat inevitable if one has engaged with

the psychedelic experience. One sees oneself clearly without the superficial trappings of a contrived image and personality. Psilocybin also seems to force one to confront bad habits and neuroses. Nothing remains hidden to the mushroom and this will often lead to a psychological 'shake-up' to persons hitherto blind to self-knowledge. After all, the tenet 'know thyself' is bound up in some way with all spiritual disciplines, suggesting that one must come fully to terms with oneself before one can begin to inwardly develop one's state of consciousness. Psilocybin and other entheogens would seem to highlight this timeless truism to such an extent that further psychedelic experimentation will prove to be of negative value unless one has dealt adequately with one's state of self-knowledge.

As to the other negative and unpublicised fact about the experiment, it transpires that one of the psilocybin subjects had to have a shot of chlorpromazine (an anti-psychosis drug) to combat some unwelcome symptoms. It seems that the student took the words to a sermon about the Christian need to spread the word rather too literally, a struggle ensuing as he tried to leave the chapel. I would point out that such impractical messianic zeal can be countered by administering some self-control rather than chlorpromazine, though we must bear in mind that these theology students were essentially naive to psilocybin's psychological effect.

At the end of his follow-up study, Doblin concluded that:

"...all of the psilocybin subjects still considered that their original experiences contained genuinely mystical elements and that psilocybin had made a uniquely valuable contribution to their spiritual wellbeing."

And there you have it, straight from the mouths of once-bitten practising Reverends. Psilocybin doth work, and it doth work well. Human consciousness is positively mutable and reality is up for re-interpretation. Amen.

LEARY BEGINS TO SPREAD THE GOOD NEWS

During the early days of the psilocybin project Leary actually got to meet Wasson. Although both had received the sacred mushroom vision and had come to value the experience as highly significant, their attitudes to its use were glaringly opposed. According to Leary, Wasson tried to come across as *the* authority on mushrooms, more interested in his own experiences than those of Leary and his associates. He was also vehemently against the current trend of widespread psilocybin use, informing Leary that disclosing the secret of the mushroom to the modern world had destroyed its power. Indeed, he would later write of his abject remorse at publicising the Indian's sacred ceremonies.

Leary, however, was soon to prove Wasson wrong on the potency of the mushroom. Psilocybin cannot fail to empower those who explore its magical effects, and, having taken it over 50 times within the first year of the Harvard project, Leary was by this time a much inspired man on the verge of attempting world revolution.

With his constant supply of mushroom pills, the heavily armed Leary soon began extending his influence to various contemporary American poets, writers, and artists, in particular, luminaries like Jack Kerouak, Neil Cassidy, Allen Ginsberg, William Burroughs, and Dizzy Gillespie to name but a few. Leary began to realise that whilst many were enthralled by the experience, others were overtly disinterested. Youth emerged as a salient factor in attitude toward psilocybin and this led Leary to propose that:

"The older the person, the more fear of the visionary experience. Race, religion, and caste were also important predictors. The more the person {has} to lose, the less willingness to go joyously beyond the Judeo-Christian linear mental structure."

I would surmise that this fear was the same fear that led the Spanish friars to denounce the Aztec's mushroom use as devil-worship and that led to the witch burning by the medieval Inquisitors. Once a person has a rigidly established mental model of reality then any tearing asunder of that model, any kind of incompatible data that threaten its existence, will produce a negative and often violent reaction to the perceived threat. An open-minded approach to psilocybin is therefore essential if it is to have a beneficial effect. One must tread slowly and carefully and familiarise oneself with the new territory since pitfalls lie in wait of the unwary and hasty explorer. The experience must then be somehow integrated into life in a way which minimises social disharmony.

1962 saw the ominous arrival of LSD at Harvard and the entire cultural psychedelic momentum was to change. Leary was so struck by this new synthetic alternative to psilocybin that it fast became the focus of attention and the mushroom faded almost into obscurity. Leary claimed that LSD was superior in effect to psilocybin and his high priest standing at this time was such that others were likely to follow his recommendations. Conversely, Terence McKenna, today's leading advocate for the shamanic use of psychedelic plants and fungi (he has also popularised the term Other to refer to the intelligible presence accessed through psilocybin), argues that natural psilocybin is a far more visionary substance and ranks its worth far above synthetic LSD. McKenna holds a more contemporary organic view that links the mushroom with the natural homeostatic systems of Gaia. As mentioned, in the 60's there was no Gaia theory and ethnobotanical investigations of plant-using shamans had yet to gather much popular publicity.

At the same time that LSD flooded Harvard, opposition to psychedelic experimentation began in earnest partly due to the omnipresent influence of the CIA who still wanted a monopoly on psychedelic drugs, and partly because of the alarming growth in popular experimentation with LSD which was still legal and fast becoming available everywhere. In 1963 Leary was forced to resign from Harvard and so he duly took his 'acidic' interests out into the big experimental arena of mainstream culture where he found himself to be quite adept in the role of psychedelic revolutionary. It is unfortunate that his clarion call "Turn on, tune in, drop out" was only two-thirds commendable. Drop out? Such a negative phrase could only serve to condemn Leary. Why not 'learn', or 'listen carefully'? Still, the pop psychedelic insurgency instigated by Leary ensured that the 60's got underway, and despite the mass drop-out by the youth populous, the resulting counter culture was to spawn a wealth of innervating art, literature, and music. That the 60's ended with the Beatles bravely singing 'All you need is love' is surely proof that some benign vision had been generated within the collective psyche. I guess you had to be there.

Leary's anarchic adventures went on to include the formation of the League for Spiritual Discovery (yes, that's LSD), major court cases, his brief role as the most dangerous man in America, incarceration, a dramatic jailbreak, and his kidnapping by the Black Panthers in the early 70's. Interested readers can read of Leary's enthralling escapades elsewhere, in particular, within the pages of his autobiography *Flashbacks* or in Jay Steven's lively book on LSD and American culture; *Storming Heaven: LSD and the American Dream*.

Unbeknown to virtually anyone at this time, mushrooms containing psilocybin were to be found growing throughout Europe and North America, and not just in Mexico. The Earth, Gaia, a far more efficient and ubiquitous supplier of entheogens than the lab-men at Sandoz, was secretly churning out millions of psilocybin mushrooms across its skin, an extraordinary fact which did not reach public attention until the

late 60's and early 70's (since then it has been speculated that psilocybin was known about by prehistoric Europeans, and that its use influenced the dreamy spiral icons carved on rocks in places like Ireland. Interested readers should consult Paul Devereux's 1997 book *The Long Trip* for more information on this incipient subject).

ATTEMPTS TO DAM THE FLOW OF PSILOCYBIN

At this point in our journey I should like to examine the main objections which were often levelled against the use of psilocybin when it first became available in the wake of Wasson's discovery. Such objections were expressed precisely and clearly by various writers and social commentators, most notably the writer and philosopher Arthur Koestler whom I briefly mentioned earlier. Koestler, who had written numerous acclaimed books on science, philosophy, and the paranormal, tried psilocybin on at least two occasions at the start of the sixties. Leary, a fan of Koestler's work, had written to him about psilocybin's miraculous properties and invited him to come out to Harvard to try it for himself.

As it happened, Koestler's first psilocybinetic encounter occurred at the psychology department of Michigan which, unfortunately, was another hotbed for covert CIA experimentation and therefore not the best of places in which to start one's psychedelic journeying. His second taste occurred at Leary's apartment as Leary had originally intended. Both encounters convinced Koestler that psilocybin was basically worthless, an opinion dramatically at odds with Leary and most others who had tried it.

In March of 1961, Koestler published a polemic article in the Sunday Telegraph denouncing the psilocybin experience. Entitled *Return Trip to Nirvana*, Koestler recounted his personal psychedelic experiences and concluded in no uncertain terms that psilocybin had nothing whatsoever to offer humanity. He wrote:

"Chemically induced hallucinations, delusions and raptures may be frightening or wonderfully gratifying; in either case they are in the nature of confidence tricks played on one's own nervous system."

He offered even harsher words about his second trip at Leary's apartment. When an American writer and acquaintance talked of 'cosmic awareness', 'expanding consciousness', and 'Zen Enlightenment', Koestler thought this "downright obscene, more so than four-lettered words". Clearly, here was a man a trifle irritated by the blossoming psychedelic culture. Koestler was no hip hippy.

Koestler went on to argue that psilocybin gave rise to 'pressure-cooker mysticism', and no more. Discussing Huxley's pro-psychedelic observation that many mystics and religious visionaries employed various physiology-changing techniques like breathing exercises and fasting in order to facilitate altered states of awareness, Koestler countered with a parable about mountain-climbing, claiming that the view obtained when one has slogged for hours on foot up the mountain is far superior to the view obtained at the end of a cable-car journey. In other words, the laborious toil undertaken by the fasting, self-flagellating, cave-dwelling ascetic leads to a qualitatively different revelation than the armchair mystic who merely pops down a handful of Sandoz pills.

This is the classic philosophical objection laid against the potential transcendental effects of substances like psilocybin. It is too easy. Where is the relentless sweat and toil? Where are the physical scars of the tortuous journey that preceded the mystical illumination? How can one possibly have access to realms of the spirit without undergoing years of suffering? Are we to admit that any Tom, Dick, or Leary can achieve transcendence without experiencing untold pain, misery and self-mortification?

Koestler, at least, was convinced that there were no short-cuts to the divine, and he stated this clearly to Leary and in the article. Significantly, he admitted to Leary that he was in the wrong state of mind when he tried the psilocybin at Leary's apartment, that he had been awoken to painful memories of being a political prisoner during the war. Similarly, on the night before his first unpleasant brush with the drug, he'd had disturbing dreams which lingered on long enough to pervade the psychedelic state. In fact, Leary himself had second thoughts in inviting Koestler to try psilocybin as he came across as being too "controlled and rational". Although these factors go a long way to account for Koestler's negative encounters, the criticisms he raised still stand strong and the advocate for the continued investigation of psilocybin must perforce respond to the allegations.

I can offer two lines of defence to parry Koestler's objections. Firstly, it is almost certain that he did not dwell upon the fact that psilocybin is a natural product of the environment, and not an unnatural, alien synthetic. Had he actually gone out and picked psilocybin mushrooms for himself perhaps his experiences might have been more rewarding, since the actual act of mushroom collection leaves an

indelible earthly mark upon the memory. This fact of psilocybin's naturalness, which I consistently remark upon, deserves a still more detailed examination and this is a good opportunity to begin doing so. I will return to answering Koestler's criticisms after this brief diversion.

FOOD FOR THOUGHT

As we shall see in much more detail later, psilocybin is believed to cause its effects by acting upon nerve cells, or neurons, within the brain. In particular, it acts upon those neurons which utilise a substance named serotonin. Serotonin is a chemical messenger, or neurotransmitter, which allows individual neurons to communicate with one another in order that information can be transmitted and processed. Now, the various compounds employed by brains in order that they are able to process information have evolved over millions of years and they are determined by the chemicals available in the environment, in particular, from the raw materials available in food. Serotonin has emerged as a key neurotransmitter, or chemical messenger, because it can be produced from these raw materials. You cannot just have any old chemical compound acting as a neurotransmitter; it has to have arisen through evolution under the deterministic constraints set by the laws of chemistry and the further constraints set by food/raw material availability.

Hence, serotonin is bound up with the chemistry of the environment. If the chemical constituency of the natural environment were radically different, Nature, or Gaia, would have had to have evolved completely different neurotransmitters complementary to the constraints set by that environment. In this sense, we are indeed what we eat and the notion that consensus reality is a popular serotonergic hallucination yields a formidably uncanny wisdom. Our minds, our very consciousness, depends upon the hardware of the brain, which in turn depends upon chemical structure, which further depends upon diet. Natural psilocybin mushrooms can enter ones diet, and the new chemicals subsequently operating within the brain will alter awareness so that consensual serotonergic reality shifts to a rare psilocybinetic reality.

Having said this much it should now be absolutely clear that the psilocybin experience is wholly natural, and that it arises out of an environmentally driven alteration in brain chemistry in so much as the psilocybin mushroom is part of the environment. There is nothing artificial about this process at all. Just as we can selectively pick wheat in order to make bread for our physical well-being, so too can we selectively consume natural psilocybin mushrooms for our spiritual well-being. Both wheat and mushroom are legitimate natural expressions of the Gaian system within which we are embedded. I think

it unlikely that Koestler considered these environmental facts before making his negative judgements.

The second line of defence against Koestler's classic objections is that it is not certain that technological short-cuts - as he called them - are necessarily bad. Is not the Earth viewed from space satellites not beautiful? Viewed thus, is it really any less beautiful than if we were to build a really large ladder and thence clamber up to get the same view? Should we abandon all labour-saving technology and make things as hard as possible for humanity?

I think not. Huxley's vision in the *Doors of Perception* of a mass-marketed psychedelic that enlightens the world cannot be faulted on its technological methodology. If technology, pharmaceutical or otherwise, can hasten some form of Utopia then the only thing stopping this is a sense of distrust and guilt, arguably instilled more often than not by dogmatic religion. Indeed, Leary surmised that Koestler's mountaintop parable arose from a deep-seated Catholic guilt, a guilt that arises all too easily in the face of pleasure, ecstasy, and the limits of human freedom.

Having defended the idea of humanity-saving technology, I would once more remind the critical reader that psilocybin is not a technological product anyway. Koestler perceived it so because his psilocybin came in the form of a Sandoz pill, the perfect symbol of a modern technological fix. This is in direct contrast to the very earthly symbol of the wild mushroom.

When Koestler left Leary's company to return to New York, it was wryly noted that he did not walk back but got a plane. Leary concluded that to ignore psilocybin as a psychological tool would be akin to rejecting the microscope because it made seeing too easy, a good analogy since both tools uncover the hidden riches of Nature.

I think it safe to conclude that Koestler's negative attitude stemmed principally from his painful store of POW memories and the unresolved conflicts lying in the depths of his psyche. In particular, I would suggest, as did Leary, that Koestler's Catholic guilt played a large part in his rejection of the mushroom.

This same type of traditional religious guilt, which seems to have plagued man for time immemorial and

which easily transforms itself into an oppressive drive against other people's freedom, was also displayed, amongst others, by the 19th century French poet Baudelaire who eventually came to be vehemently opposed to the use of psychoactive substances. Like other 19th century poets and writers such as Byron, Shelley, Balzac, De Quincey, and Samuel Taylor Coleridge (who reputedly wrote *Kubla Khan* after an opium reverie), Baudelaire had once used 'trendy' psychoactive plant products like opium and cannabis for creative purposes. Yet he later came to utterly despise them, as if they were the root of all that is evil and misleading, no less than the most cunning of the Devil's tools for thwarting mankind from reaching God.

The point is missed, almost deliberately it seems. These plant substances are not inherently evil, rather they become destructive if used in excess or for the wrong reasons, much as any benign substance can become harmful if used beyond sensibility. Had Koestler been in the possession of the right frame of mind and received the ultimate gift of the psilocybin mushroom, that is, had he perceived a direct communion with the transcendental Other and realised that this was a wholly natural phenomenon, then perhaps he would have embraced psilocybin's cultural healing potential.

It seems then, that if the potentially spiritual effects of the mushroom are likened to a torrent, or stream, then the stream can 'hit' the wrong human mind, or at least the wrong state of mind, causing the stream to be blocked. Where it cannot flow on and blossom, psilocybin's gloriously numinous potential will remain unrealised. God's flesh is clearly not everyone's 'meat'. Such an unfortunate fact must be considered at length before any kind of non-trivial psychedelic investigation be commenced.

THE MUSHROOM AS MEDICINE

In his noted *Ghost in the Machine*, written in 1967, Koestler had a wonderful opportunity to praise the virtues of entheogenic agents. Amongst other things, the book is concerned with mankind's violent, paranoid, destructive streak and how such an evil can be overcome. After documenting the awful historical effects of our 'schizophysisiology' as he terms it, Koestler argues that our only hope for survival is to develop techniques which supplant biological evolution. He reminds us of all the ways in which we have tampered with Nature - like birth control, disease prevention, artificial environment creation etc - in order to simulate and control the process of evolution for our own adaptive advantage. So, asks Koestler, can we not *invent* a remedy for man's destructive tendency?

Unable to ignore Aldous Huxley's popular advocacy of psychedelics as cultural healing agents, Koestler is opposed to such a solution claiming that it is fundamentally wrong and naive to expect that drugs can confer free gifts upon the mind, that is, Koestler assumes that drugs cannot put into the mind something which is not already there. He argues that the 'psycho-pharmacist' cannot add to the faculties of the brain, at best he can only eliminate obstructions which might impede the brain's proper functioning.

Koestler finally envisages a 'mental stabiliser' or hormone that can integrate the psyche. He even goes as far as fearing that his readers will be disgusted by the idea of relying upon our salvation through molecular chemistry rather than spiritual rebirth. This is an astonishing claim, even the more so since he refuses to advocate natural psychedelic plant substances as his 'mental stabiliser'.

Contrary to Koestler's beliefs, Nature and the evolutionary process has not let the human race down, rather we have been blind to its solutions. Nature works in mysterious ways, one of which is the production of plants and fungi possessing vital shamanic power through which the evolutionary process, in all its domains, can continue to function healthily.

Although it might sound somewhat archaic to seek global help from plants and fungi in our modern era, we should keep in mind that shamanism is perhaps the oldest form of religious psychotherapy and that the knowledge gained by visionary shamans was used precisely to help heal the tribe. There is no reason to assume that such psychedelic shamanism is now impotent or irrelevant, especially if we bear in mind the Gaian paradigm. In Gaian terms, the shamanic ingestion of plants and fungi is an entirely natural process which - when we take into account the ecological system of shaman, tribe, and plant - can be seen as being essentially homeostatic in that one part of the environment acts upon another in order to restore harmony; in this case certain plants and fungi yield aid through their psychological effects. Such Gaian psychotherapy highlights just how much we are rooted to the rest of life's web, and how the solutions to our problems are often to be found growing around us (including, of course, potential botanical cures for cancer and AIDS still to be discovered in what is left of the Earth's great rainforests).

Entheogenic species of plant and fungus still offer us a wealth of psychotherapeutic power if we choose to look their way, not to mention the information they reveal about the chemical mutability of human consciousness and the possible transformation of our models of reality. Like most philosophers, Koestler seemed far removed from the natural botanical world, but with the advent of Gaia theory and a renewed interest in all things Green and environmentally friendly, our deep connection to the rest of Nature looms

ever more apparent and a Green philosophy is already establishing itself. By radical means, Nature itself may yet cure our destructive streak.

SUPPORT FOR THE MUSHROOM GROWS

Another well-known writer at the time of psilocybin's first wave of Western use was the revered author and poet Robert Graves who also wrote publicly of his mushroom experience. Actually, Graves had been intrigued by mushrooms ever since he had licked a species of fly agaric as a young boy and had consequently experienced burning sensations on his tongue. Perhaps the incident had been a symbolic Gaian kiss of sorts, or at least a taste of things to come. At any rate, as the reader will recall, it was Graves who originally notified Wasson of the secret mushroom ceremonies still extant in Mexico. It comes as no surprise then that Graves eventually went on to write speculative articles on entheogenic mushroom use in ancient Greece (such speculation remains contentious) after he had tried the sacred sacrament in Wasson's New York apartment in 1960.

Graves was, it transpires, understandably apprehensive about his first brush with psilocybin, especially worried that he might perceive 'demons' behind his closed eyes. Being the author of the acclaimed *The White Goddess*, a book about an historical cult of goddess worship, was no guarantee that Gaia's mushroom would shower him with grace (Gaia was originally the name of the Greek Earth Goddess).

As it was, Graves need not have worried. Unable to write during his 'rapture', he passively let the experience overwhelm him. Afterwards he was to write that he had seen a "mountain-top Eden" and experienced the "bliss of innocence" and "the knowledge of good and evil". He had even felt capable of solving any problem in the world as if he had access to all of the world's knowledge.

Graves went on to predict that a once sacred substance entrusted to an elite few would soon be sought out by "jaded sensation seekers", although they would likely be dissatisfied with psilocybin as it was not a 'drug' as such since it failed to stupefy like alcohol. He ended his descriptive account with the following warning which still rings true today:

"Good and Evil alternate in most peoples' hearts. Few are habitually at peace with themselves and whoever prepares to eat hallucinogenic mushrooms should take as careful stock of his mental and moral well-being as initiates took before attending the Eleusinian Mysteries....This peculiar virtue of psilocybin, the power to enhance personal reality, turns 'Know Thyself' into a practical precept; and may command it as the sacramental food of some new religion."

Fine and prescient words indeed, once more indicative that psilocybin be approached cautiously and with a 'good heart'. Graves' remark about "jaded sensation seekers" is almost identical to Wasson's emerging dismay at the hoards of "oddballs", "thrill seekers", and "riff-raff" who were already descending in their droves upon Mexico in search of the divine mushrooms.

However, this type of popular reaction to some new fashion was surely inevitable. Although it was to cause abject consternation amongst the psilocybin elite, to deny the mushroom outright to the masses is an impractical short-sighted reaction to basic human nature and I would argue that knowledge of psilocybin's potentially supra-mundane power is best laid open to all who might wish to seek it out. If this be considered by some as like casting pearls before swine then so be it. The point is that the end will justify the means, this end being, hopefully, a culture transformed with a revitalised veneration for the natural systems of the Earth and a deeper insight into the ultimate nature of the reality process.

MOKSHA-MEDICINE GROWS ON THE VERGE OF PARADISE

Aldous Huxley explicitly summed up the early mood of optimism surrounding psychedelics in a speech he delivered to psychologists in 1961, and somewhat more implicitly in his Utopian novel *Island* published in 1962. In the speech Huxley predicted that psychological science would inevitably be confronted with more and more data on the visionary experiences induced by substances like psilocybin. Although these experiences might be valueless - no more significant than a trip to the movies - it might be the case that if the visionary experiences be co-operated with, if some deep meaning be ascertained and acted upon, then this could be crucial in changing the lot of humanity. Huxley conjectured that our mode of consciousness could be altered by psychedelics, unleashing a psychological force that enables us

CHAPTER FOUR

INVESTIGATING THE EARTH'S ALCHEMICAL SKIN

Mexico and South America are the areas most associated with ritual entheogenic plant use. Apart from utilising over 20 species of psilocybin mushroom, native Mexicans are also known to have employed the peyote cactus, the morning glory plant, and various species of datura, all of which contain potent visionary substances. The appeal of these plants, like the appeal of the mushroom, is that they support a channel of communication between the shaman and the spiritual domain. As we have seen, this unusual state of affairs arises not from hearsay or dogma but from the numinous effect of such plants upon the human psyche, an effect equally reported by Westerners who might not necessarily be as spiritually inclined as native shamans.

In South America aboriginal Amazonians still prepare a highly effective psychedelic concoction called ayahuasca made principally from an indigenous species of *Banisteriopsis* jungle vine along with various other plant ingredients. This same potion is also taken as a sacramental tea by members of the Uniao Do Vegetal, an officially sanctioned church found throughout Brazil. The active principles in these potions are the substances harmine and dimethyltryptamine (DMT for short), the latter being a close structural relative of psilocybin. Shamans claim that ayahuasca facilitates communion both with mythological beings and the souls of their ancestors. Similarly, species of *Virola* tree - the resin of which also contains DMT - are used to prepare hallucinogenic snuffs in Amazonian Colombia which are taken in order to free the soul so that it may travel in the spiritual dimension.

Such rich shamanic traditions highlight the ultimate way in which the natural environment can inspire an individual, since an intimate link becomes forged between the human psyche and the transcendental dimension of reality. Once such an emotionally charged shamanic connection has been so established and is reinforced through ritual use of a particular visionary plant, the process will generally cultivate an enduring sense of spirituality as well as a religious cosmology as is the case surrounding the use of ayahuasca.

It is not surprising then that the profound psychedelic effect of these indigenous plants becomes firmly integrated into native culture, the shamanic knowledge so acquired reaffirming the culture's identity and their beliefs about the nature of reality. Furthermore, and perhaps of most importance, these kind of plant species aid the practice of healing, whether mental, social or purely physical. In native societies without a health service or subjugation to pharmaceutical conglomerates, the curative role of the shaman becomes an essential feature of daily life, with natural plant allies being very much a tool of the healing trade.

This kind of dynamic psychedelic relationship between *Homo sapiens* and Nature is relatively rare compared with, say, our close relational links to environmental resources like wood, grain, oil, or gas. Yet the natural psychedelic link leaves all others behind in terms of its impact upon one's sense of being. Whereas most of the relational ties that weave us into the living fabric of Gaia are purely utilitarian in material terms, the resource provided by entheogenic plants operates at a different level, offering us spiritual nourishment which, although seemingly intangible, can still have a cultural role to play as witnessed by the important role of the shaman or native healer within aboriginal societies.

Of course, we might object here and assert that we have no need for shamans or entheogens in our technological culture, that we should leave these ostensibly marginal phenomena to those academic anthropologists and ethnobotanists whose vocation it is to gather information on such matters. Indeed, over the last 30 or so years a wealth of research articles have appeared which describe in quite exacting botanical detail how various psychedelic concoctions are prepared by the native cultures who still use them. However, it is almost unheard of for the witnessing ethnobotanist or anthropologist to actually experience the visionary brew for themselves. All the surrounding paraphernalia associated with the alchemical preparation might well be attested to right up to the actual implements employed to administer the drug, yet the principal substance of interest will remain exempt from enquiry. This missing factor is that which is in actuality driving the researcher's interests, namely, the resulting psychological effect of the psychedelic preparation. After all, if the eventual experience generated by the sacrament were not in any way notable then there would be no shamanic legacy to study.

We can see then that although science might be commended for documenting what is after all a fast disappearing aspect of primitive culture, the most important ingredient - the experience - is generally not witnessed. Perhaps this is because the ethnobotanist feels there is no scientific banner under which one could reasonably and legitimately go ahead and sample the hallucinogen in question. But there is. It's called phenomenology - the study of immediate experience and its implications for the allied science of psychology. To actually personally partake of shamanic substances is to glean an insight into the psychological forces which they set in motion. From such an inside view, we might understand more

about the role of the psychedelic experience within the belief systems of native cultures. More to the point, we might gain valuable insights into the mutable potential of consciousness thereby allowing us to make intellectual ground in otherwise intractable areas of human enquiry.

THE BLIND EYE OF SCIENCE

The inadequacy of the scientific study of entheogens is doubtless bound up with the compartmentalisation of science into separate disciplines. Whilst it is rare for a scientist in any particular field to stray into another discipline, it could be argued that such cross-boundary study will nonetheless be useful for fertilising new insights and broader theories. In the case of entheogenic compounds, if we wish to properly understand the entire complex of the entheogenic experience - whether the experience of a native shaman or the experience of a Westernised experimenter - then a marriage simply must be made between psychology, phenomenology, anthropology, and ethnobotany (and even metaphysics) since the subject area can embrace all these fields. If we bear in mind that disciplines like ethnobotany are relatively new anyway, then such a new discipline which I am envisaging is a distinct possibility. Waxing lyrical, I would call such an enterprise neo-shamanic phenomenology. At least its has an impressive ring to it.

But perhaps we assume that we already know all there is to know about the psychological *modus operandi* involved in the action of a classic entheogen like psilocybin? Perhaps a complete and satisfactory explanation regarding the numinous heights of the psilocybin experience has already been delivered by mainstream psychological science, reduced perhaps to a handy set of 'merelys'?

Alas (or thankfully), this is not the case. Not only are substances like psilocybin relatively new to the West, empirical psychological research was effectively curtailed for almost 30 years. The Harvard Psilocybin Project merely scratched the surface of the phenomenon, yet that in itself was enough to cause consternation from the scientific elite. Not to mince words, psychedelic plants and fungi are immensely daunting to the scientific community, not just because of the multifarious disciplines potentially involved but also because their effects are just too hot to handle. Heads turn away. Cold shoulders are shrugged. As if they were B-movie alien species, these unusual forms of life threaten to subvert the collective human psyche and upset our most cherished assumptions about the nature of reality. It really *is* a jungle out there.

Yet despite the obvious dangers posed by the use of psychedelic substances - such as their capacity to induce intense psychological terror (the so-called 'bad trip') - native cultures *have* managed to 'tame' them through a learned appreciation of their scope of effect. Furthermore, such cultures have acquired a wealth of supra-mundane knowledge along the way. Hence, it is my belief that entheogenic Gaian flora and fungi have yet to make their full impact upon the Western psyche, that the knowledge still to be gained from them relating to our conceptions of reality and our theories about consciousness will prove to be of great value not only on an individual level but at the collective level also.

These are reasonable claims since we obviously base our value systems and mass cultural behaviours upon our tacit beliefs about the Earth, life, and our role in the whole caboodle. The alluring possibility with the psilocybin experience is that after initiation one can come to view the planet in a radically different light. Gaia ceases to be an intellectual theory, becoming instead an immediately felt holistic reality of the most extraordinary and exciting kind. One learns what shamans have always known, that Nature is somehow imbued with intelligence. The biosphere suddenly appears as being *really* alive, with visionary plants and fungi acting as a kind of living interface between what Terence McKenna calls the Other or Gaian Mind and the human mind. In this way, an experienced and receptive individual can access transcendental information loaded with cultural and personal significance.

Given their uplifting and profoundly informative properties, psilocybin fungi can be viewed as a potentially symbiotic partner with our species. The symbiosis involves the new range of conception and perception galvanised into operation through the mushroom's effect and, in return, our propagation of the species or at least action on our part that serves the biosphere's overall interests in some way. In any case, psilocybin, like other naturally occurring entheogens, are very much with us and here to stay. As far as we know, more people are familiar with psilocybin fungi today than at any other time in history, their use having grown in popularity since the late 60's and early 70's when it was discovered that they were readily available in Europe and North America.

Notwithstanding the saturation of the entire globe in selective fungicides, restricted access to wilderness areas, or other mad-cap responses to the presence of psilocybin fungi, we have a choice as to whether to investigate the Earth's alchemical skin further or to turn our backs for fear of the unknown. If we do decide to pick up the Gaian gauntlet, we might well be rewarded with a cascade of novel insights into the deepest mysteries of being. Official science can play a role in this noble venture as, indeed, can independent research at the behest and risk of no authority other than one's own.

AN INNER REVOLUTION AWAITS

With the presence of various species of psilocybin fungi growing throughout most wild places of the world as I write (at least 89 species are now known to flourish across the globe), and bearing in mind their illuminating properties which more and more people are becoming familiar with, one cannot help but suspect that some innervating Gaian cultural alchemy is at hand. As we shall see in more detail later, paradigms - conceptual belief systems - crumble and are rebuilt in the wake of the psilocybin experience. This kind of paradigm shifting is not simply an instantaneous event transpiring after ingestion, rather the process can continue long after the original experience almost as if some process of long-term digestive refinement was taking place. By this I mean that if we reflect upon the experience in terms of, say, how the mushroom works chemically, then we gain exceptional knowledge about the underlying chemistry of the brain and the potential parameters of consciousness. The very real possibility of perceptual enhancement is also at stake in which case our dialogue with Nature might be raised to new levels never dreamed of by conventional science and philosophy.

It is through these new conceptual tools, or new improved lenses to borrow from an earlier metaphor, that old paradigms will perforce be challenged. If these old paradigms cannot deal with the entheogenic experience then they must either be adapted or be confined to the past. It is in this way that psilocybin and its effects become gradually absorbed by our culture.

PSYCHEDELIC SCIENCE : ROUND TWO

By now, the reader might assume that mainstream science only skirts around the issues we are most concerned with, that the only extant high-spec research revolves around ethnobotany and the like. Indeed, with the American government's illegalisation of LSD in 1966 and with the subsequent illegalisation of almost all psychedelic drugs (Europe followed suit), human-based studies stopped dead. Everything on the experimental front went into cold storage. You could almost hear the bolts and locks sliding into place. The politics of consciousness reigned supreme.

However, after all these years the locks have been surreptitiously picked and the politics of consciousness challenged. Despite my bemoaning of science, a new kind of psychedelic research is

gradually becoming apparent. This time around the scientists involved do not throw wild parties, nor do they exhort young persons to "tune in, turn on and drop out". Dressed in traditional lab-coats and sensible shoes, firmly buttoned and tied, the second generation of psychedelic scientists have got their empirical act together. Human-based hallucinogen science is now returning to the academic fold, only with far less publicity than 30 years ago and with a lot more caution and circumspection. This time around, science is taking it step-by-careful-step.

Leading the resurgence are two American organisations: The Multidisciplinary Association for Psychedelic Studies (MAPS) which I briefly mentioned in the last chapter, and the Heffter Research Institute (HRI). Founded in 1986, MAPS actively funds psychedelic research (as well as medical cannabis research) and helps scientists draw up their research protocols, a tough job when you have to approach notoriously conservative governmental agencies for permission to do your study. The HRI is a more recent organisation inaugurated in 1993 and named after Arthur Heffter who, a century ago, became the first scientist to isolate and systematically study a psychedelic compound from a plant - in this case mescaline from the peyote cactus. This name reflects the tone of approach to psychedelics taken by the HRI.

The main thrust of both MAPS and the HRI is upon finding a clinical use for psychedelics. In other words, today's psychedelic researchers are primarily concerned with putting psychedelics to use as medicinal agents, a practical agenda which is more easily accepted by the various officiating bodies who control the availability of psychedelic agents to science. In reality, I believe that both organisations are acutely aware of the role that entheogens can play in the study of consciousness. They are, perhaps wisely, less vocal about this 'other' agenda. Despite wishes to the contrary, politics and science invariably mix and this is the main reason why the medical application of entheogens gets priority funding. Perhaps we are witness to paradigm shifting by stealth.

THE MEDICAL USE OF IBOGAINE

One such psychedelic drug presently receiving much scientific scrutiny over its possible medical utilisation is ibogaine, an alkaloid derived from the West African plant *Tabernanthe iboga*. The plant is employed *in situ* by members of the Bwiti cult, a secret society found in Gabon and the Congo who use it in much the same way psilocybin mushrooms and ayahuasca are traditionally used. The aim is to free the soul to connect with God and the ancestors. Here is a typical report from a native African user:

"I wanted to know God - to know things of the dead and the land beyond.... I walked or flew over a long, multicoloured road or over many rivers which led me to my ancestors, who then took me to the great gods."

Ironically perhaps, scientists have now established that the psychological effects of ibogaine can be used to break hard drug addiction. In the mid 1980's Howard Lotsof, an ex-junkie previously cured through his experiences with ibogaine, formed a company to promote the medical use of ibogaine. So assured was he of ibogaine's capacity to break drug addiction, that Lotsof patented ibogaine treatments in the mid-80's. Apparently, it is the unusually intense and personally significant visionary effects of ibogaine that can break the curse of hard drug addiction. Lotsof describes the visions induced by ibogaine in patients he has treated as being like movie-clips:

"The presentation of visual material is rapid. Some patients have described it as a movie run at high speed. Others describe it as a slide-show, each slide containing a picture of a specific event or circumstance in the viewer's life."

Once more, we see the capacity of entheogens to instigate dramatic visionary experiences within the human psyche. Lotsof refers to these movie-clip visions as having Freudian and Jungian connotations as if they could convey deep and significant meaning to the experiencer, and infers that it is this process which lies at the heart of ibogaine's efficacy in breaking patterns of addiction. Lotsof believes that ibogaine is able to make patients re-evaluate their lives and see the mistakes that they may have made and which may have led them into uncontrollable bouts of drug-taking. After treatment with a single dose of ibogaine, the majority of patients remain free from chemical dependence for 3 to 6 months which indicates that ibogaine therapy needs to be on-going and, if possible, be accompanied by other treatments.

DIMETHYLTRYPTAMINE

Perhaps the leading figure in this second wave of psychedelic research is Rick Strassman, a psychiatrist who carried out some remarkable studies at the University of New Mexico in the mid-90's. A look at his

groundbreaking research reveals the spirit of a scientist determined to break through political bureaucracy in order to advance the frontiers of knowledge and add to the pharmaceutical armoury of the practising psychiatrist.

Strassman's work has centred around the prototypical entheogen dimethyltryptamine (DMT). Recall that DMT is a naturally occurring substance employed for millennia in the botanical potions and snuffs utilised by native Amazonian shamans. Classed as an ultra-short acting hallucinogen, DMT, when administered intravenously to humans (as opposed to the drinking of an ayahuasca brew), causes fantastic alterations in consciousness and yet is completely inactive within 30 minutes (the effects of ayahuasca can last for hours). If smoked, the DMT experience is even shorter, lasting less than 5 minutes.

Since DMT is believed, strangely enough, to occur naturally in the human brain (it has been found in blood, urine and spinal fluid and precursor enzymes for it have been found in brain tissue), it was apparent to Strassman that an understanding of its action might shed some light on the development and possible treatment of endogenous hallucinatory conditions like schizophrenia. It is in this way that clinical science comes to make anti-psychotic drugs, substances which can block pathological forms of thought as evident in conditions like schizophrenia. Once you understand the neurochemical events which accompany abnormal states of mind, then you are in a position to develop drugs to treat such conditions.

Despite his purely clinical leanings, Strassman was also interested in using DMT to explore the evermore popular brain/mind issue. This murky area of science - which we shall be returning to in later chapters - is concerned with how the physiochemical brain (the unsightly mass of grey porridge-like stuff in our skulls) is related to the non-physical mind with all its attendant thoughts, ideas, fears, beliefs and so on. What exactly is the connection? Strassman argues that psychedelic drugs, since they alter consciousness, should be able to tell us something about how consciousness is formed in the normal brain. In other words, since psychedelics alter higher cognitive functions connected with what it is to be human, then they can essentially be employed as probes to study the mind/brain interface. This is, of course, exactly my point outlined in the prologue of this book.

It took Strassman a long 2 years to secure permission to carry out DMT studies with humans (experienced psychedelic users were used as this is deemed to be a more ethical approach to such studies). Indeed, it was probably this magnitude of necessary effort which explains the extant lack of

human-based hallucinogen research. A look at Strassman's struggle reveals the horrendous bureaucratic forces (a kind of lingering cultural symptom of the 60's) that face the potential psychedelic researcher. He had to get permission from all sorts of official bodies such as the formidable Drug Enforcement Agency (DEA), and the Food and Drug Administration (FDA), not to mention the numerous ethical bodies which serve to monitor human-based experimentation.

Two years of uphill struggle and Strassman finally acquired all the necessary permission to perform a DMT study, The remarkable results were subsequently published in reputable but specialised scientific journals, a bit like planting the seeds of a new paradigm underground. Perhaps the most interesting finding concerned the subject's reports on what the (intravenously injected) DMT experience was like. As with psilocybin, the effects of DMT warrant our attention if we are interested in the latent potential of human consciousness to transcend 'normal' reality. In Strassman's own words:

"Several aspects of DMT's effects are interesting, The rapidity of onset is quite remarkable; nearly instantaneous when given intravenously. Also the short duration is remarkable; people are quite over the inebriation within 20 to 25 minutes. Many people describe an "intelligence" within the DMT state, which is either just "felt" or "sensed" and sometimes actually "seen" with the mind's eye. People often lose insight into their participation in a drug study for several minutes, forgetting how they got into the mental state they find themselves so suddenly thrust into."

As with its close structural relative psilocybin (molecules of these two compounds are only a few atoms different from one another), subjects reported that the DMT experience felt *more real* than normal reality. Indeed, it is presumably this novel reality encountered through DMT, especially with regard to the perceived contact with an 'intelligent Other', that has led to the use of DMT-containing plants by Amazonian shamans. As already noted, shamans consistently claim that their DMT-containing concoctions put them in direct contact with a transcendental dimension infused with intentionality. Which makes it even more intriguing that Western DMT users report similar experiences. Strassman concludes that:

"The commonality of experience described by various religious traditions makes one wonder if the biological concomitants of these experiences are also similar {and} this has religious/spiritual significance."

Indeed. It would seem then that the chemistry of the brain is indubitably bound up with consciousness. Both are mutable. And, moreover, certain realms of consciousness can be generated in which a seemingly external intelligence is apprehended. If ever there was a 'hard' approach to spirituality, this is it.

Although the study of mystical experiences and neurochemistry might seem like compelling science, the fact of the matter is that most scientists exercise great caution when it comes to explaining, in scientific terms, something as precious and as guarded as the mystical experience. Those who tend to police communion with the divine like religious leaders are quick to react when science attempts to reduce an epiphany to neurochemical events occurring in the brain. Indeed, recall the reaction to Walter Pahnke's findings in the 60's at Harvard. Many religious authorities felt their toes being stepped on and Pahnke was refused further funding. Yet science, with its expanding interest in the nature of human consciousness, is surely mature enough to take on the issue and it thus remains to be seen what science can teach us about the potentialities and extraordinary capacities of the human brain/mind.

Again, I hasten to add that science is not the only valid approach to studying altered forms of consciousness. As I have repeatedly implied, direct self-experimentation according to one's own terms and at one's own risk is also an option. At the end of the day, data is needed. From data we can thence derive theories. Since all entheogenic experiences carry data, we should not be in a rush to dismiss any self-report, whether garnered from a native shaman, an official study subject or an independent researcher (the internet, for example, is abrim with self-reports on the effects of entheogens, most of which relate spiritual aspects).

DOES THE BRAIN RECOGNISE DMT?

There was another finding of Strassman's which proved provocative. Strassman found that the human brain does not develop tolerance to DMT. Whereas the brain normally develops tolerance to psychoactive chemicals (repeated use means you need to use more to get the same experience), Strassman found that tolerance does not develop to the repeated administration of DMT. This suggests that, in the normal brain, DMT has some kind of function - i.e. that the brain recognises DMT and repeatedly utilises it instead of developing tolerance to it. So far this putative function of endogenous (and illegal) DMT remains unknown but it might well be involved in the process of dreaming. This is a tenable hypothesis because we must repeatedly dream every night. If we are selectively denied that part

of the sleep cycle in which we dream - known as REM sleep - then we will subsequently have more dreams at some later time (known as the REM-rebound effect). And so if there are indeed dream-inducing chemicals like, for instance, DMT, then the brain would by necessity have to *not* develop tolerance to DMT since tolerance would stop dreams from taking hold. It is also the case that both dreams and DMT-induced visions are of a fairly similar nature. Both are conditions which, willy-nilly, an experimenter finds themselves utterly involved in.

However, Strassman has other ideas about DMT's putative function:

"Maybe it mediates near-death experiences, or other 'psychedelic' experiences which are elicited without drugs. Maybe it is released at death and birth..."

Well, these are certainly interesting suggestions which Strassman declines to elaborate further. Returning to more down-to-earth speculation, Strassman also recognised a new clinical use for DMT. He found that he was able to administer DMT every half hour to his subjects and after each session was able to discuss their experiences with them. He found that their "psychological resistance's" gradually wore down through these sessions suggesting that DMT has therapeutic potential. Indeed, since DMT is only active for 30 minutes, then it has an advantage over other therapeutic drugs whose effects last much longer and which require more in the way of supervision from the therapist.

SO WHAT DOES IT ALL MEAN?

Although the medical application of psychedelics seems clear enough, with regard to how these substances work and their full range of implications, this is less clear. At the very least, psychedelics alter consciousness in a dramatic fashion, and at the most extreme, as we have repeatedly seen, such substances can elicit a transcendental experience in which one communes with an intelligence of some kind. Indeed, there is a popular belief amongst many of today's psychedelic researchers that the very origin of mankind's religious impulse is bound up with our ancestor's discovery of hallucinogenic fungi, a notion which, as you may recall, was first introduced by Gordon Wasson. Professor David Nichols, president of the of the Heffter Research Institute, puts it this way:

"One can imagine an early hominid accidentally ingesting a hallucinogenic mushroom while foraging for edible foodstuffs. Knowledge of these drugs was handed down through the generations and led to the creation of rituals around their use. We have the hymns written to Soma in the *Rig Veda*, or the ancient Eleusinian Mysteries of Greece, as only two examples of the extreme importance attached to these substances.... Whatever you believe in this regard, it is a simple fact that the use of psychedelic drugs can profoundly alter one's understanding and belief about life and its meaning. Man has been on an age-old quest to find his place in the Universe, and these drugs can be important tools both in understanding this quest, and in gaining meaning about ourselves as conscious creatures."

Whether or not these speculations about mushrooms are correct is not the main issue. The main issue is the conceptual paradigm which sees a naturally occurring psychedelic agent of some kind lying at the heart of humanity's sacred traditions. And if it be doubted that the aforementioned traditions go far enough back in time to be considered instigators of the religious impulse, then one need only observe certain rock paintings found at Tassili in Northern Algeria. Dating from before 6000 BC. (a long, long time before the Mexican use of psilocybin mushrooms described in chapter 2), these ancient Neolithic images show mythical shaman-like beings covered in mushrooms. These mushroom motifs are very distinct. Many have therefore argued that the Goddess-worshipping peoples who inhabited Tassili and who eventually migrated to other parts of the globe, used locally gathered psilocybin mushrooms (such as the large species *Stropharia cubensis*) and that psilocybin influenced their beliefs about Nature and helped evolve many of those aspects of human consciousness (like language, ritual, art etc) which make our species so unique. Indeed, psilocybin might well have been the natural environmental catalyst that launched human civilisation and human history into being in the first place. At any rate, its use in the archaic past is sure to have influenced human perception and conception.

Whilst the debate on the prehistorical relevance of psilocybin and its effects continues, we can end this chapter with a comment by Dr. Strassman. The comment concerns the value of researching the entheogenic experience so as to aid our understanding of human consciousness. With regard to the mystical claims made by native peoples who employ entheogens, he says:

"Scientists ought to take all claims about the mind seriously. The DMT and psilocybin states....are basically non-material. They are not dependent upon the body moving through space, or interaction with other material objects. Thus, they are windows into consciousness, which, while it may have structural underpinnings, is essentially a movement of energy, rather than of matter.....So, at the very least, any claims by non-western people {e.g. shamans} about consciousness might prove very valuable....for speculation about how the mind works. In addition, these 'non-literate' cultures are how we found out

CHAPTER FIVE

THE MUSHROOM AND THE SYNAPSE

Now that I have acquainted the reader with the full spectrum of the psilocybin experience (and others like it), it is time for us to focus our attention upon psilocybin's physical *modus operandi*. If we can get to grips with *how* alkaloids like psilocybin work their spectacular effects upon the human psyche then we will be one step closer to a preliminary understanding of the nature of the conscious human mind and the underlying factors governing the switch from normal awareness to the mystical perception of an intelligent Other.

At this point, consciousness lies at the centre of our enquiry. All our paths of investigation lead directly to it. The psilocybin cultural history covered in the first few chapters of this book arose solely because of the radical change in consciousness induced by the mushroom in the Aztec and Mayan psyche. The pre-LSD events at Harvard were likewise spawned by the psilocybin-induced state of consciousness. Indeed, the whole 60's thing happened, in part, precisely because of the new ranges of conscious experience originally kick-started into existence by the mushroom. The growing second wave of psychedelic research has likewise appeared on account of the compelling nature of entheogen-inspired states of consciousness. One cannot escape the mystery of consciousness. Psilocybin simply highlights the boundless nature and mystical potential of the human mind lest we allow this fortunate state of affairs to pass us by.

As I pointed out at the very outset to this book, if we are interested in apprehending the ultimate nature of the reality process then it makes sense to home in on consciousness since consciousness represents the interface which links us to the 'world out there'. If we can understand what consciousness is, then we might also understand how consciousness is able to be transformed and whether such a transformation does indeed yield bona fide insights into the subtle nature of Nature. Nothing less than reality is up for grabs.

In the chapters that follow, I hope to develop a new non-technical and user-friendly theoretical framework with which we can explain consciousness, and in which we can properly place the entheogenic experience. Essentially this conceptual framework derives from Aldous Huxley's reasonable assertion that the psychedelic experience results from an influx of information not normally available to us - hence the 'doors of perception' being 'opened' after ingestion of substances like, in Huxley's case, mescaline. What I eventually hope to show is that consciousness itself is a form of information; that physical matter can be described in terms of information also; and that *reality consists of an evolutionary flow of self-organising information*, with human consciousness occupying a significant functional role in the entire process.

However, before we can explore the exciting insights that such an informational model of reality yields, we must start from the beginning, that is, we must look more closely at the obviously important physical relationship between psilocybin and the human brain. That might sound rather intimidating but, lets face it, getting to intimate grips with Nature in order to ascertain the meaning of life, consciousness and everything that really matters was never going to be a simple piece of cake. I assure you that its a deeply fascinating piece of cake though.

NEUROMANCING WITH NEUROSCIENCE

In any serious attempt to elucidate the brain processes underlying the psychological effects of entheogenic agents, one must utilise whatever relevant scientific data is at hand. In our case this means neuropsychological data, of which much has become available since the 50's era when Huxley wrote *Doors*.

Neuropsychology is a modern scientific discipline based upon the study of the nervous system, which consists of the body's entire network of nerve cells. These nerve cells, or neurons as they are more formally known, allow us to sense, transmit, and process information. Whereas other cells in the body are designed to, say, form tissues and organs, neurons exist solely to transmit information in the form of discrete signals or impulses. We are able to see, touch, smell, hear, taste, feel and think because we possess a vast network of these neurons which, between them, manage to continually process and communicate information both about the external state of the world and the internal state of the body.

Of particular interest to neuropsychologists is the detailed study of the brain (one component of the nervous system) and the way in which the brain's particular neurons function in order to produce thinking and behaviour. Since psychoactive substances are known to effect the way brain neurons process information, neuropsychology has made some headway into understanding the chemistry of the brain and the actual way in which psychoactive substances work. Thus, we now know something about how common psychoactive substances like tea, coffee, nicotine and alcohol interact with the brain's neuronal architecture to cause their desired psychological effects of stimulation or stupor.

However, the study of psychoactive substances is far from being neuropsychology's key research area. Of perhaps most prominence is the study of the effects of brain trauma, a condition in which specific parts of the brain are known to be damaged. A brief look at the rationale governing this kind of research reveals that we can approach the phenomenon of the entheogenic experience in the same theoretical way.

For instance, medical patients with brain tumours and a corresponding psychological deficiency are, despite their misfortune, of great interest to neuropsychologists because a causal relationship can be ascertained between the area of the tumour and the particular psychological disturbance. This is equally true of brain-damaged victims of accidents, for where there is localised damage one invariably finds psychological disturbances of a definite kind.

As an example, damage to the area of the brain known as Broca's area will often lead to language problems associated with speech production. Patients of this type will have no difficulty in understanding speech but will have a noticeable difficulty in producing speech even to the point of being mute. The point of interest is that a specific area of the physical brain is damaged with an associated specific psychological disruption. Once the neuropsychologist has gathered a wealth of such examples then psychological functions like language (which is often affected after brain injury) can be divided into various sub-systems or 'modules' operating in different areas of the brain, each of which can be differentially disrupted.

The upshot of this methodological enterprise is that science is now able to speculate about normal brain function, and is able to link localised physical brain mechanisms with aspects of the mind. This is quite an achievement, resulting directly from the prevailing 'localisation' paradigm governing a major part of neuropsychology. It is therefore not unusual to come across references to the 'mapping' of the human brain, where different areas are associated with different psychological functions.

Bearing this in mind, it becomes clear that we ought to be able to approach the entheogenic experience in much the same way. That is, by looking at the specific changes to consciousness arising from the unusual presence of specific substances in the brain, we should then be able to theorise about how normal consciousness arises. In other words, just as we can analyse abnormal language production and then speculate about how the language system works in normal people, so too can we analyse altered states of consciousness and thence speculate about the nature of normal consciousness. At any rate, by examining chemical changes associated with changes in consciousness we ought definitely to come to some understanding as to the nature of mindstuff and the ways in which it is possible to modify it via chemistry. On the face of it at least, this area of study promises a wealth of relevant psychological data with which to understand the mind.

Despite this reasoning, science, as should be crystal clear by now, has unfortunately been all but barred from psychedelic investigation since the late 60's when psychedelics became illegalised. And yet enough information on the psychedelic experience has been generated with which to construct a user-friendly theory of consciousness. Most of this information I have outlined in previous chapters, in particular, information on the fundamental type of global change in consciousness caused by psilocybin. If we add to this the relevant information regarding the physical details of psilocybin, then we shall be able to combine the two and reach some sort of sound theoretical conclusion about the nature of consciousness. Regardless of any legal issues, this mode of enquiry promises to be most fruitful. In fact it is rather apt that a mysterious phenomenon like consciousness should require such radical means with which to pry open its nature.

INTRODUCING THE NEURONAL BRAIN

As mentioned, the brain consists of individual information-processing nerve cells or neurons. It is estimated that the human brain contains some 13 or so billion of them. This is an astronomical amount, comparable to the vast number of stars in our galaxy. It is also more than twice the number of people alive on the planet. These 13 billion neurons are the essential 'wetware' of the brain and, massed together with other cells that provide support and energy, they form the spongy grey matter residing within our skulls.

Although the evidence is overwhelming, it still seems extraordinary that this immense interconnected wet mega-blob of porridge-like neuronal stuff is bound up with the elaborate properties of the human mind. Although one might have reservations in associating a soft wet blob with consciousness, the association is indisputable. Scramble someone's brain either through a severe blow to the head or through some other such trauma, and their consciousness similarly becomes scrambled. Or, electrically excite the brain of a patient undergoing brain surgery whilst they are only under the effects of a local anaesthetic, and it transpires that the electrical stimulation evokes definite experiences. And, of course, certain chemical substances introduced into the brain serve to alter consciousness.

Hence, it is overwhelmingly apparent that the human mind with all its attendant beliefs, ideas, neuroses, fears, hopes, goals, and aspirations is intimately bound up with the unsightly wet blob brain. Indeed, what distinguishes *Homo sapiens* from, say, our primate cousins, is the sheer size of our brains and the mental abilities that such a relatively big brain grants us; abilities like self-awareness, language, complex social behaviour, foresight, problem solving, metaphysical musing and so on. We are what we are by virtue of our evolved brains, the phenomenon of human consciousness being determined by this fortunate evolutionary cerebral turn of events.

So what is the neuron exactly and how does it come to be involved not only in your reading of these words, but in the psilocybin experience also? What is it exactly that these billions of units do?

NATURALLY NEAT NEURONS

Structurally, the neuron has 4 main components; dendrites, the soma (no relation to Wasson's soma!) or cell body, the axon, and terminal fibres. This may sound somewhat complicated but the essential principles involved are easily understandable, and are essential knowledge to anyone interested in how their brains 'do their thing'.

Imagine a big tree suspended in mid-air. This tree has a dense network of roots which join on to a bulbous lower trunk. Above this fat lower trunk is a long thin upper trunk which ends with a wispy network of branches. In this picturesque analogy of the neuron (which will be worth bearing in mind for the discussions to come when we try to imagine psilocybin's journey within the brain) the roots of the tree are the dendrites, the lower bulbous trunk is the soma, the long upper trunk is the axon, and the

topmost branches are the terminal fibres. This is the essential structure of the archetypal neuron with its four distinct components, and all of the brain's 13 billion neurons are basically made in this kind of way.

The dendrites are the root structures of the neuron which serve to receive information in the form of signals/impulses from other neurons. In the analogy, the root network of the suspended tree receives signals from the branches of other trees suspended below it. These neuronal signals travel to the soma (lower trunk) where they are integrated. The singular result of this integration is then passed on to the axon (upper trunk), which in turn passes on the information to the terminal fibres (branches).

Already we can see that neurons transmit informational impulses in an orderly well-defined manner, that is, informational signals progress or flow through the neuronal architecture in one direction only. But what exactly are these signals? What sort of information do these tree-like neurons process?

Since neurons are living tissue they operate by making use of their inherent electrochemical property, which is to say that their particular chemical molecular structure allows electrical potentials to be generated. The neuron has been constructed by Nature in such a way that it can either fire or not fire depending upon its input from other neurons. Firing here means that the neuron sends forth an electrochemical impulse (a rapidly travelling wave of electrical excitation) down its axon to its terminal fibres, at which point the impulse can be transmitted to other neurons.

This then is the sort of information that neurons process. The information they carry is embodied in the *electrochemical activity of the neuron* - its state of either firing or not firing, transmitting electrochemical impulses on to other neurons or not transmitting impulses. This is rather like the 'bit' components inside computers, which are binary devices which store information by being either on or off, active or inactive. Neurons thus appear to operate *digitally*.

Neurons can either fire or not fire, they cannot half-fire. There is no room for doubt or indecision, only a logically determined discrete firing or non-firing signal according to what other neurons in their vicinity are doing. The purpose of the soma is to integrate all the incoming signals from its dendrites (signals which come from other neurons) in such a way as to yield one subsequent impulse down its axon - or not, as the case may be. The concept of threshold is therefore crucial here. For simplicity's sake, if there are a certain number of impulses received by the soma from other neurons then the firing threshold will

be met and an impulse will be passed on down the axon. Conversely if the particular threshold is not met then there will be no impulse sent down the axon.

Don't relax yet, for there is one more important fact to consider. Neurons can be excitatory or inhibitory. If the neuron is excitatory then if it fires, as its name suggests, its impulse will be one that tends to cause excitation in other neurons with which it connects. In other words its impulse will add to the chances of the next neuron in line firing as well. On the other hand, inhibitory neurons should they fire are such that they will decrease the chances of the next neuron in line firing.

To use the suspended tree analogy again, imagine that the roots receive 100 impulses from the nearby branches of other trees below. The majority of these impulses, lets say, are inhibitory - that is, their inherent message being conveyed to the tree is "do not fire an impulse". After these signals are processed or integrated by the lower trunk of the tree a resultant impulse is therefore not passed along to the upper trunk and branches, and thence no signal is conveyed to subsequent trees above.

And there you have it, the essential features of the brain's neuronal machinery in a highly sophisticated nut-shell. Information is transmitted and processed by the brain via the collective firing patterns of billions of neurons. Like the myriad on-off bit components of a computer, unbelievably large systems of neurons are able to carry out various computational processes and procedures, although in the case of the brain it's capacity to compute and literally think far outstrips the capacity of any currently existing computer. To imagine a sentient HAL-like computer by 2001 which worries about being turned off is, perhaps, excessive wishful thinking. Whilst computers might be good at numerical calculation and other well-defined logical operations, they fail miserably when it comes to carrying out the types of thinking which we do all the time like crossing a really busy whilst simultaneously contemplating a Shakespearean metaphor. Perhaps if computers were born into a society of computers, were able to form intricately detailed models of reality, and were able to continually re-write themselves, then maybe they might eventually come to possess mindful characteristics. As it stands, what partly determines human consciousness and the human self is the vast web of social and societal relations which impinge upon us, the complex internal models of reality which we build and store, and the continual learning processes we undertake (given its global connectivity, I concede that the internet might eventually achieve some sort of intelligence/sentience).

When considering the organised neuronal activity of the human brain, what we must actively strive to appreciate is the enormity of the system and the different patterns of impulse firing that the whole system

can potentially embody. Not only are there billions of discrete neuronal firing devices, the amount of connectivity between them almost defies calculation. It has been estimated that each individual neuron can potentially pass on impulses to as many as 10,000 other neurons, and is in receipt of as many as 50,000 potential impulses from other neurons. In our tree analogy, each tree could therefore receive, integrate, and pass on impulses to and from vast *forests* of other trees.

Based upon the above figures it has been calculated that the informational storage capacity of the brain is comparable to the content of all the books ever written. It is this bewildering capacity to process and store information that makes the human mind as rich and as complex as it appears to be. Without the brain's ability to continually channel and organise billions of bits of information, the conscious human psyche as we know it could not exist.

This wealth of neuronal complexity which we all carry around in our 'big' heads is staggering to say the least. At any one moment the entire network can be in an essentially infinite amount of states of firing, and somewhere amongst such informational complexity lies our consciousness - who and what we are. Before dwelling upon this obviously compelling mystery, there is yet more relevant data to consider. According to the outline of neurons given thus far, it might be assumed that they contact one another directly. We might suppose that the terminal fibres of neurons pass on their firing impulses directly to the dendrites of other neurons. In the tree analogy this infers that the branch tips of one tree touch the roots of others. However, this is not the case. What is more, the actual mechanism in which neurons relay their electrochemically mediated information to one another is the very place where psychoactive substances like psilocybin and your morning cup of caffeine-enriched coffee are believed to operate. To be more precise, the synapse is where its all at.

A FANTASTIC JOURNEY INTO THE SYNAPSE

The synapse is the junction between two neurons, the place where they communicate, and is arguably the most interesting feature of neuronal activity, for it operates with chemical substances which psychoactive drugs resemble. In fact, as we shall shortly see, all of the most powerful psychoactive drugs act by mimicking the brain's own chemical substances employed at synaptic sites.

The chemicals employed at the neuronal synapse are called neurotransmitters since they are the chemical

agents which allow neurons to transmit their electrochemical impulses to one another. Instead of one neuron directly fusing onto another, there is an intervening gap between them - the synaptic cleft - over which impulses must be conveyed if they are to pass on their informational content. This synaptic gap is so small that it can only be discerned with the aid of the electron microscope. Yet despite its microscopic size, a tremendous amount of chemical activity can and does occur in the synaptic cleft so that, in reality, the microscopic gap is more of a busy molecular chasm.

Basically, when an electrochemical impulse reaches the synapses at the end regions of the neuron's terminal fibres (the tips of the branches in our tree analogy), it causes a neurotransmitter substance to be released into the synaptic cleft. After this substance has flooded this intervening space, some of its molecules bind themselves to special receptors on the surface of the dendrites of the receiving neuron. After the binding has occurred, the original impulse is re-generated in this neuron and subsequently passed on towards other neurons.

In order to fully appreciate the scope, scale, and intricacy of synaptic information transmission, permit me to employ another picturesque analogy. Instead of a terminal fibre/dendrite synapse, think of two train tunnels that do not meet but have an intervening space of, say, 10 metres between the ends of each of them. Furthermore, imagine that a train speeds along one of the tunnels at 100's of miles per hour. This is akin to the high velocity impulse travelling along a neuron. Not dogged by track problems, this 'Intercity Electrochemical Impulse Express' reaches the end of the tunnel and duly crashes onto specially constructed buffers. The dramatic impact upon the said buffers causes a group of strategically placed gas canisters to explode, thus dispersing their gaseous contents into the gap between the two tunnels. The gases instantaneously diffuse across the gap and cause a reaction to occur to a stationary train situated at the start of the next tunnel. As soon as molecules of the gas reach this next train, a neat reaction occurs in which the engine roars up and the train is off, at the same speed as the first train. Meanwhile the gas molecules in the gap are immediately 'mopped up' (and then conveniently re-cycled) so that they do not cause the replacement train (which magically appears almost instantly to replace the one that just sped off) to start up also. And in the first tunnel the original train has also been removed in order to allow another to follow if needs be.

Though elaborate, this analogy is nonetheless a relatively simple representation capturing the principles of the information communication which occurs at a *single* synapse. Although one might argue that a speeding train is a physical thing and an electrochemical impulse is not strictly a physical thing, the most important feature is the activity of the system and the *informational state* that it is in at any given moment. We could equally imagine a speeding band of fluorescent light or even a speeding vortex of turbulent air travelling down the tunnels; it does not matter. What really matters is the informational state

of the components of the system - i.e. their *relations* with one another. In the actual neuronal synapse these crucial relations are defined by the chemical constituency of the whole system, that is, where and what effects various neurotransmitters are having upon the different parts of the synapse.

If the synapse is starting to sound ridiculously complex (as if Nature could not be *that* smart in her evolutionary manipulations), we should also keep in mind that the synaptic transmission of an impulse outlined above takes place in no more than 100 microseconds. In this outrageously short space of time, a few tens of thousand neurotransmitting molecules are released from the terminal fibres of one neuron, are diffused across the synaptic cleft, come to attach themselves to special receptors on the dendrite of the next neuron, cause an electrochemical impulse to be generated (or not), and are finally reabsorbed and recycled for further use by the first neuron. All this in 100 millionths of a second! Truly the mind boggles at the very processes underlying its boggling!

Despite the awesome intricacies of the neuronal system, I have deliberately ignored many of the other features to the neuronal transmission of information. For instance, the electrochemical impulse which shoots through the neuron is itself chock-a-block with chemical complexity. We find outrageously sophisticated potassium and sodium chemical pumps in the axon, we find vast oceans of charged particles or ions being continuously pumped in and out of the axon through special membrane channels so that an electric current is created, and we witness, finally, the aforementioned emergent wave of electrical activity whizzing along the axon to the terminal fibres and on to the synapses. That is the least that can be said to even begin appreciating the millennia-old work of environmental forces in shaping the evolution of the mammalian brain.

In general, a major conceptual flaw in our understanding of the workings of neurons is this distinct lack of appreciation for their relative size and speed of processing, an unfortunate fact which I am at pains to rectify here. Our modes of enquiry are such that we will tend to gloss over complexity. True, we don't have to marvel, gasp, and sit down in amazement at neuronal phenomena, yet to not do so (marvel at least) is to betray the subtlest fruits of the evolutionary process.

So, although we can examine individual neurons and ascertain the mechanism whereby they carry information and although we can recognise the role of neurotransmitting substances in propagating nerve signals from neuron to neuron via the synapse, traditional scientific approaches tend to fail dismally in fully conveying, in an emotional sense, the immense organisational complexity involved in the neuronal system as a whole.

Textbooks, for clarity, describe single neurons (as have I) and single synapses in a fairly cold and reductive manner. What seems never to be stressed is the magnitude of electrochemical changes which zip throughout the conscious brain. Literally billions of co-ordinated and meaningful molecular events occurring in literally billions of discrete locations at every moment virtually non-stop and somehow integrated so that organised sense results. This is seriously mean information processing with a vengeance.

If, then, we are attempting to marry such neuronal activity with psychological activity (i.e. consciousness), that is, if we are attempting to bridge the conceptual gap between mental and physical reality, then we must appreciate the organisational complexities involved. For if we merely skate over the immensity of these processes we shall be missing a kind of intuitive feel for the entire system.

NEURONAL PATTERNS AND CONTEXT

Returning to the concept of organised patterns of neuronal firing, this becomes useful when we begin to think about the way the brain must work in everyday situations. If we take some important psychological function like, say, face recognition, then we can see that the particular *pattern* of neuronal firing caused by nerve impulses issuing from the visual system when it is looking at a face, will be, for any particular face, unique. In other words, each face we see will generate a unique pattern of neuronal firing - the face's neuronal signature - in our brain. Furthermore, the neuronal processing of faces would appear to reside in a specific area of the brain which can be selectively damaged resulting in prosopagnosia, a psychological disorder in which the sufferer fails to recognise faces, even those of close family members.

Similarly, we recognise different people's voices by virtue of the fact that each voice will cause a distinct pattern of neuronal firing which will be conducted from the auditory senses to deep within the brain. Eventually this pattern of information will reach that part of the brain where acoustical information is analysed and recognised. The same is true for different tastes. Each type of food or drink we consume will cause a different pattern of nerve impulses to be generated, which will finally reach that part of the brain which deals in the perception of taste.

In each of these cases, the neuronal pattern produced through the sensing of a particular face, voice, or taste will, at some stage, need to be compared with other possible neuronal patterns in order to yield its particular meaning and significance. Therefore, the different processing systems of the brain must act, in part, to provide a *context* for on-going neuronal patterns. Without such a contextual effect, neuronal patterns will not be able to yield their inherent informational content. The brain's capacity to provide a precise context for on-going neuronal patterns is thus crucial in understanding how neuronal activity and neuronal firing patterns can become meaningful.

The Berkeley psychology professor Bernard J. Baars has noted the importance of contextual effects in giving meaning to on-going neuronal patterns. He writes:

"We generally gain information about a world that is locally ambiguous, yet we usually experience a stable, coherent world. This suggests that before input becomes conscious, it interacts with numerous unconscious contextual influences to produce a single, coherent, conscious experience. Consciousness and context are twin issues, inseparable in the nature of things."

Although a detailed look at all the intricacies of neuronal firing patterns is beyond the scope of this book, for the time being it is enough that we grasp the essential principles which are likely to be involved in the brain's processing of information. Organised neuronal patterns arising from, say, visible external stimuli, contain a wealth of latent information about the stimuli, which is to say that the neuronal patterns are representations of those stimuli. The latent information in these neuronal representations then gets 'read' once the neuronal patterns are contextually processed. The brain, by supplying a context to neuronal representations, is able to access the meaning inherent in them.

One currently popular neurophilosophical approach to understanding mental states is that of functionalism, which, despite its dreary name, captures the important role of context in conscious brain processes. Essentially, functionalism views firing states of the brain as playing functional roles in an economy or language of such possible firing states, which is another way of describing the type of contextual effects outlined above. Any neuronal firing state of the brain derives its significance and meaning according to the functional role which it plays within a language of possible states. All possible states will be related to one another (just as words in the English language are all related to one another) and it is the network of relations (held within unconscious systems of the brain like the memory system) which act as context.

We now have at least a preliminary handle on the fundamental way in which the neuronal brain operates. Patterns of neuronal firing embody information and meaning which is read or accessed by the brain through language-like contextual/relational effects. Conscious experience would appear to be intimately bound up somewhere within this information processing system since it is consciousness which comes to experience meaning. We see faces and we know who they are. We see pictures and we see what they mean. We hear sounds and we know what they signify. Consciousness is therefore substantiated within neuronal information processing, and it begins to look as if consciousness *were itself a form of information which emerges at the highest level of the neuronal system.*

With these speculations in mind, let us look at the way in which psychoactive substances effect neurons, synapses, and, of course, consciousness. This is where physical processes can be seen to be connected directly to changes in consciousness, an area of analysis teeming with profound implications, especially when we consider the effects of psilocybin. More importantly, we might ascertain still more clearly how consciousness can be understood as a form of information.

CHEMISTRY AND THE MIND

There are drugs and there are drugs. To be precise, there are 5 principle classes of drugs which effect mood and behaviour, some of which we have already met and discussed. These are: depressants like alcohol, barbiturates, valium, and anaesthetics; stimulants like amphetamine (speed), cocaine, caffeine, and nicotine; opiates like opium, heroin, and morphine; antipsychotics like chlorpromazine (thorazine); and last but by absolutely no means least, there are psychedelics or entheogens like psilocybin, mescaline, LSD, and DMT. Also included as psychedelics are cannabis - since it can cause visual hallucinations at high doses - and the synthetic rave-drug Ecstasy (MDMA).

Despite the fact that the substances listed here as being psychedelic could be further divided according to the precise effect they have, this basic classification will suffice for the following discussion in which we will focus upon the way in which these substances are believed to work. Although we will briefly look at each class of substance, most attention will be paid to the known neurophysiological effects of psilocybin.

The predominant effect of depressants is to depress, or deaden, neuronal activity. Consider anaesthetics. They are so strong in their depressant action that beyond the state of general anaesthesia which they induce there lies only coma and death. It is believed that once anaesthetics have been administered, they reach the brain and inhibit neuronal firing so much so that consciousness is 'lost'. Therefore it is clear that without adequate neuronal firing there can be no information processing or informational conductance and hence no mindfulness. Already then, we have yet more proof that consciousness is bound up with the billionfold action of activated neurons in the brain.

If we take another depressant - alcohol - we find that it too acts to inhibit neuronal firing throughout the brain, and hence consciousness becomes depressed or reduced. However, at low doses the opposite effect pertains whereby there is a certain degree of psychological stimulation because of the initial depression of inhibitory synapses, which, as you will recall, serve to diminish neuronal firing. However, soon after these inhibitory neurons are depressed, excitatory neurons begin to be depressed as well and this effect comes to dominate the ensuing state of consciousness.

Not only do depressants act to inhibit neuronal firing in the brain, they appear to depress the activity of the body's other nerves, heart tissue, and muscle tissue. More specifically, depressants upset the functioning of the arousal centres in the brain such that psychological arousal and stimulation are diminished. In short, the quantity of consciousness is reduced due to a concurrent reduction in neuronal firing i.e. there is less informational patterning and less informational organisation happening within the neuronal systems of the brain once a depressant drug has become active.

Stimulants appear to have the opposite effect of depressants. Cocaine and amphetamine each work in virtually the same way, causing almost identical stimulatory effects such as euphoria, an increase in alertness, an elevation of mood, and a reduction in fatigue. Indeed, cocaine is derived from the coca plant, the leaves of which are still chewed daily by millions of South American native peoples precisely for the resultant psychological stimulation and reduction in perceived tiredness and hunger. This latter 'productive' effect of the coca leaf explains the fact that whilst the 16th century Spanish conquistadors outlawed the religious use of psychoactive mushrooms, peoples like the Incas were allowed to continue their practice of chewing coca leaves as long as it was whilst they slaved away in Spanish gold mines.

Amphetamine is believed to act in a way that mimics and increases the activity of the neurotransmitter

noradrenaline (the brain uses many different types of neurotransmitter), thus interfering with the normal synaptic functioning of noradrenaline-containing neurons. This is because amphetamine is so similar in molecular structure to noradrenaline that it literally invades those neuronal areas where synaptic transmission with noradrenaline occurs and thence increases the rate of impulse generation. Once it has done so, the typical 'speeding' psychological responses take hold.

With cocaine a similar tale unfolds. In this case however, it appears that cocaine inhibits the re-cycling (the 'mopping up') of noradrenaline within the synapse after it has done its work. Because of this selective interference, there is more noradrenaline 'hanging around' in the synapse and therefore more of it to stimulate the receiving neuron into excitatory action.

In both cases, the chief physical effect is that of an increase in synaptic activity which causes stimulation of the nervous system. Again we see that the uplifting alteration in consciousness caused by these drugs is due to an increase in the information processing activity of certain types of neuron, in this case, neurons utilising noradrenaline. Increased neuronal activity of this kind then generates the desired psychological stimulation or 'high'. It is important to bear in mind here however, that the increased neuronal activity in this case does not lead to any kind of profound visionary experience. Such radical phenomenology is restricted to entheogens.

With good old tea and coffee, the active ingredient caffeine is believed to increase rates of cellular metabolism, thus making more energy available to cells. The net result of this action is once more an elevated rate of neuronal firing, which explains the subtle stimulatory properties of tea and coffee and their widespread use.

The third class of psychoactive substance on our list are the opiates which are derived from the natural opium poppy. The opiates are interesting for their variety of powerful effects. The world-wide painkiller morphine is an invaluable opiate and its chemical isolation from the opium poppy radically revolutionised medicine and the world-wide control of pain. Morphine seems to selectively bind to 'opiate receptors' in the brain, which suggests that the brain has its own pain control mechanisms. Indeed, it has been proposed that acupuncture and hypnosis might be able to reduce pain because they encourage the brain to generate its own endorphins, which are opiate substances which will bind to opiate receptors (endorphins are also believed to be the cause of the high often felt after rigorous exercise). Once these opiate receptors are activated the emotional perception of pain diminishes - as opposed to a diminishing of the actual 'pain' impulses arriving from the site of injury. Along with opium and heroin (a semi-

synthetic compound), morphine also generates euphoria and this is associated with the emotional changes wrought through the activation of the nervous system's opiate receptors.

With the fourth class of drugs, the antipsychotics, we find mass-synthesised compounds like chlorpromazine being used the world over to treat mental diseases like schizophrenia. Perhaps the most accepted neuropsychological theory holds it that schizophrenia results from an excess of the substance dopamine within the brain. As you might have guessed, dopamine is yet another of the brain's major neurotransmitters.

The excess dopamine explanation for schizophrenia is supported by the effects of chlorpromazine which diminishes the symptoms of this disease. Since chlorpromazine operates by blocking dopamine receptors in the brain, it is logical to assume that an excess of dopaminergic neuronal activity lies at the heart of schizophrenia. This leads to the intriguing conclusion that somehow an excess of dopamine-using neurons is intimately bound up with the strange delusions and belief systems of the unfortunate mind suffering from schizophrenia. By blocking the receptor sites of the excess dopamine, chlorpromazine therefore helps to block disorders of thought.

Here we have another strong clue on how to unravel the mysteries of the global formation and global emergence of consciousness, for schizophrenia is noted precisely for its global disruptions of consciousness. Furthermore, these vast disruptions in thought appear to be non-random in that certain definite types of delusion are observed, often related to feelings of paranoia and the belief that one is being controlled by horribly malevolent external forces. If dopaminergic synaptic overactivity really is to blame for these global thought disorders, then we can begin to conceive how large patterns of abnormal neuronal firing yield large disorders of thought i.e. delusions and the like. If neuronal activity becomes too overactive and too 'wild', then the resultant firing patterns might well be 'flawed', which is to say that such patterns are essentially mistakes serving to mislead the experiencer. Or, if there is some negative disruption to the overall way in which the schizophrenic conceives reality, then their model of reality will provide a faulty contextual effect upon on-going neuronal activity.

Obviously the human brain is a finely tuned information processing instrument. If the neuronal events substantiating some kinds of information processing are pushed too far from some criteria, or if neuronal events are 'read' by an erroneous contextual system, then faulty processing occurs with its resultant negative disruption of consciousness.

NEURO-ALCHEMICAL MAGIC

Finally we have come to the class of compounds we call the psychedelics or entheogens. Admittedly it has been a little tough getting here, yet the journey is worth it since the psilocybin mushroom is always worth pursuing for its striking implications relating to human consciousness. Thus, we are now ready to home in even closer to the link between neuronal chemistry and consciousness.

Psychedelic substances are by far the most interesting of all known psychoactive substances, although precious little is known about exactly how they are able to generate such a remarkable set of psychological effects. Psychedelics are often referred to by unwary clinicians as hallucinogens (as opposed to entheogens), yet this term suggests that hallucinations are formed. The general definition of an hallucination is that of a perceived object in 3-dimensional space which is in actuality not there - a bit like seeing a ghost or mirage. But this is not a typical effect of psychedelics as I hope I have shown in previous chapters. In fact, amongst the most prominent effects of substances like psilocybin is the induction of complex visionary scenes which unfold with closed eyes, along with the perceived increase in the 'realness' of the external world as viewed with eyes open. More specifically, one does not hallucinate non-existent objects, rather one comes to see external reality in a new and arguably enhanced way. It is for these reasons that the term entheogen or psychedelic (literally mind-manifesting) be preferred to classify these particular substances.

It is believed that psilocybin, LSD, and DMT work by mimicking the neurotransmitter serotonin (5-HT), one of the most important and widespread of the brain's synaptic neurochemical messengers. The mimicking occurs because LSD, and particularly psilocybin, possess an almost identical molecular structure to serotonin i.e. their shape is so similar that they are able to 'fool' and infiltrate parts of the brain which process information using serotonergic synapses.

Serotonin is employed in a number of brain structures which seem to control functions like sleep, mood, and general arousal. One of these structures is the raphe system at the base of the brain, whose serotonergic neuronal axons project to all other major areas of the brain, notably the limbic system (which controls emotional responses) and areas of the visual system.

According to noted neuroscientist G.K.Aghajanian, the serotonin-using raphe system has a homeostatic function in which two primary effects emerge. Firstly, in the waking state the system acts to enhance the activity of motor neurons which govern the control of muscular movement. Secondly, and more significantly, during the waking state this same serotonergic system acts to suppress sensory systems, which are those systems relaying information about the external world. This second effect, according to Aghajanian, serves to "screen out distracting sensory cues."

Furthermore, it has been speculated that this homeostatic 'screening out' function maintains a kind of 'balance' of consciousness in which we perceive reality in a 'steady' way, almost as if the serotonergic raphe system were a balancing stick enabling us to walk the 'tightrope' of normal perceptual awareness. If this serotonergic homeostatic balancing system is interfered with, then the perception of reality will be correspondingly altered, so much so that we may plunge off the tightrope into new dimensions of perceived reality. Chemically dismantling the raphe system's screening effect would therefore admit the entry of latent information into consciousness. Is this how agents like psilocybin work?

Most of the detailed physiological experimentation that was carried out with psychedelics in the 60's concentrated on LSD and psilocybin and used rat brains, cat brains, and isolated rat neurons. Perhaps the most important finding was indeed that LSD and psilocybin depress the action of serotonin neurons in precisely the raphe system (a neuronal system shared by rats, cats and humans). The usual activity of the particular serotonergic neurons which psilocybin and LSD depress is inhibitory which means that their normal firing serves to dampen or suppress activity in the those other parts of the brain with which they synapse. Thus it was believed that psilocybin and LSD's dampening effect on serotonergic neurons facilitated an increase in neuronal firing in those areas of the brain in contact with the raphe system (like the aforementioned visual and limbic/emotion systems). It was this effect, this enhancement of neuronal activation, that was believed to correlate with the entheogenic experience itself.

It seemed like a nice neat theory. However, things are never that simple when it comes to the actions of psychedelics. For the above scenario does not take into account the more recently discovered neuropharmacological action of mescaline, another classic entheogen. With not a little theoretical irritation we find that, like psilocybin, mescaline induces the full spectrum of visionary phenomenology but is not known to significantly effect the raphe system. Which means that our raphe theory is not the whole story. Just when it was all looking so clear....

Research over the last decade has revealed that there are distinct kinds of serotonin receptors, or serotonin binding sites, within the brain. In other words, neurons which are modulated by the release of serotonin from other neurons with which they synapse, are not tied down to just one kind of serotonin receptor. In typical fashion, Nature has made things more complex and intriguing than that. In fact, there appear to be many different kinds of serotonin receptor (called sub-type receptors) and it is believed that different psychedelic drugs have differential effects upon these receptors. One particular serotonin receptor though - the so-called 5-HT₂ type - appears to represent a common site of action of both psilocybin and mescaline.

5-HT₂ receptors are found throughout the cortex and also in abundance in the brain system known as the locus coeruleus which, like the raphe, is situated at the base of the brain. The locus coeruleus processes so many sensory inputs (a flow of incoming data if you like) that it is considered to function as a 'novelty detector' and is able to influence one's state of arousal. By monitoring the constant surge of 'electrochemical traffic' passing through it, the locus coeruleus is able to detect changes in the flow of data should a change occur and thus alert other parts of the brain. According to our expert G.K.Aghajanian, both psilocybin and mescaline bind to these 5-HT₂ sites in the locus coeruleus and thus alter the functioning of this system, ultimately raising levels of alertness and arousal. In other words, it once again seems that entheogens function by making more information available to the experiencer.

THE NOVEL ORCHESTRATION OF INFORMATION

We are now in a position in which we can summarise the above findings: the net result of psilocybin's combined effects upon the locus coeruleus and the raphe system is an increase in neuronal firing, a concurrent increase in consciousness (an increase in perceived reality), and the emergence of shamanic visions.

Of the above description, only the second claim is in any way contentious, for I suggest an increase in consciousness. Others might argue that the increase in neuronal firing in the brain is more of an unwelcome dysfunction than a constructive effect. However, such a negative judgement is to miss the implications of the entheogenic state of mind. After all, Huxley claimed that psychedelics could, through an act of 'gratuitous grace', permit one access to perceptual information that was 'out there', but not normally needed since from an evolutionary standpoint we need only information regarding things like food, safety, and sex. Or at least those are the sorts of thing it has been essential to know in our evolutionary past. Of course for Huxley and other champions of the psychedelic experience, the

knowledge made available through visionary plant alkaloids was suddenly very important in the light of contemporary Western culture. A transcendental reality appeared to be awaiting us, ready to erupt amidst the mundane and oft-profane trudge of human history.

Armed with modern data on serotonin receptors and their infiltration by entheogens, we can see that Huxley was correct in his pioneering conjectures. Once entheogenic compounds have entered the brain, an increase in neuronal activity (i.e. an increase in neuronal excitation and electrochemical information processing) takes place - hence more information does indeed become accessible to the mind. In particular, the parts of the brain which become more activated are involved with novelty-detection, arousal, emotions, and the relaying of sensory information.

But what exactly does it mean that there is an increase in neuronal informational activity? Just how valid and 'real' are the novel patterns of neuronal firing orchestrated by psilocybin? Indeed, how can novel patterns of neuronal firing actually *be* conscious thoughts?

From here on the ground gets more uncertain, mainly because the brain is such an astonishingly complicated organ. However, before we go on to speculate and deal further with what has been said thus far, there is one more piece of information we should consider, namely the role of serotonergic neurons with the process of dreaming.

SLEEPING DREAMS AND WAKING DREAMS

REM sleep, or rapid eye movement sleep, is that part of the sleep cycle in which we dream the most vividly. Sleep, let alone dreaming, is a peculiar thing, especially since we spend about a third of our lives succumbing to it. Despite such a dramatic nightly encumbrance, science has yet to reach a universally agreed reason why we sleep, for one can come up with plenty of arguments that counter explanations which view sleep as a purely restorative process. Proneness to attack comes to mind for instance, for when else are we so passively oblivious to our surroundings? As to why we dream, there are again numerous theories, from odd theories that we dream to forget, to theories that we dream to consolidate information.

Although we might not remember our dreams it is vital that we engage in REM/dream sleep each night. Sleep researchers have found that if periods of REM are selectively disrupted then this results in a rebound effect whereby the next night, barring any more selective interference from researchers, there will be an extra amount of REM, or dreaming. We absolutely must dream, and therefore dreaming has been related to some very important informational process of the brain.

Neuroscientist B.L.Jacobs has carried out experiments which show that a suppression of serotonergic neuronal activity elicits dreaming. If cats (unfortunately these most loveable creatures are often used for questionable brain-meddling sleep experiments) are injected with a chemical called PCPA which is known to block serotonin supplies to all parts of the brain, then the cats start to exhibit brain-wave patterns consistent with the onset of dreaming despite the fact that they are fully awake. In other words argues Jacobs, the cats are experiencing waking dreams.

Therefore, waking dreams are somehow associated with low levels of serotonin. Indeed, during dream sleep serotonergic cells in the raphe system will 'turn off' completely so that they cease having a depressant effect on other parts of the brain, a process which echoes the effects of psilocybin upon the raphe system.

The conclusion reached is that dreaming is associated with a form of neuronal firing normally kept at bay by inhibitory serotonergic neurons until the onset of sleep. More importantly, the visions produced by psychedelic agents like psilocybin might be the result of waking dreams. Or at least they might emerge from neuronal processes which are similar to those processes occurring whilst we dream. This idea is not only compelling, it also seems intuitively correct; the psilocybin mushroom allows one to experience dream-like consciousness whilst awake and these take the form of intensely moving visions behind closed eyes.

According to the various documented cases of the shamanic visionary state, entheogenic visions are indeed dreamlike, the only difference being that one is immeasurably more conscious during such visions than in dreams (even lucid ones) and one is able to remember them vividly, unlike dreams which appear to fade quickly. Whereas most people cannot, offhand, recall most of the thousands of dreams which they all must have had, psilocybin visions remain fairly emblazoned upon the memory, like favourite movie clips.

To be sure, the suggestion that psilocybin visions are dreamlike is theoretically useful, yet it seriously downplays their impact and dynamic vividness and 'Otherness'. But since there is clearly some similarity in the chemical basis and phenomenological quality of dreams with the chemical basis and phenomenological quality of entheogenic visionary episodes, their relationship - in terms of neuronal processes - demands further exploration, and so this is where we head, in part, in the next chapter. But, we must bear in mind that the vision-generating side of the mushroom experience is only the half of it, since the altered perception of reality with eyes open is of equal importance. However, as stated, both these phenomena are intimately related to the processing of information within the neuronal systems of the brain, and we therefore need to begin thinking more deeply about the relationship between billion-fold patterns of neuronal firing and consciousness. I have already introduced the idea that vast patterns of orchestrated neuronal firing *are* conscious experience, yet this concept is so much rife with profundity that I shall repeatedly return to it in order to fully explore its worth as an explanatory model for understanding the nature of the brain/mind.

Whether it be a dream or an entheogenic vision, a normal perception of an object or a psychedelic perception, the underlying structure of such experiences can now be discerned. The common mediating factor is *information*, and the way in which such information is transmitted, organised, and substantiated within the neuronal firing of the brain. Information, the 'currency' of the brain, emerges as the key concept in explaining the normal conscious mind, the entheogenic mind, and the dreaming mind. We continue our numinous investigations in the next chapter, as we spiral in towards the secret of the shamanic earthly mushroom.

[Go to Chapter Six](#)

CHAPTER SIX

THE STUFF OF CONSCIOUSNESS

The purpose of this and the following chapters is to build upon the ideas previously introduced in order that we might understand of what 'stuff' the mind, or consciousness, is made, and how it is potentially possible for one to experience a visionary dialogue with the transcendental Other. At this juncture I can repeat that I believe mindstuff to be information, or at any rate that consciousness is an informational pattern embodied within the neuronal wetware of the brain. Moreover, it seems that entheogens like psilocybin work by enabling *novel* informational patterns to emerge which are not normally 'permitted' due to the normal constraints operating in the brain. This much seems clear from what has already been said about the way in which neuronal firing substantiates informational states and how such informational states are dramatically altered through the chemical action of entheogenic compounds.

In other words, mindstuff resolves itself as being informational stuff. This is perhaps not too controversial a claim, but what I eventually hope to show is that matter or physical stuff is also informational in nature. This would mean that *everything*, whether atoms, molecules, muscles, or thoughts could be described in purely informational terms. The mind and body could then be seen as consisting of essentially the same kind of substance i.e. as *particular forms of information*.

Of course the concept of what information itself is, or what information actually means, is a decidedly muddy issue, especially since we now appear to be living in an Information Age. Books carry information, as do CD's, apple seeds, bank statements, fossils, fibre-optic cables, hormones, food wrappers and the human genome. And so too do vast banks of firing neurons carry information, whether infused by psilocybin or not. As to the notion of atoms (of which the above mentioned information-carriers are all composed) being units of information also, the case is less clear. However, should I succeed in the coming chapters in accurately defining the nature of consciousness *and* matter in informational terms, then I should also be able to explain more clearly why psilocybin is able to generate both Other-derived visions and an altered perception of reality - all in terms of the flow and flux of information. In fact, armed with such a sweepingly new informational view of reality one might come to perceive oneself and the world as if with new eyes. Indeed, the information paradigm of which I speak

yields a whole array of truly stunning conceptual consequences.

MIND AND BODY

The issue confronting us - that of understanding exactly what consciousness is - is, as you probably now realise, a decidedly hoary beast, covered in thorns and about as amenable to close analysis as the wind on a very blustery day. Formally speaking, it is known in the philosophical trade as the mind/body problem. At its heart lies the seemingly inseparable gulf between the world of physical matter and the world of mind. We know much about the former, yet little about the latter. Before we go on with our quest to define consciousness in the light of the entheogenic experience, let's take a very brief look at the history of this most murky philosophical quagmire.

The 17th century French philosopher Descartes is generally credited with being responsible for fully appreciating and documenting the mind/body dilemma. Descartes came to the conclusion that there were two sorts of universal stuff - mind and matter - and that they interacted in some mysterious ghostlike way. Such a dualistic 'ghost in the machine' view of consciousness has annoyed many a philosopher and scientist alike. Especially scientists, for they do not like talk of incorporeal entities (elusive minds) not located in 3-dimensional space being somehow able to interact with matter. Perhaps this explains why most psychologists have until quite recently been content to ignore the issue of consciousness. It is such an enigmatic phenomenon and yet, as I observed earlier, it is consciousness that is the very core or ground of our being human.

It is consciousness which defines *you* right now for instance. This book might be physical and clearly tangible yet what are your thoughts to know this? And even more problematic is the mind's ability to act directly upon matter via the body. How can a thought which is non-weighable and not made of physical particles nonetheless be able to move the collective atoms in, say, one's fingers? How can some sort of informational pattern embodied within the brain act upon so-called matter?

To reach some understanding we should therefore either side with the old Cartesian dualist belief or launch ourselves wholeheartedly into an alternative 'informational monism' in which the reality process consists of one stuff only - information. As I hope to show, the nature of the entheogenic experience suggests we embrace the latter scenario.

AN ATTEMPT TO EXORCISE THE GHOST OF DESCARTES

Since the philosophical musings of Descartes, philosophers have had a veritable free-for-all in their attempts to either defend Descartes' ideas or do away with them and somehow unite mind with matter. Indeed, some academic philosophers make it their professional business to immerse themselves night and day in the mind/body problem. So annoyingly problematic is the existence of consciousness in an apparently physical Universe that entire academic careers have been built upon this subtle paradox. Row upon row of shelves in the philosophy section of academic libraries are given over to books dealing in some way with the mind/body problem.

Still, as far as I am aware not one professional mind/body philosopher has become seriously involved with entheogenic experimentation in order to further their knowledge and insight into the dynamic interplay between chemistry and altered states of awareness. In fact, most books purportedly dealing with the issue of consciousness patently ignore psychoactive substances altogether, as if they had nothing whatsoever to tell us. I suppose that most traditional mind/body 'specialists' balk and quiver at the very idea of psychedelic shamanism and its alchemical explorations of the mind. Or perhaps wild visionary plants are still too ill-understood or rarely encountered by armchair-bound philosophers. Whatever the case, entheogenic flora and fungi have remained a peripheral phenomenon to be studied solely by anthropologists, ethnobotanists, and a handful of adventurous mavericks. It is hoped this state of indifference be shattered soon, and that science comes to properly address the delicate interface between chemistry and consciousness.

Chemistry and consciousness.....what do such terms imply? The important answer is that, taken together, they directly address the boundary between the physical and the psychological. Chemistry implies chemicals and substances - clearly 'material' things - whereas altered states of awareness lie in the realm of the intangible mind. We have already established in the last chapter that various types of substance, particularly those with a close molecular resemblance to the brain's neurotransmitters, appear to elicit fairly predictable and characteristic changes in consciousness. If we consider psilocybin, then we see that it bridges perfectly the conceptual gap between the two seemingly incompatible worlds of mind and matter, psychological and physical. The more we can understand the psilocybin *modus operandi*, the closer we get to divining the actual design of the bridge linking mind to matter.

A tall order then, this attempt to resolve the age-old mind/body problem. Still, no harm will have been done should I fail miserably in my theoretical endeavours. After all, untenable solutions inevitably aid the formulation of sound solutions, so the 'psilocybin solution' should not have to be completely 'poured down the sink'. Bear with me then, and judge for yourself as we embark upon the next stage of the mushroom mystery tour. This will take us further into informational territory as we focus more closely upon the structural dynamics of psychedelic visions. Since such visions seemingly depend in some vital way upon the integration and cohesion of large amounts of neuronal information then, above all else, information is our key to unlocking the mystery of consciousness, whether of the entheogenic kind or of the normal kind.

SYMBOLS IN FORMATION

We have seen that one major aspect of the psilocybin experience - the perception of vivid visions with eyes closed - appears to be the result of dreaming whilst awake, or at least something akin to this (this has nothing to do with 'daydreaming' which is something else entirely). According to our previous analysis, we can view such visions as being dynamic informational patterns conveyed in the neuronal systems of the brain, informational patterns which have been specifically 'freed' to form themselves through the 'liberating' action of entheogenic substances upon serotonergic systems. Similarly, REM dreams would appear to be generated by the same 'freed' neuronal systems.

The fact that entheogenic visions are loaded with powerful and often universal symbology might reflect that there are pre-determined ways in which large amounts of neuronal information can be organised and brought together i.e. integrated. This is an important idea being introduced here. Just as elements like carbon, hydrogen, nitrogen, and oxygen will naturally organise themselves into specific stable structures like water, carbon dioxide, and amino acids, so too can we view information in the brain, in the form of co-ordinated arrays of neuronal firing, as organising themselves in the same kind of way.

The fundamental quality which makes, say, water the same everywhere is its molecular structure - the exact way in which molecules of hydrogen and oxygen cohere together. They form a specific pattern, a specific molecular 'expression'. If my speculations are correct, then information embodied in systems of neuronal firing likewise forms itself into specific structured patterns. And, just as large amounts of

microscopic water molecules can organise themselves *still further* into stable macroscopic patterned structures like snowflakes, so too can more and more elaborate forms emerge from the patterning processes occurring in the psychedelically influenced brain. Frozen temperature acts to elicit the structured patterns exhibited by snowflakes, whereas psilocybin acts to elicit the structured patterns of neuronal activity which come to be experienced as shamanic visions. Water molecules organise themselves according to the rules of a molecular language, neuronal firing patterns organising themselves according to the rules of a psychological language.

If there *are* specific patterns and structures which emerge from large information-integration processes occurring within brain, then this would explain the existence of universal symbology, universal dream images and things like mythical archetypes. For throughout the world in all of the countless religions, cosmologies, and mythologies created by our species, we come across highly similar mythical images and symbols full of meaning and associative power.

The serpent (or snake) is a good example of this universal symbology. It is found in the religious mythology of the following: the Maya and the Aztecs (who worshipped Quetzalcoatl - the Feathered Serpent); the ancient Egyptians (the head-dresses of the Pharaohs incorporated the viper as a symbol of wisdom and intellect); the Australian aborigines (who worshipped the Rainbow Serpent); the ancient epic of Gilgamesh (a serpent tells of a mythical plant that can confer immortality); the ancient peoples of India (who worshipped Nagas, literally wise serpents), and even in the Eden of the Old Testament (the wise but feared serpent who offers forbidden fruit from the tree of knowledge), and so on. Always, the serpent or snake appears to symbolise a wise/divine/spiritual life-force or deity.

Such universality might be due to the fact that mythical symbols represent stable, organised concentrations of information produced by the most holistic/integrative type of information processing achieved by the human brain. The symbol embodies a whole set of relations or, to be more specific, it is the point where a huge web of psychological relations converge. To fully understand the symbol is to sense at once all of its relations to other objects of perceptual experience. In other words, *visual symbols play a role in a psychological language*. (here, I again invoke the concept of language since language is essentially an informational system not restricted to words alone. Language, in the abstract way in which I refer to it, is a system of informational elements bearing definite relations with one another; hence a language of words, of molecules, of symbols etc).

Such universally powerful visionary symbols can be thought of as expressions in the dictionary of a

'higher' language connected with the human psyche. What I mean by 'higher' is that the visual elements in this language are far more rich in meaning and informational content than the words of our spoken language. Moreover, the direct perception of visionary symbols choreographed together in a movie-like fashion - as occurs in the entheogenic state - is to experience meaning in perhaps its purest, most informationally rich way. To partake of a visionary dialogue is to be overwhelmed by the direct apprehension of naked, unmuddled meaning, which arises as a consequence of the highly integrative informational processes liberated by shamanic compounds.

In the metaphorical and visual language emanating from the most integrated information processing of the human psyche, the serpent therefore appears to be a significant 'word' or icon, itself derived from the natural environment. There are many such universally potent icons equally derived from the natural environment. Try now, if you would, to visually imagine in glorious technicolour a volcano erupting, a butterfly emerging from its pupa, or a hand reaching into a flame. Further imagine all of the ways in which such potent symbolic images like these could be meaningfully put together by some agency dissociated from the self/ego in order that the agency convey some message or idea to us. And finally, imagine an informationally-rich creation like this being experienced directly by one's consciousness with no noise or distraction whatsoever. Here we begin to understand what the shamanic visionary experience is like, that it consists essentially of a communication transmitted in the 'higher' language expressed by the Other, a language of symbols embodied in animated imagery.

SEE WHAT I MEAN?

Seeing, it seems, is the most direct form of perception. This is why one comes to 'see the truth'. It also explains why art is powerful. A great painting is unworded, yet it may well speak volumes to us. Visual symbols and images can be truly effective in their capacity to inform. It is in this sense that I refer to a higher language of the psyche, a language not of words but of concentrations of information visibly beheld.

To really see something is to see what something really means, and to see what something really means is to instantly access all of its inherent relations to other things. That is why pictures of the Earth from space are used as a powerful symbol with universal appeal; such pictures contain a wealth of informative relations, they capture a terrific amount of meaning. And yet for a new-born baby or some prehistoric Neanderthal who has never contemplated the Earth as being a finite but unbounded sphere, the symbol of the Earth from space will not be properly seen at all, rather it will represent no more than a meaningless

round shape coloured in blue and green. Thus, symbols can only be understood as *relative* focus points for networks of informational relations. When the network of relations is accessed and understood, then the symbol has conveyed its meaning. To see powerful symbols, whether this be in a shamanic vision, a dream, or in religious/spiritual artwork, is to behold a concentration of information, a super-condensed localisation of meaning.

The idea then, is that very large amounts of information can cohere or integrate into condensed symbols, and, since all brains work in the same way, universal symbols might emerge in a language of symbols, just as universal expressions and meanings emerge in all worded languages. But, it should be stressed that universal symbols are related to real objects in the shared world. Even if they are not deified, snakes, for example, are generally at least feared the world over, and for good reason since their venom can prove fatal. This automatically means that the real world snake/serpent is going to be a good candidate for playing a role as a universal symbol wherever symbol-generating processes arise.

DESIGNER SYMBOLS, DESIGNER VISIONS

In the case of shamanic visions (or dreams), it might well be that they contain not only universal symbols, but culturally determined symbols or icons which can only be *fully* understood and appreciated at the personal level. In the case of much of South American shamanism, like that practised by the ayahuasca-using Tukanoan Indians of Colombia for instance, we do indeed find culturally/environmentally determined symbology in the visions experienced by the shamans, often related to powerful and revered jungle creatures like the jaguar, as well as the ubiquitous serpent/snake. These Tukanoan shamans also experience imagery related to their particular brand of cosmology, which is known and fostered by all members of the tribe. An analysis of the varied pieces of artwork inspired by their psychedelic visionary experiences reveals a striking commonality, for the Indians invariably portray the spiritual entities encountered in the same way and in the same style. This clearly testifies to the culture-bound nature of their visions i.e. they experience one particular kind of visionary dialogue with the Other.

According to the informational approach being taken here, such culturally determined visionary dialogues still result from information-integration within the psychedelically altered brain, with the attendant fact that the information used in the visionary communication derives, in part, from the shamans' personal store of knowledge. Since native South Americans share the same culture and experience the same environmental forces, there will obviously be certain symbols and images which are highly significant to them in a way which an outsider would not be able to fully apprehend. It appears then that, in common

with spoken language, there exist regional 'visionary dialects' expressed in the psychedelic visionary state, the dialect being determined by the tribe's unique physical and cultural environment.

Claudio Naranjo, a researcher who has spent many years investigating the shamanic use of ayahuasca in the Amazon, has reached a similar conclusion about the commonality of the shamans' visions. He has written of visionary symbols as follows:

"...the superimposition of the reptile, the feline's fangs and claws and the bird's wings (as well as the fish's watery environment and scales) results in the image of the dragon {synonymous with the mythical serpent}. Furthermore, through an examination of dragon myths and the content of subjects' reports, I concluded that the consciousness stimulated by ayahuasca involved an intuition of the inseparability of life and death, an apprehension of life as a self-consuming and self-devouring living-into-death or dying-into-life - and observed that just as mythical dragons may be symbols of good and evil, ayahuasca animals may be terrifying or friendly according to the readiness of the psyche to accept life-death or to reject, not only the "internal animal" but a greater Life, along with its deadliness and mortality...."

Whether Naranjo is essentially correct in his interpretation is not important. The point is that this *kind* of interpretation in which the visionary elements are considered to be symbols replete with meaning, matches the theoretical approach being taken here. Visionary symbols can be understood as deriving from the confluence of vast amounts of (psychological) information.

It really is as if individual video/computer graphic films of the utmost sophistication are made by the Other and then privately screened whilst one is in the entheogenic state. The visions well up magically from the depths of the psyche as though woven out of some undulating multicoloured dream fabric, as if one's visual cortex were directly interfaced with some mega-powerful intentional computer. Obscure items from memory are often strung together in some new creative fashion, or perhaps one will witness scenes never before encountered but that are nevertheless immediately understood. In either case, the visions fairly burst with an overwhelming amount of information (regarding the typical film-like quality of entheogenic visions, I once watched an illuminating anthropologist's documentary on the apprenticeship of a South American shaman which included a reference to 'visionary movies'. The documentary showed footage of the master shaman and his apprentice visiting a nearby Westernised town for the first time. Whilst there, they decided to try out the cinema. Although this was a completely new phenomenon for them, and arguably a great piece of Western artistic technology, both commented that the film being shown was not as good as the visions they experienced from their use of native sacred

flora!).

The material basis from which personalised designer visions are fashioned, is one's store of memories and personal knowledge of the world. According to my interpretation, the Other is able to re-form such idiosyncratic information in order to communicate in a highly personal way which one will likely be responsive to. Such creative artistry represents the meta-language spoken by the Other, the visions representing a higher, more informationally-rich symbolic language being conducted deep within the innermost sanctums of the psyche.

STRETCHING CREDULITY

If this is starting to sound too far-fetched, then it is only because the terminology is new. What I am calling the Other is a dynamic information-integration process given life within the entheogen-infused brain. To put it another way, the Other can be understood as an informational phenomenon that is *focussed into being* in much the same way that a newly cleaned lens might suddenly focus sunlight into a tight beam. It does appear to be a higher, more integrated manifestation of the human psyche, so much full of 'Otherness' and purposeful import that it can be considered to be fully autonomous and dissociated from the individual self/ego.

It is hard not to believe this when one has come to directly experience entheogenic visions. Think of the Reverend from Harvard's Good Friday experiment who had profoundly religious visions of Christ. This is the way in which the Other 'spoke' or 'introduced itself' to him. Its language is that of symbols and images and their creative juxtaposition in order to convey some vibrant meaning. In the depths of the Reverend's psyche neuronal informational patterns of incredible complexity arose informing him in a soulful way. Those particular arrangements of psychological information were generated out of the informational stores of his own personal psyche in a 'style' which would be highly meaningful to him in particular.

The Other thus represents a name or label for the kind of neuronal information processing underlying the visionary state, a kind of process which demonstrates the inherent property of neuronal information to purposefully organise itself into streams of perceived ideation laden with profound meaning. If one can conceive the mind as being a kind of informational process, one can equally envisage the Other as being an informational process. Whatever the actual neuronal firing mechanisms involved, it seems likely that

concurrent information-integration of some psychological sort underlies the felt presence of the Other.

The greater the scope for informational coherence, the more will the emergent patterns be able to embrace differing fields of psychological data. This process will *have* to lead to the formation of mythical symbols and the like, since such symbols are the only way in which large amounts of related information can be expressed or 'captured'. A symbol *is* the concentrated expression of information. Since there must be limited ways in which such high concentrations of information can be so expressed - in other words there are logical constraints - then this again explains the existence of universal symbology.

But why exactly should the focused embracing of large amounts of psychological information be under logical constraints? Could not any old image or icon do? Not really. Think of some short story and imagine trying to sum up the theme in one sentence or one visual image, the moral of the story so to speak. Although there maybe a thousand and one ways of telling that story, to concentrate the moral (the point or overall pattern that connects the elements of the story) into one meaningful sentence automatically constrains us to use certain key words or certain pictorial icons.

Consider also what it is like when one searches for a word that one knows will express what one wants to convey; that frustrating.....what is it called? Ah yes, that *tip-of-the-tongue* moment. The word or term we look for is a logical consequence of what we need to express, and we might well be constrained into using but one word which 'captures' the exact meaning we wish to communicate.

Likewise, in the language of the Other, there will be certain types of meaning (large patterns of information) which can only be expressed in definite symbols and icons. The symbols and visual representations *are* highly organised fields of information. Such symbols and the drawing together of them into coherent progressing visions therefore reflects the on-going language being 'uttered' by the higher information-organising processes of the Other.

We can also refer back to Gordon Wasson's vision of a mythical beast drawing a chariot or of the colossal doors opening. These are obviously massively powerful symbols teeming with inherent meaning, especially when perceived as close as is possible - that is, directly behind closed eyes whilst under the superconscious spell of the mushroom. These visions are not like simple pretty pictures, they are more like a confrontation with ideas and symbols in their pure form issuing from some highly organised source

of intelligence - like, say, the Platonic realm of pure Ideas, an inference you will recall which Wasson himself made in his attempts to come to terms with his experiences. The thing is, this Platonic Realm, if that is what one chooses to call the transcendental Other, is not static, like an archival system. Instead, it is able to inform one through a dynamic stream of intentional information in which visual symbology dominates.

Such types of symbol can therefore be considered elements of a higher language, a language not of the individual ego-driven mind but of the communicating Other. The symbols are amalgamated concentrations of information coming to life in a mind illuminated by visionary alkaloids. Or, to use Huxley's terminology, the informational forms are *transmitted* via the psilocybinetic brain. In either case, a Great Spirit, a sacred presence, or Gaian Other reveals itself as being no less than a tremendously vast system of confluent information flowing through the psychedelically enhanced neuronal hardware of the human cortex. As information 'struggles' to integrate, evermore coalescent forms emerge, and these are experienced as the felt presence of the Other actively communicating in a language of potent visual imagery. Information appears as if alive and intent upon self-organisation.

THE MANY GUISES OF THE OTHER

As Terence McKenna has repeatedly pointed out, it is quite common, for Westerners at any rate, to perceive UFO or alien/extraterrestrial motifs in entheogenic visions. McKenna has suggested that the UFO is the Other in the guise of a contemporary symbol. According to McKenna, the Gaian Mind or Other is so normally remote from us that it dons "the mask of the UFO" in order to express itself, its 'Otherness'.

Since the 1950's, there has been a plethora of sci-fi films dealing with alien/UFO visitations to Earth, most famously perhaps being Spielberg's *Close Encounters of the Third Kind*. The predominant theme in these sorts of entertaining fantasies is the incredible impact such an alien presence would have upon humanity. It is a modern reworking of the ancient religious idea of divine intervention. Some great alienesque force suddenly appears in the midst of our culture in a way which kind of upsets, or radically alters, human history and human destiny. Everyone would have to take notice. The banks would have to shut at the very least. People would, willy-nilly, be forced to cease their everyday business for a spontaneous alien-inspired Bank Holiday or two. Everything would have to change. UFO's and alien visitations are dramatic. They negate everything else.

Obviously then, the UFO can be understood as being a late 20th century and millennial icon, an immensely powerful Western symbol packed with meaning. It also highlights the way to think about information, for, in terms of information, the archetypal UFO is the centre of whole web of psychological relations and associations. It embodies a concentration of information. It contains or expresses a powerful set of psychological associations. As a simple word, 'UFO' embodies information in the context of the English language, whereas as something visibly beheld in an entheogenic vision, the UFO or indeed any kind of image of advanced alien technology, represents an utterance in the symbolic language of the communicating Other.

McKenna has spoken of the UFO as:

"...an autonomous psychic entity that has slipped from the control of the ego and approaches laden with the "Otherness" of the unconscious. As one looks into it one beholds oneself, one's world information field, all deployed in a strange, distant, almost transhumanly cool way, which links it to the myth of the extraterrestrial. The extraterrestrial is the human Oversoul in its general and particular expression on the planet."

Here may lie the explanation for the rampant and often far-fetched stories of actual UFO sightings and alien encounters not reserved to closed-eyes visions. Perhaps for some people the Other emerges into the perceived world of external reality, although this would more than likely represent a genuine hallucination.

McKenna's use of the term 'Oversoul' is yet another way of referring to the Gaian Mind or Other. Whereas McKenna readily assumes the Other to be the creative source of sacred visions, I am being more specific by asserting that this sort of Other/Gaian Mind experience results from an *inherent property of information* just as the individual mind results from an inherent property of information. Through the redemptive action of sacramental Gaian alkaloids like psilocybin, the Other is able to manifest itself and flow through the neuronal architecture of the brain. The Gaian Mind/Other/Oversoul *is* information, or at least it is the creative organising principle underlying brain-based information-integration and brain-based informational patterning. Its language is that of symbols and cultural images, futuristically alien or otherwise.

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To sum up the far-reaching speculations presented thus far; whether personal or universal, information becomes incorporated into entheogenic visions in a novel and creative way such that a definite message or meaning is conveyed, or at least appears to be conveyed. The resulting overwhelming confrontation with a spiritual intelligence is thus the result of information-integration to the point where the integrational process appears most definitely to be 'alive', purposeful, and distinct from the self or ego. This is the supra-mundane Other, a sentient informative entity that is not us but something very closely related to us.

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CAN, OR SHOULD, WE BANISH THE OTHER?

Alternatively, a cool, restrained, and sceptical approach might be to suggest that the self-organising patterning property of neuronal information does not reflect an information-composed Other after all, but just some *incidental* property of information. Just as gravity is a property of the Universe acting everywhere (on a macroscopic scale) to draw physical material together, so too might there be some inherent but incidental property of psychological material (or neuronal information) which acts to organise it. Although this organisational process can, if boosted by psilocybin or endogenous brain chemicals like DMT, result in the perception of a communicating Other, this Other will in fact be just a kind of illusory side-effect promoted by the experience.

However, having said that, in terms of the cultural history of the visionary shamanic experience, it is clearly so powerful and so emotionally charged that the inference of a transcendental Other is well established and seems clearly indicative that something important and hitherto unbeknown to psychological science is occurring. As many Westerners who have sampled entheogenic flora will readily attest (this includes those few brave anthropologists who have taken Amazonian psychedelic brews and experienced numinous visions), it is not all merely 'primitive' inference or hearsay that has led native

shamans to invoke a perceived contact with gods or spirits, but rather that the sacred nature of the entheogenic experience appears so dramatic, so persuasive, that the inference of an Other becomes unavoidable.

Even if we did still opt for the restrained armchair-bound explanation, it is not incompatible with the notion of the Other, but merely a kind of clever avoidance and reluctance to invoke a 'big idea' that we are not accustomed to. For to reduce the Other to 'merely' an incidental organising principle inherent in information with no real purpose, is like saying that normal consciousness is 'merely' an incidental neuronal effect without any real purpose. But since we know that normal consciousness *is* purposeful (we have will, more or less) then it is tenable that the Other represents a kind of purposeful will above and beyond that of the individual ego. Indeed, if we also consider the many other self-organising properties of the Universe - which are deemed fundamental - then the Other might well represent a similarly fundamental aspect of Nature, one which manifests when conditions in the human cortex are appropriate.

Yet, if pushed, is it really still necessary to speak of a dissociated communicating presence when a less fanciful explanation will at least partially suffice? Aren't we in danger of becoming a trifle religious by invoking a kind of super-intelligence dissociated from the individual self?

The short answers are 'yes' and 'yes a bit'. But, if the notion of an intentional Other still seems too bizarre to the critical reader, the idea can be further defended by examining a common analogous situation in which we infer a non-self-based other. After all, do we not all assume without any doubt whatsoever that other conscious minds really exist? And yet this is also a big inference drawn based solely upon subjective experience. Let us pursue this, since it is, strangely enough, relevant to the validity of invoking other purposeful entities.

BIG O, LITTLE O

To infer a transcendental communicating Other is really no different from the tacit inference that other human minds exist. Both these sorts of other, the big 'O' and the little 'o' variety, are equally conceived of as the focus points of intentional information processing. Yet, there might *not* be other conscious minds apart from ourselves. Or there might be just a few. We cannot absolutely prove that others possess conscious minds like our own since we only have access to their external manifestations. Other people

may in fact be, god forbid, soul-less automata, no more than mechanical zombies masquerading as conscious beings. For all you know, you might be the only conscious entity existing, for what conscious experience are you familiar with but your own? Indeed, when Descartes began his philosophical career he wanted to know what he could be absolutely certain about, with no room for doubt whatsoever. Gazing out of an ornate 17th century window, he wondered if perhaps all of reality was a cunningly designed trick played on him by some artful demon with absolute powers of trickery. Entertaining such a sinister scenario, Descartes came to the conclusion that the only thing that he knew to be real for sure was the existence of his own self - he thought, therefore he was. There could be no doubting *that* at least. This deceptively simple realisation became the sure-fire bedrock enabling him to develop all of his subsequent philosophy and science.

The philosophical belief that only one's own self really exists is known as solipsism. As weird as it might sound, it is a theoretical stance which many might be tempted to adopt, even for the sake of just playing with the idea in order to annoy and confuse friends. The point of raising this issue is that all of us make a big leap of faith in accepting that other minds really do exist like our own, and this way of thinking 'works', so much so that most people have not the faintest idea what solipsism is, and never come even to entertain the idea despite its being an essentially reasonable piece of personal philosophy.

Directly analogous with our tacit assumption that other conscious minds exist like our own, is the inference that an intelligent communicating Other lies at the heart of shamanic visions. This seems unavoidable if one is experiencing powerful visionary effects from entheogenic agents, and this makes it a valid and workable way of explaining the experience despite its distinct tone of grandeur.

I would therefore claim that any talk of an Other, or Gaian Mind, is a reasonable theoretical conjecture brought about because of the remarkably integrative information processing occurring in the entheogen-imbibed brain. Such chemically inspired neuronal patterning is experienced as being so rich in symbology and meaning that for all intents and purposes it can be considered the result of a living, intelligent, and communicating agency made of information, an agency whose intent can become focussed should the chemical conditions of the human cortex be so conducive. Information must indeed be in some sense alive.

'DREAMFORMATION'

A similar process to that outlined above would appear to govern dreaming, since complex and often fantastically stylised dream scenarios are something our dreaming selves *confront*. We literally witness the integrational information processes of our dreaming minds, often finding ourselves cast in strange and elaborately screened and scripted dream scenarios. But, and this is a major caveat, with dreams our dream self is not generally in a very consciously attentive state so that dreams remain ethereal and forgettable (unless we write them down), unlike psilocybin visions which one is highly conscious of and which are faithfully retained within memory.

It has been speculated that the reason we are unable to retain dream experience is because the normal neuronal mechanisms which underlie long-term memory processes are shut off during the dream state. This, however, is not the case with 'waking' psilocybinetic dreams/visions, since the neuronal systems which facilitate long-term memory are still operative. Psilocybin is therefore able, perhaps, to by-pass those brain mechanisms which normally serve to stop us consciously attending to information arising from the creative depths of the psyche.

The neuropsychologist and expert on sleep processes J. Allan Hobson has developed a model of dreaming which is compatible with the type of information-integration model outlined in this chapter. Hobson has offered an 'activation-synthesis' model of dreaming. He reached his theoretical conclusions after having studied in depth the neurochemical processes underlying REM/dream sleep, processes which include, of course, the cessation of the serotonergic raphe system.

On his activation-synthesis model, Hobson writes:

"Activation is an energy concept: in REM sleep {dreaming}, brain circuits underlying consciousness are switched on. Synthesis is an information concept: dream cognition is distinctive because the brain synthesises a dream plot by combining information from sources entirely internal to itself and because chemical changes radically alter the way information is processed. So the term 'synthesis' implies both fabricated (made up) and integrated (fitted together)."

Basically then, dreams are associated with nightly periodical bursts of neuronal firing in perhaps millions or even billions of neurons, with, of course, their attendant potential for an incomprehensibly large

amount of inter-connected communication (we should bear in mind that dreaming might be due in part to endogenous DMT). All this wealth of activity is then organised/integrated in such a way that dreams emerge, or are synthesised. Dreams are thus constructed of information, whereby the information is embodied in the unusual global firing state of the brain.

As we have already established, a related process appears to take hold when psilocybin is present within the brain, although this latter 'waking dream' situation takes place during the eyes-shut waking state whereas dreaming takes place during sleep. So, although the psychedelic visionary state and the dream state both take place whilst the brain is in a different overall state (awake state versus sleep state), the general *principle* of vision generation and dream generation is the same in each case. To reiterate, this principle consists of the patterning and cohesion of vast bursts of neuronal activity being generated from *internal* sources and not from external sources. The advantage of 'waking dreams' induced by entheogenic alkaloids over normal dream processes is that in the former one remains highly alert and highly conscious of the visionary dialogue and it is generally not forgotten. Entheogenic visions also tend to be more sacred in character than dreams.

THE VARIETIES OF DREAM EXPERIENCE

Often dreams might appear to be quite mundane, containing perhaps integrated scraps of information sub-consciously perceived during the waking state. By joining these disparate pieces of information, a kind of learning might be facilitated. Indeed, it has been demonstrated that if rats (excuse the ratomorphism) are selectively denied periods of REM/dream sleep then they are more likely to forget information previously learned.

Lazy new-born infants spend about 16 hours a day asleep, of which half that time is spent in REM/dream sleep. This means that they dream about 3 times as much as adults. Since new-borns have a strong need to learn about the world, dreaming presumably facilitates certain types of information integration - and hence learning - to take place. Through dreams, information acquired through waking perceptions can be sifted, consolidated, organised and generally 'worked out' so to speak. In short, one psychological approach to dreaming has it that dreaming allows information to become integrated within the developing psyche, a view fully compatible with my own speculations.

What of dreams not obviously connected with, say, diverse pieces of information, but which concern 'big' themes? Especially those really vivid dreams which leave a lingering emotional impact upon us. These

might seem definitely to contain some meaning important to our inner well-being. Although we in the West do not have a cultural tradition which takes dreams, whether the mundane variety or the moving variety, too seriously, this has not always been the case with our species. It is presumably the phenomenon of significantly perceived dreams that led native cultures, like native Amerindians, to take dreams seriously - so much so that dreams would often be discussed and acted upon by the whole tribe. Such types of informative dream also led Western thinkers like Jung to conceive of a Collective Unconscious from which archetypal dream symbols could emerge. Although such a Jungian interpretation might be unwarranted, it does highlight the fact that certain dreams *can* act as a source of useful information should we choose to contemplate them. Indeed, if this were not the case then presumably native cultures would never have bothered with dream analysis in the first place.

Considering these properties of dreams, we can see more clearly how the brain is literally an organic information-organising device able to continually forge informational patterns both consciously and unconsciously. *The only real difference between dreams and entheogenic visions would appear to be the extent and scale of this important process.* If informational integration is allowed to reach a certain threshold of activation through the catalytic agency of entheogenic compounds, then the ultimate source of the informational patterning process can be divined and we come to directly experience a symbolic and unmuddled dialogue with the Other, where the Other is precisely the self-organising property of the information so embodied in the neuronal firing activity. In this sense the Other is a latent form of information which can potentially be brought to life through the processing mechanisms hard-wired within the brain. Neuronal/psychological information, by shaping itself in constrained ways, will allow definite motifs to emerge, representative of the transglobal symbolic language of the transcendental Other. This language is activated and apprehended during both the lucid dream state and the psilocybin-induced psychedelic state. Both states are natural and both derive from the capacity of the brain to arrange, cohere, and pattern large amounts of information.

REALITY EXPANSION

From what has been discussed thus far concerning the psilocybin experience, it might seem as if the eyes-shut visionary state was the prime effect, yet with eyes open one encounters equal perceptual wonders. The world appears as if new, bursting with a significance and beauty that literally brushes one's soul. One sees more clearly than one could imagine, as if an occluding cloud had been graciously dispelled to reveal the sheer unadulterated 'isness' of reality. Visual perception is experienced as though it were the finest grain cinematography able to pick up upon a luxury of detail previously hidden. Great thoughts occur to one, unbidden yet full of profound import as if the very secrets of existence were suddenly in one's grasp. This is the very least that can be restated here. How can such phenomenology be accounted

for in our information-integration model?

Regarding psilocybin's radical enhancement of visual perception, it seems logical to surmise that a change in the functioning of serotonergic systems facilitates a greater 'absorption' of the external information impinging upon the eyes. More information inherent in light flows through the visual system and into the brain, and is experienced as breathtaking visual clarity and enhanced consciousness (super alertness if you like). Since we humans are effectively embedded in an ocean of photic information, by subtly altering brain chemistry we can allow a tidal influx of this informational sea of light to sweep over the visual system, leaving us awash with perceptual data.

All objects, whether organic or inorganic, possess an intrinsic meaning or set of relations to other objects. They possess informational content, linked as they are to a network of relations with other objects. As discussed earlier, to 'see' an object is not merely to apprehend its shape or colour, but to access its meaning. After all, the retina of the eye only records an inverted 2-dimensional myriad pattern of light intensities, much as computer vision records arrays of light intensity values. This is not seeing. Real seeing, as we know it, involves the perception of what the object signifies. To see an object is to apprehend, all at once, its role, function, and relations - i.e. its meaning - within a vast network of objects.

Under the spell of psilocybin, I suggest that one is able to penetrate deeper into the informational content of objects. This a bit like looking up a word in a dictionary and noting *all* of it's meanings, thus coming to understand the word in its fullest sense. Normally we might not perceive the entire meaning of a word, accessing maybe only a fraction of its true semantic content, yet, in theory at least, we might come to ascertain more. This is what psychedelic perception involves, the accessing of latent information normally occluded to us by the normal information processing constraints of the brain (my comparison to the comprehension of words is useful as, in the next chapter, I hope to show further how 'material' objects in various domains - like the domains of physics, chemistry and biology - are themselves elements within a nested hierarchy of language-like systems, playing functional roles just like words).

INFORMATIVE DIALOGUES

As to the wealth of revelatory thoughts and ideas which erupt into consciousness during entheogenic ecstasy, these would appear to be, as with visions, a manifestation of the Other, in that they represent the

holistic patterning of neuronal-mediated information. This may often be experienced as a kind of internal dialogue with a wise being. Profound thoughts take on a rapidly flowing life of their own, generating further thoughts and insights. It is impossible not to once more invoke language here as a conceptual explanatory tool, though this type of inner psychedelic language involving complex thoughts and ideation works far more efficiently than the language system of the spoken word. Everyday language appears sluggish and cumbersome in contrast to the language of shamanic contemplation which moves at a profoundly different pace. Indeed, the sheer fluency and dramatic insightfulness of shamanic contemplation explains its emotional impact and ineffability.

If we start to conceive of language *in whatever mode* as a communicatory information system, then we see that its modes are many and varied, all operating at different speeds and with differing properties. The principle however is the same. There is a flow of information and a natural progression which yields further information, just as in the case of a spoken dialogue. When we communicate with one another in conventional language, whether written or spoken, we initiate a dialogue in which information is exchanged. Regardless of whether this dialogue is one-sided or not, the process is dynamic in that information flows from one system to another, from one person to another, from one brain to another, from one mind to another.

With entheogenic contemplation an internal dialogue ensues in which there proceeds a flow of ideas between the self and the Other, where the Other is a dissociated or higher level informational source acting as one component in the dialogue process. Through entheogens, the individual psyche manages to open itself to the realm of the Other thus facilitating a dialogue of thought in which radical knowledge is received. An incredible idea to be sure, yet, as I hope I have made clear, the psilocybin experience, to do it any sort of justice, demands these kinds of incredible explanation.

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We are now equipped with a model of consciousness which views it as a particular pattern of information embodied in the flowing electrochemical state of the brain. And we also have an informational entity which we can call the Other able to communicate its intent through the agency of entheogenic alkaloids like psilocybin. Both can be better understood as processes (or verbs) as opposed to things, moreover processes involving the patterning, or focussing, or coalescing, or even *orchestration*, of vast amounts of information.

Now we must turn to the nature of information itself. In particular, we shall look at information *outside* of the brain and see if it too can be understood in the same 'integrational' way. Does an informational language underlie Nature itself? Can molecules and atoms be interpreted as being informational elements in a molecular or physical language? And if so, does the reality process ultimately consist of a flow of language-like information? Is everything information? Did our man Einstein emerge out of, grow up in, become famous in, and eventually die in an essentially informational reality process? Read on then, for my psilocybin mushroom tale has hardly even begun. Information, it seems, cannot be stopped.

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CHAPTER SEVEN

A UNIVERSE OF INFORMATION

Willy-nilly, Nature's entheogenic agents have provided compelling evidence for the following two most interesting of propositions: firstly that consciousness is a form of information substantiated within the brain's neuronal firing activity, and secondly that this kind of cerebral information has a tendency to organise and integrate itself. Evidence in support of the first proposition was provided through looking at the ways in which consciousness becomes altered through subtle alterations in the chemistry underlying neuronal firing. Chemically induced changes in global states of neuronal firing are equatable with changes in consciousness, and since global states of neuronal firing must be global states of information (what else could they be?) we can conclude that consciousness is a form of information.

Evidence to support the second proposition - that cerebral information has a tendency to organise itself - came from an examination of entheogenic phenomenology and even dreaming, both processes highlighting the way in which psychological information organises itself without a deliberate effort on our part to do so. Which is to say that we can *find ourselves* experiencing shamanic visions after ingesting entheogenic agents or likewise find ourselves experiencing elaborate dream scenarios whilst we sleep (perhaps mediated by endogenous DMT).

The former experience, the entheogenic visionary state, seems to represent a most extreme manifestation of informational organisation, so much so that a third proposition suggests itself, namely that an intelligent Other, distinct from the ego/self, lies behind the sacred thrust of psychedelic phenomenology. Such a dissociated Other can be considered to represent an organised source of intentional information which communicates with an individual whose neuronal system is infused with entheogenic alkaloids. We can thus concur with Huxley with his assertion that psychedelics allow a greater amount of what he called Mind at Large to flow into conscious perception. The Mind at Large is the Other, the Gaian Mind, which potentially interfaces with the human psyche, revealing itself in the shamanic experience and possibly during symbolic dreams. Information is the stuff of both the Other and the human mind. Conscious experience is information in process, as is the entheogenic experience. The greater the field of information being processed or integrated, the more conscious may we become (the word consciousness

means 'knowing together').

In all three propositions, it is most definitely the term 'information' which fits the theoretical picture. This chapter attempts to formally elucidate this information-based scenario and to explore further the nature of information and its role in the Universe at large.

CONSCIOUSNESS, INFORMATION AND REALITY

At first, it might seem somewhat off the point to delve into the nature of information and its role in shaping the Universe. After all, are we not entering territory far removed from tangible entheogenic plants and fungi? Are we not speculating far beyond the call of duty?

Actually, the ground of the informational territory which we will shortly be exploring is precisely what these shamanic agents illuminate. The issue at stake in all refined psychedelic debates is that of the nature of perceived reality, in particular, whether the seemingly expanded field of reality unveiled in the psychedelic state, with its undeniably spiritual trappings, has any kind of firm foundation. My conviction, like that of Huxley and McKenna, is that entheogens like psilocybin really do allow us to glimpse the 'bigger picture', and that the implications of such an experience should be followed as far as they might take us.

The association between psychedelic contemplation and the contemplation of reality are really one and the same thing. A genuinely mystical experience in which the presence of the Other is felt, cannot fail but change one's conception of the world, and, in particular, the significance one gives to life, particularly conscious human life, on this sensitive little planet of ours. It therefore comes as no surprise that entheogenic phenomenology can be a tad religious in nature. Because the entire field of reality is re-conceived and re-perceived in the psychedelic state, a kind of subjective paradigm shift occurs somewhat akin to paradigm shifts in science. These shifts in theoretical perspective involve thoroughly new conceptual frameworks with which to comprehend the fundamental nature of things. Similarly, traditional religious ideologies attempt to provide an overall scheme with which to understand reality. It is this holistic nature of religious thought which links it with psychedelic thought.

Entheogens then, are powerful tools with which to forge a new set of conceptions about the reality process and any competent fellow out to grasp the essence of Nature should consider employing them. Such newly acquired concepts and percepts can continue to be employed long after the consumed shamanic catalysts have been metabolised into inactive by-products. In a sense, it is as if new conceptual perspectives and new insights into Nature, once divined, install themselves permanently within the mind. Organic visionary ecstasy, once tasted, is not forgotten. Never. The difficulty, the overwhelming labour, is in trying to integrate the new view of reality with the old, to merge them so to speak, which is precisely what the rest of this book is about.

Huxley epitomised the paradigm-shifting effect of psychedelics in his interests and concerns during the last decade of his life. As we have seen, he was convinced that psychedelics allowed one access to the sacred side of Nature as encountered by mystics and religious visionaries, an aspect of reality real but hidden to the secular mind. Indeed, he even asked his wife to inject him with LSD shortly before he died, so assured was he that a psychedelic state of mind could prepare him to face the final stage of human life. This is rather dramatic testimony to the fact that psychedelic consciousness connects one to the deepest mysteries that reality confronts us with.

Similarly, in the context of traditional psychedelic shamanism as practised in South America, the mythological conception of reality held by the whole tribe stems from the effects of entheogenic plants upon the psyche of the shamanic voyager. And, as the acid gurus of the 60's testified, world views are very much at stake when it comes to the use of psychedelics. Chemically instigate a change in one's underlying concepts about reality, and culture transforms itself also.

In each of the above cases, reality is the issue at stake, along with the importance of the psychedelic experience in shaping it. Even without a psychedelic experience, Nature demands that we conceive her in some kind of organised way. Since we are woven into the very fabric of Universe, we cannot ignore its true nature for ever.

Perhaps, for the most part, we conceive the nature of reality unconsciously, for we all carry many tacit assumptions and tacit beliefs about the world (this book for example, carries a number of basic assumptions such as the assumption that a 'world out there' really does exist and that its nature really can be understood).

Like our consciousness, we take many things for granted and hardly ever reflect upon them (like the stable existence of beneficent energy-emitting suns for example). What makes entheogenic substances so remarkable is their uncanny ability to take one's precious store of reality concepts and then shake them about vigorously so as to reveal just how fragile and shallow-rooted such ingrained beliefs might be. If we imagine normal consciousness to be like a needle trundling along the groove of Nature's apparent 'surface', entheogens like psilocybin can jog the needle of consciousness into a rarer, and indeed, more 'groovy' surface groove. The true nature of reality then becomes a kind of 'unfinished business' which simply must be dealt with. This is the clarion call of the advocate for psilocybin. If we really wish to understand the reality process and the role of humanity within the natural world, then entheogens offer us a direct path to the Other, a sentient and intentional agency made of information whose presence and message awaits us.

ASSESSING THE REALITY SITUATION

One cannot stop reality, and this makes it's nature formidable regardless of what you believe. The sun warms us or burns us. The cold of Winter bites at our flesh and our homeostatic bodies automatically respond by shivering. The relentless rush of our billion cell biology propels us towards sex, always it seems, making us grope, cling, moan and shudder. This same biological march also puts us to sleep every night. We awaken, and again there it is - the reality process. We are inescapably bound up in it like grains of sand caught up in an everlasting vortex of wind. More to the point, eventually this perennial condition kills us.

As I remarked in the introduction to this book, whatever you may have read, the ultimate nature of the reality process remains open to question. This may always be the case. Science seems always to reveal more mystery as it delves into the heart of 'matter'. What is more, science is done first and foremost in order to gather data. How this data is *interpreted* is another matter. What is a complex mechanical system to one scientist might be blatant proof of an organising intelligence to another. And, as for the long sought after super-theory which will be able to explain the totality of Nature in terms of, say, umpteen dimensional superstrings, or in terms of some convoluted mathematical equation which only a few institutionalised professors can really understand, these are likely to omit an explanation for consciousness and the mysteries of mind. Indeed, such a 'final' theory, such a final equation scrawled upon a blackboard with one fell swoop of chalk, will probably serve only to confuse the average mind rather than enlighten it.

It seems apparent that if we open ourselves to the vast cosmic mystery of existence, then we could do a lot worse than pursue the implications of the psilocybin-driven numinous experience. To consume God's flesh is to launch oneself wholeheartedly into the mystery of being, the mystery of our short existence within this big system we call Nature. Our lives are defined by our conscious experience. We are led, prompted and coaxed according to how we are informed. The remarkable feature of entheogenic plants and fungi is that they can inform us in ways profound and sublime. To ignore their effects is to ignore new perspectives on reality.

As it is, the nature of the Universe in which we find ourselves is defined by the prevailing conceptual systems built into our culture. In our case, the predominately reductive and materialistic paradigm afforded by most of the science community shapes our views about reality. In the traditional scientific outlook which permeates our educational institutions, there is no real room for any kind of transcendental aspect to Nature. Nature is there, Nature is eminently intelligible, we can learn how it works and that's really all there is to it missus. Talk of Nature having a spiritual dimension or an intentional quality is anathema to most scientists. The advocate for neo-shamanism will doubtless have a stereotypical image of the hard-nosed reductive scientist. It will be a he, and he will be old, scary, and grim faced, always waving a dry finger of admonishment at any talk of a so-called sentient and intentional Other. If psychedelic visions cannot be empirically measured in the lab then forget it, he will say. And if one points to the few scientific experiments which have attempted to measure the numinous experience, he will doubtless pick holes in the methodology and ask for more proof. He would maintain that such experience is simply too subjective and too personal to base any objective claims about reality upon.

Still, as I hope I have demonstrated, entheogenic phenomenology flies in the face of such a denial that Nature has a spiritual side; or at least the shamanic experience offers what I believe to be the most compelling reason to grant Nature an intent of some kind. This appears to be a neat and valid side-step with which to bypass the moribund spectre of the reductive materialist. Indeed, the real possibility that the reality process has a fantastically benign and purposefully *smart* aspect becomes readily apparent through entheogens. Such a possibility will become ever more clear as this and the following chapters develop.

In short, entheogens represent catalytic agents of change in the domain of perceived reality, and this is why we shall now pursue the implications raised by the information-based propositions stated at the outset of this chapter. We are now armed and ready to re-view the nature of reality in the light of the

psilocybin experience. This will prove to be astounding so hold tight.

ELUCIDATING THE NATURE OF INFORMATION

What does it really mean to say that consciousness is a form of information? We seem to have merely replaced the intangibility of consciousness with another abstract entity. The question thus arises as to what exactly information is. But, even if we do succeed in adequately defining information, will we not then be in danger of trapping ourselves into one of those infinite regresses of terminology? Well I certainly hope not. What we really want is a conceptual picture of information, not just another term. What I wish to develop is a clearer understanding of what information is, and, in particular, whether it can be used to describe the world of so-called 'matter' as well as that of mind. If so, then reality will have revealed itself to be made of different forms of information, almost as if...well, we shall see.

Information is notoriously difficult to get a handle on. The 'slippery eel' that was consciousness has now become the 'slipperiest eel' that is information. Apart from my (hopefully) reasonable assertion that consciousness is a form of information, it would also appear that much else besides consists of information. It seems to be everywhere, all over the shop in fact, yet defies a simple all-encompassing formulation. I am reminded here of the cult 60's British TV series *The Prisoner* in which protagonist Patrick McGoohan, 'number 6', asks his mysterious captors what they want of him. "We want... information... IN... FOR... MATION!" he is repeatedly told. Perhaps he should have asked them to carefully define it. Anyhow, whatever it was, they never got it. Lets hope we fare better.

Someone once compared the modern status of information to that of iron in the Iron Age. The fashioning of iron lay at the heart of Iron Age material culture, yet no-one knew of its atomic structure, that its useful nature lay in its atomic configuration relative to other matter. Similarly, we live in an Information Age, yet, if pressed, we find it difficult to get at the nature of information, at what exactly it is that links all forms of information, whether this information be in the form of consciousness, a bar-code, a designer label, a weather front, or the current positions of the planets.

There are, in fact, specific ways to measure specific types of information. These were developed in the 40's and 50's by communication engineers who were concerned with the efficient transmission of information along media like telephone lines. But before we look at the way in which they have

conceived of it, lets first examine the common-sense view of what information means to us in its ordinary non-technical sense. Since we use the term all the time, especially in our present culture, this must signify that we *do* know something intrinsic about its nature.

Take the following three deliberately evocative examples in which information is involved. They are not as trivial as they might at first appear, rather they enable us to focus more clearly on the nature of information.

Example number one; at the end of the esteemed gangster movie *Miller's Crossing*, the main character shoots a fellow gangster but makes it look as though he was shot by someone else. He does this by putting the gun involved in the hands of yet another gangster who lies shot and dead (it was a violent film...) so that it looks like the two gangsters had shot each other dead at the same time. It could happen. Now, when he plants his gun, our miscreant fails to wipe off his fingerprints. That's because they had not fully advanced the art of forensic fingerprinting in the late 1920's when then the film is set. The man simply places his gun in the other's hand. We know of course, that had a modern forensic expert been around at the time then they would only have had to test the gun for prints for the real villain to have become apparent. And what is the significance of the said fingerprints? No-one would doubt me if I said that the fingerprints contained information.

Example number two; a nervous student armed only with a fountain pen and a small bottle of ink enters an examination hall and sits an exam. After completing the exam the relieved student leaves carrying his pen and his ink bottle which is now empty. The ink he has left back in the examination hall is carefully distributed over the various sheets of the exam paper, and the distributional pattern of ink will, ultimately, decide whether he passes or fails the exam. Clearly, the pattern of ink set forth by the student contains a wealth of information.

Example number three; you crack open a boiled egg for breakfast. As you dip your toast into the yolk, you begin to reflect upon the nature of this tasty source of protein. In particular, you realise that had this egg not been removed from beneath the warm body of the hen which produced it, then it would have eventually developed into a full-grown chicken with wings, a visual system, an innate repertoire of behaviour, a digestive system and so on. In other words you become aware of the astonishing fact that somewhere within the soft yellow substance of an egg there resides an inconceivably large amount of information.

POTENTIAL INFORMATION AND ACTIVE INFORMATION

The first point to make about these three examples is that the information inferred is in a *potential*, or *latent* state. Which is to say that the unseen fingerprints remain as potential information until perceived, the distribution of ink across the exam paper remains potential information until the paper is read by an examiner, and an egg, before it's untimely removal from beneath a hen, is also rich in potential information.

The second point is that this potential information can become *active* provided that it comes under the effects of an appropriate environment or *appropriate context*. As you will recall from chapter 5, I mentioned contextual environments in connection with their effect of providing meaning to individual neuronal patterns. We can now use this concept of context in a more general sense in order to understand how information can be made to actively flow or unfold from a potential state. As we shall see, context is an incredibly important word.

In the fingerprint case, a forensic expert armed with the tools of his trade can come to draw out the information embodied in the prints. He causes the information inherent in the fingerprint patterns to flow out into the larger environment, such that the information causes things to happen. The information has gone from a latent, passive state into an active state by virtue of the contextual effect of the investigative forensic expert. Such an appropriate contextual environment allows the meaning inherent in the prints to become manifest. To highlight the scope for causal effect that such a transitional flow of information can have, we should bear in mind that information in fingerprint traces can penetrate a court room and induce a conviction. Information is a powerful thing, able to spread itself out into the greater environment.

With the distributed ink example, its analysis by an exam marker causes the potential information to flow out and be *actively informative* so that it comes to shape the grade awarded to the student. In the context of the psyche of an examiner, the information inherent in the precisely patterned distribution of ink is significant enough to indicate the intellectual capacity and communicational intent of the student.

As for the egg, its informational content similarly undergoes a transition from a potential state to an active state when an appropriate environment draws the information out. In this case, a specific temperature acts as the befitting contextual environment (as far as I know), serving to elicit a flow of information from the sequential DNA patterns in the yolk (within the nucleus to be precise). Deny the egg the appropriate temperature context (take it away from warmth) and the information remains potential and inactive; hence a chicken fails to be brought forth.

SUBJECTIVE AND OBJECTIVE PATTERNS OF INFORMATION

Besides the distinction between potential information and actively flowing information, there is also a distinction to be made between subjective information and objective information. In the case of the fingerprints and the ink distribution, the information is activated by *us*. The apropos context is the subjective attention of human observers who come to channel the information. Which means that the information is purely subjective in nature, depending upon human observation to activate it. In fact, this subjective nature of information holds for the majority of the things we usually conceive of as information in our culture; things like TV and radio broadcasts, books, memos, newspapers, etc. To the fly crawling over the TV screen or the pages of a book, the visual or written information remains potential and dormant (unless of course it happens to be a cunningly designed electronic CIA bug), whereas in the context of the observing human psyche the information actively flows out of these media and comes to be causally influential. It should be stressed however that this subjective nature of the information does not lessen it in any way; it is still very much a real part of the Universe. Relatively speaking, all and any kind of information is real.

The case is somewhat different with the egg, for human observers are not necessary to elicit the (genetic) information they carry. The information in an egg is usually 'read out' by the natural environment, and we can refer to an egg's information as being objective in the sense that the objective natural environment is involved as the appropriate context eliciting the process of information flow. The same goes for seeds and spores. They are informational entities that release their stored information when the natural environment is in a specific state. If the seeds or spores fall on 'stony' ground (the wrong context) then their information remains unread, dormant perhaps for years. Indeed, a rather dramatic and apt example of this process occurred in the case of a freeze-dried Neolithic hunter found in the Alps some years ago. When his non-designer straw footwear was thawed out, some fungal spores in the ancient straw began to come to life and grow. Scientists were astonished, since it was the first time that such a turn of events had been observed. Cryogenically suspended by Nature for 5000 years, the pattern of information in the DNA of the fungal spores went suddenly from a passive to an active state due to the warm environmental context of the science lab. The information in the spores thereby began to actively flow, this process

manifesting itself in the elaborate growth of the fungus.

But, in both subjective and objective information, what is it that comes to flow? What is actually happening when the fingerprints are analysed, when the ink is read, and when eggs and spores begin to grow? It is obvious that some actively flowing process occurs wherein potential information becomes active information, but what exactly does this moving and dynamic process involve? This, in fact, is the crux of informational processes, and I should warn the reader that what follows is perhaps the toughest going in this book. But bear with it since the subsequent implications are many and rewarding. Trust me.

THE FLOW OF INFORMATION

Above all, when information flows, there appears to be movement and change, in particular, a change in the *state* of at least one of the systems involved. In analysing fingerprints, the information they contain initially effects the overall state of the forensic expert's psyche (the psyche being a system). Through analysing the prints, the psyche of the forensic expert is provided with knowledge, a term often associated with information. Indeed, the concept of knowledge is bound up with the theory of information developed by communication engineers, for information is conceived by them as representing a *reduction in uncertainty*. The richer the transfer of information, the less uncertain about something is the recipient of the information - hence more knowledge is gained. If I ask you to think of some famous person and I try to guess who you thought of through the 20 questions game, then if my first question is whether the person is male and you answer 'yes', then that single bit of information has halved my uncertainty. For the communications engineer, information is correlated with knowledge and a reduction in uncertainty regarding a choice of possibilities. Actively flowing information therefore comes to reduce the number in an ensemble of possibilities. It reduces uncertain possibilities and gives rise to the actual. The net result is a definite change, or resolution of possibilities, in the receiving system involved in the information flow. An uncertain 'open pattern' becomes a certain 'closed pattern' as it were. In the fingerprint case the receiving system is the psyche of the forensic analyst which changes its state or at least part of its pattern according to how it is informed.

Regarding the examiner case, before he or she comes to mark the paper, there is complete uncertainty about the ability of the student. As the exam paper is read, the information flow gradually causes a reduction in uncertainty until an eventual mark is settled upon. So, akin the previous example, we can see that the information contained in the patterned distribution of ink *gradually changes the information state within the mind or psyche of the examiner*. It is this sort of process which would appear to lie at the heart

of subjective information transfer. A system of information on one level or in one domain connects to another system of information such that the state of the receiving system becomes altered. Or, to put it another way, one pattern of information is able to effect changes in another pattern of information. The human psyche is precisely a type of informational system, or informational pattern, able to change its state according to information coming from those other systems in which it is sensorially embedded.

It is apparent then that subjective information, when accessed through reading, hearing, smelling, sight, or touch, comes to change the *form* of the receiving informational system substantiated in the receiver's brain. If we imagine the brain's neuronal wiring system to be like clay, then as patterns of information impinge upon this clay, the patterns comes to alter the form or shape of the clay, and thus there has been a flow of information. The impact of the flowing bits of information leads to a gradual change in the form, or formal state, of the clay. The actual system which functions like clay is the neuronal system, or, to be more specific, the way in which billions of neurons are connected to one another. Indeed, learning, and by definition information access, is thought to be mediated through changes in neuronal connections. It is the overall network of connections which reflects the global form or 'shape' of the neuronal system.

The dictionary definition of information helps us here to, for it tells us that information comes from the Latin word *informare*, which means 'to give form to'. When information informs us, it alters the form, or pattern, of the informational system that is our mind. The mind is therefore an information-based system constantly re-forming itself (changing its pattern) through the accessing of information deriving from other kinds of information-based media, just as if it were clay being shaped by its environment.

For us, there is only information. Our minds are uniquely enduring patterns spun from it. Information from other patterns, or systems, is continually being absorbed, integrated, and given out again. In this process, the form of the mind changes through changes in the ways in which neurons are formally connected to one another. Consciousness emerges as a type of global information whose form is constantly undergoing change due to the integration and accessing of other types of information through the senses.

If, instead of clay, we imagine the mind to be analogous to the white chess pieces on a chess board with the black pieces representing the external world, then as the black pieces move (the world changes around us) the information content of the white pieces will change in relation to the black pieces. Consciousness can therefore be viewed as a neuron-mediated form of information in process. As the overall state of the brain changes so too does consciousness change, and it once more appears that

consciousness is a particular form/pattern of information embodied within the firing activity of the neuronal brain.

DNA INFORMATION

The case of the egg is different. When environmental conditions are conducive, the objective information in the DNA becomes active and is expressed through biochemical activity. DNA is seemingly 'tuned' to operate when a specific environmental context surrounds it, just as our minds are tuned to our native language and familiar objects. The precise molecular details of DNA need not concern us here, rather we need only grasp the general principle of how information actively flows out from DNA.

In our discussions of the egg, DNA represents 'matter in a significant state' such that given a certain environment complex organic activity will unfold. From a single fertilised egg cell an entire organism will develop because the information in the egg cell's DNA becomes activated. The DNA causes particular amino acids to form which then cause various proteins to form and hence various organs. Morphogenesis, the growth in form of an organism, is thus the reading out of DNA information, the expression of the meaning inherent in DNA (incidentally, if an egg is eaten, then another form of its information is accessed, in this case its 'nutritional information' which is absorbed by the consumer).

DNA information is read out via biochemical processes, and the resulting change in the formal state of the system *itself* then acts as a contextual environment allowing the growth, or information read-out, to progress. We can view the immediate chemical environment of the DNA as being both on the receiving end of the information transfer and able to feed back upon, and influence, the information being accessed from the DNA. The form of the DNA, its specific information-rich *pattern*, comes to govern the form of the developing cells within which the DNA is embedded. In turn, the form of the cells i.e. their relative distribution, will determine the formal development of the organs within which the cells are embedded as well as determining further DNA translation. In this way, the DNA information comes to flow outwards and be expressed on a macroscopic scale.

There is a strong suggestion here that informational systems (i.e. meaningful patterns of form embodied within different media) are embedded within one another as in a nested hierarchical continuum, and that they are continually influencing one another's form. This is rather dramatically illustrated in the fact that

the reading out of DNA will eventually lead to an organism moving about in the world at large. If some mutated DNA has fortunately produced some new advantageous behaviour, then this will eventually feed back upon the mutated DNA and favour its evolutionary fate. In our case, the form of the human genome is a direct consequence of the form of the environment in which our ancestors evolved. Informational systems like DNA, cells, organs, organisms, minds and environments, are like the nested layers of an onion, each embedded within one another, each able to in-form (put form into) its 'neighbour'. All are interrelated states/systems/patterns of information.

INFORMATION AND LANGUAGE

Since DNA is clearly a form of information, we can dispense with calling it 'matter in a significant state'. DNA is information in the same way that words are information. Both contain meaning, potential or otherwise, which can be read. DNA is thus an organic informational language which is expressed through biological growth and biological activity. I would go further and suggest that this language-like informational process is not merely a metaphor for spoken and written language, but that DNA really is linguistic in nature with its own grammar and semantics, albeit of an organic kind. If the DNA is disorganised in any way then this corresponds to faulty grammar, and the development of the organism will proceed in a defective way. Consider the disease sickle cell anaemia in which red blood cells are misshapen (they are shaped like a sickle). It is caused by just one faulty microscopic link in the DNA, yet this single error is enough to produce the disease. The faulty DNA link can be viewed as a grammar-like error which interferes with the meaningful expression of the DNA.

The language-like processes so far suggested lead us to another concept, that of a dialogue. If we conceive a dialogue as the communicatory process in which information is transmitted, then subjective information like the written or spoken word flows according to a dialogue between the source of information and the recipient. Imagine someone talking down a telephone line with no-one on the receiver. No dialogue, and hence no communication of information takes place because there is no-one to provide a receptive context - no-one is there to be in-formed. However, if someone does take the receiver then the information from the sender comes to be absorbed by the recipient i.e. there is a definite information flow between psyches. The form of the neuronal 'clay' of the receiver is altered by the patterns of information being conveyed across the telephone line. The subsequent dialogue might be a one-sided affair in which the receiver merely listens, or it might be two-sided in which case both parties are involved in the information flow. In either case the dialogue facilitates a flow of information which will lead to a qualitative change in the informational state, or formal state, of the receiver's mind.

If we now consider biological systems once more, a similar kind of informational dialogue takes place, this time between the organism (with its DNA) and the natural environment. Think of any plant in the advanced stages of growth. At the very tip of the plant, the leading edge of the growth process so to speak, there will be newly emerging cells. This unfolding growth will take place within the context of the natural conditions it comes into contact with, such as luminosity, temperature, humidity, gravitational force and so on. A whole host of such influential factors both within and outside of the plant will play a relational role in shaping the form of the growing tissue. I suggest that such a relational process is a *natural dialogue* (as opposed to a dialogue in conventional spoken language) whereby information embodied in the plant comes to be read out by the immediate environment.

The resulting plant forms, in this view, are no less than natural on-going organic utterances or expressions shaped in response to the surrounding environment/context. The key point is that the interaction of the plant with the environment can be described in terms of a dialogue-like, language-like, process of information flow. There are no rigid boundaries at all, rather it is the case that there exists a hierarchy of information in which forms and structures constantly emerge and influence one another. Information is everywhere, residing in systems as diverse as biology and the human psyche. All systems can be viewed as patterns, or architectures, of information embedded or embodied within one another. Further, when one pattern influences the form of another, the process appears to be remarkably language-like.

DISSOLVING MATTER INTO FORMS OF INFORMATION

But what of inorganic matter? Can we stretch the language-like informational paradigm to cover such entities as physical elements and the like? We should not forget that atoms underlie the various informational systems we have been discussing. If we take the most basic element hydrogen, I see no reason why we should not consider it to be akin, in computer terminology, to a localised 'byte' of information, divisible into even smaller 'bits' (each byte in a computer's memory consists of a string of eight elementary digital on-or-off bits). What makes an element of hydrogen different from, say, an element of iron is its atomic configuration. The structural form of hydrogen (its pattern) is such that it bears important systematic relations to other elements. Here again, we arrive at an informational and language-like conception of hydrogen. It is an atomic expression, a 'word' in the language of physics. Put hydrogen in the context of other elements like oxygen, and its relational properties cause the formation or expression of molecules like water. Or, put an atom of hydrogen in the context of a star, and another aspect of its information becomes apparent, in this case its ability to undergo nuclear fusion. A star thus evokes one kind of information embodied within hydrogen, a fact of no small import for the existence of

life on Earth.

An atom of hydrogen can therefore be understood as a localisation of basic information, an element within the most primal language of the Universe. With this view, the basic 'matter' of the Universe starts to dissolve, and instead we again see only information. All elements from argon to gold to zinc are here inferred to be units of information whose informational substance differs according to the relational role played by those elements in a language of such elements. This is the informational language of physics, as opposed to the informational languages of, say, biochemistry, genetics or psychology.

As a measure of the sheer expressive capacity of the language system of elements, one has only to think of all the countless ways in which basic elements like hydrogen, carbon, oxygen, phosphorous, magnesium, and nitrogen can combine themselves, yielding such varied forms/expressions as DNA, methane, ammonia, psilocybin, sugar, chlorophyll, amino acids, proteins and so on. Which implies that the language of physics underlies the language of chemistry which further underlies the language of biology. Once more, one can divine that all these languages of Nature are part of an interconnected continuum wrought of information and within which the various kinds of information are everywhere flowing.

When we come to the various particles of which atoms are themselves made (protons, neutrons etc), we are confronting still more basic units of information, akin to on-off computer bits or the individual letters which make up words. The following relevant quotation on the nature of elementary particles comes from the physicist and philosopher Fritjof Capra, who, through his examination of quantum physics, has also come to conclude that the classical Newtonian view of material particles as being elementary 'material stuff' is no longer tenable:

"The high-energy scattering experiments of the past decades have shown us the dynamic and ever-changing nature of the particle world in the most striking way. Matter has appeared in these experiments as com

CHAPTER EIGHT

DOES THE UNIVERSE COMPUTE?

Before we try on the Universe-as-a-computation notion for size, let's briefly acquaint ourselves with the number crunching background that provided us with computer systems in the first place. We are not so much interested in the complicated electronic details of computer hardware and the like, as we are in the essential informational principles governing the operation of computers. This will reveal more about information and the way in which different forms of information can be processed. We will then be able to see if Nature really is amenable to a computational description (this is not as offensive as it might at first seem to some). If it is - and I hasten to add that I am not the first to put forward this idea - then we would have to view ourselves as living programs written in an organic biochemical language. More to the point, we would represent programs whose destiny is to be *twice executed* - firstly by way of genetically determined growth and secondly by inexorable death.

In the meantime of course, before the latter eventuality, we can, through the consumption of certain 'access codes', come to experience information pertaining to the point or purpose of the overall master plan governing the reality process. Once more, it sounds assuredly fantastic and assuredly millennial, yet if the computational paradigm is in any way accurate in describing and understanding what Nature is about then such radical ideas as these will have to be accepted or at least be debated. Anyhow, to get you in the mood to swallow the idea of an information processing Universe, let's briefly look at the rise of computer culture for, whatever your opinion of computers, these 'infamous' machines are guaranteed to run and run....

THE COMPUTER REVOLUTION

It was the emergence of information processing computers in the 1940's which heralded the arrival of the Information Age. Before 1950 there were just 15 digital computers in the world, probably because there

was no room for more given their huge bulk in those days. Now of course, computers have shrunk in size and are almost a compulsory possession. Indeed, our culture thrives on computers, which explains the exponential growth in computer technology, that is, that computer science is evolving ever more rapidly. Trade and industry, the military, the educational system, financial institutions; all now depend upon the constant processing and manipulation of information carried out by these ubiquitous and versatile machines. Information is the supreme currency of modern culture; it is everywhere being fed in and out of computer systems.

As with information and information-integration in general, the emergence of computer systems and the proliferation of global computerised telecommunication systems like the Internet seems unstoppable. It is difficult to discern whether anyone has any real control over this development. So fast is computer technology racing, that before we can assess the implications of one aspect of it, another dramatic breakthrough is made. Nostalgically recall the chunky portable digital calculators which suddenly appeared in the mid-70's. At the time did they not seem excitingly futuristic? Whether or not they were understood, their various buttons and computational functions seemed to provide an instant gateway to esoteric mathematical knowledge. Input a few numbers and commands, and the little machine instantly responded as if by magic. Log books and slide rules could at last be ceremoniously trashed. And yet digital calculators are now given away as tacky promotional gifts. Similarly, those original home computers of the early 80's, like the cute rubber-key Sinclair Spectrum ZX81, are now all but worthless and even primitive (in terms of capacity) in comparison to today's lightweight, high resolution, multi-media compatible, memory-expandable and portable variety. And by tomorrow even these will have become passé. The digital computer revolution is happening so fast as to make it a blur.

FORMAL SYSTEMS

Computers are popular because they are able to process information so quickly and in so many different ways. Processing information, information in process, its the same thing. At heart, information processing is all that computers do, whether the computer system in question is that used by the Pentagon, the Inland Revenue, or myself to write this book (which, I might add, is a Pentium 133MHz model, out of date it seems before I had hardly left the shop). Computers might process musical forms of information, financial forms, meteorological forms, or even visual pornographic forms. Either way, computers can only be fed with information, which they promptly process and return to the user.

Since it is the form or 'shape' of the information which is processed by computers, a computer is an

example of a *formal system*. (aha! That sounds familiar....) When it comes down to the nitty-gritty, all a computer does is take one formal set of symbols (an informational pattern) which mean nothing to it and then translate that set of symbols into another form according to specific rules. Likewise, the output of symbols (an informational pattern) will mean nothing to the computer either. The computers we employ only slavishly manipulate symbols; they do not think, they know not what they do.

In general, formal systems like the computer consist of a set of processable formulae such as strings of elements/symbols taken from some well defined alphabet. In a computer the strings involved are sequences of binary numbers - ones and zeros - which are known as machine language. *Any information can in principle be coded into binary strings*. Think about it. Recall in the last chapter my contention that matter was informational. As we shall see, it is precisely because physical systems can be transcribed into digital bit strings (i.e. they are informational) that has allowed computers to model aspects of the world. Add to these bit strings (whatever they might represent) a set of transformation rules which govern the ways in which the binary strings can be transformed, and you end up with a formal system able to process information. The more powerful the computer the more rapidly can it deal with its binary manipulations.

The transformation rules operating in a computer system are embodied in the computer's software which is run by the computer's central processing unit (the CPU). The software instructs the CPU how to operate upon its input information in a specified way. Built into the CPU are numerous logic gates (like AND, OR and NOT gates) which transform sequential inputs of 1's and 0's into further sequences of 1's and 0's, according to how input is fed into the CPU. Millions of such transformations can occur each second and the resulting output states (further strings of 1's and 0's) can then be interpreted from outside of the system. In other words, the context of human perception is needed in order to inject some meaning into the computer's output. For example, a computer system might take some input from a keyboard, process it according to its program, and then come to display the words "It is now safe for you to turn off your computer" on the computer's monitor. Although the pixel array might well say this, for the computer it is merely a particular pattern of binary output absolutely determined by the logical processing of the input.

Other formal systems are things like dreaded algebra, and heavy propositional logic (input: "All sensible men hate propositional logic" and "Aristotle was a sensible man", and hence according to the transformation rules of propositional logic, an output which must read: "Aristotle hated propositional logic").

Chess is another more common kind of formal system. In chess, the pieces are the individual symbols and the strings are the possible positions of those pieces. The game proceeds according to state transitions of the initial state, just as a computer processes information via state transitions of its initial input state. The rules of chess are the 'software' which dictates how state transitions are to proceed.

The transition from one state of a chess game to another is *discrete*, as with the operation of any formal system. A bishop does not half move; instead it discreetly 'jumps' from one position to another. Also, since a formal system like chess depends solely upon the form of the symbols and strings relative to one another, it is irrelevant what the pieces are made of. Indeed, they need not even be 'physical' at all, for most professional chess players are able to play the game in their heads alone. Though that will not do much for avid spectators of chess, it does highlight the fact that a formal system can be realised in many different types of medium. Indeed, a computer system can be made of tin cans and bits of string. What is crucial are the formal relations, or patterns, of the system's symbols to one another no matter how they may be embodied.

You could even take some people and use them to code in some input numbers which you would like to multiply. Roughly symbolising genital structure, the women could represent the binary number 0, and the men the binary number 1. After the two input numbers have been transformed into a specific binary queue of men and women, one could multiply the two input numbers by channelling the queue through a few logic gates operated by a couple of friends (instead of telling the binary people queue to go forth and multiply...). You could then take the output queue (the new pattern) and interpret the resulting encoded number which, if you set up the system correctly, would correspond to the multiplication of the two original numbers. Agreed, a simple calculator could have done the job more efficiently and with much less hassle, yet the point is that the calculator itself works on the same principle, only this time it uses silicon on/off switches to embody the binary information. Formal systems like computers are therefore not tied to any particular substantiation.

FORMAL SYSTEMS AND LANGUAGE

Before we alighted on the notion of formal systems, I argued that not only was the Universe made of information, but that this information moved or flowed in a language-like way. I claimed that the elements in informational systems like that of DNA uttered their informative content in response to specific contexts, as if natural dialogues were unfolding. We have now reached the point where we can

define language, *in whatever mode*, as a formal, and hence informational, system. Let me quote writer Paul Young, author of *The Nature of Information* who has written thusly:

"All languages are form dependent. In spoken language, arbitrarily selected symbols are manipulated as units that can be interconnected or arranged only in specific relationships according to specific rules. It is the form (relations), whether semantic, syntactic, experiential, or contextual, of the elements of language, and not the matter of which they are constructed, from which the mind generates meaning; the physical symbols themselves embody no linguistic meaning....It is neither the mass nor the energy content of the letters, words, sentences, and so on, whether expressed via mouth, pen and ink, stylus and wax, or computer printout, that contains the information in language, but their specific form or arrangement."

I have gone one theoretical leap further however. Young refers to the so-called "matter of which they are constructed" with regard to the symbols of language. This 'matter', in my view, is *itself* composed of language-like elements within some formal system or another. Which implies that there is only information; the Universe is built upon formal informational systems like those of physics, chemistry, and biology, and all are embedded within one another to form an integrated informational continuum. They are formal systems because it is the form (i.e. pattern or architecture) of the elements whether they be particles, atoms, molecules, or words, and their formal relations to one another, which determine the role, meaning and subsequent action of those elements.

The language-like system of particles represents one of the Universe's most basic informational substrates. This system begets the language-like system of atomic elements. In turn this system gives rise to the language-like system of chemistry, which itself leads to the language-like system of DNA. And so on right up to the substantiation of the language system of consciousness within our biological brains. Each of these language-like systems of information utilises its own kind of logic to express itself, namely the logic of physics, chemical logic, molecular and genetic logic and finally the logic of mind or psychology. Each form of logic gives rise to patterns and architectural structures which influence one another and lead to more patterns, some of which produce, or come to embody, new systems of logic. Descartes was wrong; the dualistic mind/body problem is an illusion. Formal systems consisting of language-like information in process constitute reality. Information in process is everywhere and everything.

SOME INSIDE INFORMATION: ARE WE OUTPUT?

If the above reasoning is correct, then the Universe must in a real sense be an on-going computation in which its informational content is being continually churned and processed so as to yield new forms/patterns of information. At any one moment the Universe is in a specific state or form. This state is processed according to the 'rules of the Universe', and another universal state is formed. And so on, from the moment of the alleged big bang to right now. The entire Universe can thus be considered a progressive state transitional computation, a kind of meta-formal system continually expressing its potential nature. And, more profoundly, we are inside the computation. Or so it seems.

Is such a speculation tenable? Could we really be locked inside a vast computation as though we were all but hapless sub-routine prisoners, moving in time to some grand algorithmic dance? According to our foray into the nature of information and computations, such a suggestion would appear to be a spectacular probability, albeit a trifle claustrophobic, and an outrageous absurdity at the same time. We are so used to thinking of computers as neat white boxes atop desks that we forget that they are formal systems which can, in principle, be embodied in anything. But, if we do take this fact into account, and if we also bear in mind that computers can manipulate all sorts of information even going as far as simulating things like the weather, then we might well be attracted to the idea of a computational Universe. Or, am I merely resorting to the use of a convenient metaphor borrowed from our technological culture? If so, then the metaphor might be useful but, ultimately, since it is temporal, its use will be limited until another more useful metaphor becomes available.

Whereas it is true to say that metaphors have often be taken from the latest technological devices in order to support some novel theoretical conjecture, I would reverse the argument. I hold that the principle of informational computation reflects the actual way (or at least one way) in which Nature itself operates. What we have achieved in the digital computer revolution is a mimicking of Nature. We have come to realise that the name of the Universe game is information (everything is information) and its processing according to predetermined rules.

Indeed, one only has to consider the fact that DNA, the very mainstay of life, is itself a form of digital information to begin suspecting that Nature be computational in some fundamental way. There are four nucleotides which make up all and any DNA - guanine, cytosine, adenine or thymine - and since any given element of DNA must be one of these four possibilities then this system is clearly digital.

As if this digital quality of DNA was not striking enough, it is also the case that neuronal firing activity

must be based upon similar digital principles since neurons do, or do not, fire. Patterns of neuronal firing differ according to which neurons are firing and which are not firing (as well as the rate of firing). Thus nervous systems (which includes the brain) likewise employ an essentially digital form of information processing. As much as we like to think ourselves as pioneering inventors and technological geniuses, Nature verily beat us to it in terms of digital technology and digital computation. The Information Age is clearly far older than we imagine.

STATE TRANSITIONS

If you are still not convinced that the essential fabric of the Universe is informational or if you still much prefer the safe and reassuring feel of 'hard tangible matter', let me introduce some more support for the Universe-as-a-computation scenario. This comes from the brilliant (and wealthy since he has been awarded large sums of money by certain theological organisations) science philosopher Paul Davies. Davies is foremost a professor of theoretical physics, yet he is one of those rare breed of scientists who dares to ask the really intimidating questions about the fundamental nature of reality. He also attempts to answer such questions.

In his book *The Mind of God* (a term borrowed from the end of physicist Stephen Hawking's book *A Brief History of Time*), Davies labours hard to get to the heart of reality. Whilst discussing the ability of computer simulations to mimic aspects of the real world, Davies inevitably asks us if the Universe is itself computational:

"Compare the activity of the computer with a natural physical system - for example, a planet going around the sun. The state of the system at any instant can be specified by giving the position and velocity of the planet. These are the input data. The relevant numbers can be given in binary arithmetic, as a bit string of ones and zeros. At some later time the planet will have a new position and velocity, which can be described by another bit string: these are the output data. The planet has succeeded in converting one bit string into another, and is therefore in a sense a computer."

In the same vein, Davies goes on to discuss the various states within a system of gas molecules. An incredibly long binary sequence could be used to specify the velocity and position of all the gas molecules at one instant. After a set amount of time has passed, a new state will have been reached which

can likewise be specified in terms of a bit string. Input information has thus been converted by Nature into output information, and this is clearly a computational process.

It is precisely because different aspects of the world can be coded into a binary form that computers are able to model different facets of reality. Of course, computers are not able to simulate the real world *exactly* since that would require a calculation involving *all* the relevant information in the system to be modelled. Any inaccuracy in the initial configuration of input data will tend to increase exponentially as the simulation progresses (if the simulated system is non-linear). This is the so-called butterfly effect in which the state transition of the system is highly sensitive to initial conditions (perhaps the beating wings of some anarchic butterfly led to the unforeseen hurricane that swept through the U.K. in 1987 - if so, the days of this dastardly butterfly are surely numbered!).

Alter the initial state of a computation in some minuscule way, and the alteration will inevitably develop an increasing influence upon the development of the computation, so much so that the end state might be radically different. This is the reason why computer simulations of the weather will not be accurate beyond a few days, and why we should be merciful in our judgement of erroneous weathermen. It is simply impossible to input all the information about the current state of the weather. Only the real weather system itself contains all the relevant information. In this sense, *the Universe is its own best computation*. All that weather scientists do is simulate the weather as accurately as they can using as much input information as they can obtain. Computers merely model different aspects of the world, they cannot recreate them 100% for that would necessitate inputting *all* the relevant information. For sure, man-made computers and computations are smart, only the real world is far smarter and far more rich in information. And part of its output is we conscious humans.

THE ORIGINAL SOFTWARE

If we go along with the notion of the Universe at large as being an on-going computation, at least of sorts, we are unavoidably led to ask ourselves what precisely governs the state transition of the Universe from one moment to the next? In other words, what are the rules which control this vast information processing system? After all, there must be some lawful control over the progress of the Universal Computation for we witness order and cohesive patterns on all scales of reality, from simple cells to spiral galaxies. What then is the basis of the meta-grammar or meta-software which runs the reality process?

It would appear that the fundamental laws of physics represent the Universal program. These constitute the essential software governing the on-going computation of the Universe. There can be no denial of this, for the four fundamental laws of physics (like gravity and the strong and weak nuclear forces) reign throughout the Universe and provide the bedrock upon which cosmological events unfold. However, these laws of physics - representing perhaps the ultimate contextual rubric - are such that they have generated new informational systems like those of elemental physics, chemistry, genetics, biology and the mind etc, which I outlined in the previous chapter and which I described as being formal informational systems in this chapter. These informational systems have themselves allowed *new laws to emerge*. This is also undeniable. Formal systems like genetics, and the English language can in no way be totally reduced to physics. Nor can consciousness be reduced to physics. And yet physics and the fundamental laws which govern physics have 'encouraged' these subsequent systems to emerge.

Laws are essentially grammar-like because they govern the way information flows and integrates within different language-like informational systems. Thus, once new forms/patterns/architectures of information have arisen within the Universal Computation, new laws appear to emerge which control the relations between those novel forms i.e. new grammars arise. This is an important point to bear in mind when we talk of the laws of physics, for one might be suspicious that physical law alone is sufficient to cause, say, the evolution of life. It is rather that the laws of physics have allowed new laws to emerge once new forms of information have come into being. In this sense, the laws of physics are primary, they are the fundamental grammar so to speak, or fundamental pattern, which has facilitated all else of interest. This is somewhat reminiscent of the role of the octave in music. The octave defines music since it holds all the major notes within it and specifies the vibrational relations between those notes. Once the fundamental octave system has been specified, then all music, all those compositions and melodies we love, can be generated out of that basic system. The same principle applies to chess of course. Once the rules are created, then every chess game, whether a classic, an epic, or an embarrassment, can be generated from those basic rules.

IS REALITY A BIT FISHY?

The laws of physics, such as they are, require an initial input state in which to manifest themselves. This initial state would appear to be the initial conditions at the time of the alleged big bang, conditions which many cosmologists have argued had to have been highly specific in order that the Universe evolve in the way it has. Here we face a deep mystery. Why that particular set of initial conditions, and why those laws of physics?

In most of his books, Paul Davies always seems to conclude that the Universe appears to be a 'bit fishy', or that there is definitely 'something going on behind the scenes'. Davies refuses to accept that the laws of physics and the initial conditions just happen to have been that way. It appears 'too good to be true', especially since we are around to speculate upon it. Either one accepts these fundamental properties of Nature as being unexplainable 'brute facts', or one can try and account for them in some kind of metaphysical way.

As we are once more entering unusual territory, lets quickly re-cap. We have been trying to understand reality as an on-going computation in which all the Universe's information is being relentlessly processed via countless state transitions. This informational process has led to the formation of galaxies, stars, planets, life, *Homo sapiens*, consciousness, and subsequently conscious reflection upon the nature of galaxies, stars, planets, life.....etc. In itself the existence of such patterning is astonishing enough. But we have also concluded that such interesting and creative outputs are entirely dependent upon the laws of physics and the initial input conditions, and that these are special in some way; at least special in the sense that they have produced enduring forms of information such as you and I.

If this line of reasoning already suggests the presence of a God in some fashion, then it is because our vocabulary is severely limited when it comes to discussing these types of issue. This is a relatively new area of thought, for only in the last decade or so have scientists begun to seriously contend with why things are the way they are, with why the Universe appears to be somewhat fishy. These *are* legitimate questions to ask, though they extend well beyond the limited scope of science.

I believe that since we are inextricably caught up in the Universal Computation, wherever it might be leading, then it is surely in our interests to confront this state of affairs. In fact, we should demand to be enlightened as to what is really going on here. Then again, marches and demonstrations in which banners are held aloft bearing the legend **WHAT IS THE POINT OF THIS UNIVERSAL COMPUTATION WE ARE ALL IN?** are unlikely to yield answers. Indeed, as I have made clear, natural entheogens and their ability to foster transcendental forms of cognition are perhaps the greatest tools at hand for coming to terms with such questions about reality. Create the right sort of biochemical alchemy, bring the right sort of natural ingredients into place, and information seems to conveniently orchestrate itself into patterns of deep understanding. The method perhaps whereby Nature resolves an understanding of itself through the vehicle of consciousness.

However, before we go on to form some kind of conclusion from our informational/computational view of things, it will be useful here to show in more detail how the computational processing of information according to a few very basic rules can nonetheless yield organised forms and structures. In particular I would like to welcome to this chapter the extraordinary world of the cellular automaton. This is not as dull as it sounds and, since such a system is simple to grasp, it lends itself well to our computational/informational paradigm.

THE GAME OF LIFE

A cellular automaton is a computational-cum-informational system able to yield life-like phenomena, and is therefore a model which captures, at least in part, Nature's life-making capacity. Oddly enough, the study of such systems has its roots in a novel Mexican mushroom, only this time the mushroom in question is the malignant mushroom cloud of the atomic bomb.

The hydrogen bomb was created in the army laboratories of Los Alamos in New Mexico as part of America's Manhattan Project. In fact, it was in response to the cautionary word of Einstein himself that the USA originally began to attempt the cracking of the atom for weaponry purposes. In 1939 Einstein, who was then seeking asylum in the USA, had written to president Roosevelt concerning Germany's widespread and zealous search for uranium. It was painfully clear to Einstein that the implications of his $E=MC^2$ equation were being followed through to their ultimately explosive end and that therefore the USA would do well to keep abreast of this disturbing development. On the strength of Einstein's warning the USA galvanised themselves into developing an atom bomb before Germany managed it and thus the Manhattan Project was born.

It was precisely at this time, the early 1940's, that computers first made their appearance having just then been invented. One of them, aptly named MANIAC (mathematical analyser, numerical integrator, and computer) was used in the Manhattan Project in order to speed up the calculations necessary to produce a fully working atomic bomb. By August of 1945 two such devices had been 'successfully' detonated over Japan.

MANIAC was supervised at Los Alamos by the mathematician John Von Neumann. Although Von Neumann was a mathematical wizard, his ethical stance was a little questionable. Not only was he an extremely vocal advocate for the total nuclear destruction of Russia before they got to develop a nuclear capability, and not only did he feel that it was safe to carry out and closely observe nuclear test explosions (he was later to die of bone cancer, probably caused from witnessing nuclear explosions at Bikini atoll), he even devised plans to dye the polar ice-caps in order to melt them.

Despite these cheery idiosyncrasies, it was Von Neumann who first began to study the computational properties of cellular automata on the bulky computers at Los Alamos. Von Neumann had always been fascinated by the idea of self-replicating machines, though he believed that ultimately this was not possible using only vacuum tubes, transistors and the like. However, by utilising the new computers that were at hand, Von Neumann was able to implement a computer program in which simulated life forms were able to replicate themselves. The program was the original cellular automaton. That these self-replicating computer-generated entities were not made of flesh or machine parts did not matter since it was their logical and organisational structure which defined them. This was one of the first real insights into the simulational power of computers. They could create convincing forms of life.

Von Neumann's work was given a whole new lease of life (literally) by Cambridge mathematician John Conway, who, in 1970, invented a cellular automaton called the Game of Life. The game is deceptively simple, yet it is able to generate an endless amount of complexity and variation. It also mirrors the computational quality of biological life itself.

The Game of Life is referred to as a cellular automaton because it proceeds within a chessboard-like grid of cells, and because the program governing the way in which the game progresses is entirely automatic. The Game of Life consists of just 3 rules which are applied again and again to the current state of the cells in the grid. Cells are either occupied or not which means the system holds binary values. Cells are digital, on or off, alive or dead. These are the 3 miserably simple rules:

1. If an occupied cell has precisely three occupied neighbours then the cell remains occupied.
2. A cell remains unchanged (occupied or not) if precisely two of the neighbouring cells are occupied.
3. In all other cases the cell becomes or remains empty.

An initial configuration of on/off cells is provided as input and then the 3 seemingly vacuous rules are applied. The output from this process will yield a new configuration of on/off cells. The rules are applied repeatedly, hundreds or even thousands of times. The results can be quite spectacular. Not only do slightly different start configurations yield wildly different outputs, various patterns can form which *endure* through the game. If the successive states of the cellular automaton are presented rapidly on a computer screen, then a Life movie can be watched as it progresses. Patterns emerge, move around, collide, mutate, and some are even able to replicate themselves.

Conway's Game of Life grabbed media attention in 1971 through coverage in the pages of the *Scientific American* (it can still be found, often as a screen-saver program for personal computers). The various Life objects began to acquire names. Shuttles, beehives, and flotillas were born. Ships, boats, barges, and blocks were readily observed and documented as they meandered about the 2-dimensional Life plain.

The gene-like pattern with the capacity to replicate that sometimes emerged in the primordial Life soup was named the 'glider'. Gliders were observed to collide with one another resulting in the formation of a 'glider gun' which shot out further gliders as though they were its offspring. It was even discovered that glider guns could be set up in such a way as to constitute a virtual computer! Conway proved that processions of gliders were able to code binary numbers, and that logic gates could be formed by making glider streams collide with one another in a specific way. The result is startling. The Life computer can itself embody yet another computer, and so on ad infinitum. A digital information process within a process within a process.....

What was originally so fascinating about the lifelike patterns that evolved in the Game of Life, was their origin. From initial simplicity, complexity was born. Furthermore, cellular automata were clearly computational, whether they were played out on a computer, a chessboard, or on graph paper. Via state transitions, information was being processed throughout the game. There was an unavoidable implication that life itself might represent a similar information processing system. If so, then the Universe could most definitely be understood in computational terms.

Stephen Wolfram of the Institute of Advanced Study in Princeton summed up the computational implications of cellular automata in the *Scientific American* in 1984:

"It is presumably true that any physical process can be described as an algorithm {a condensed set of computational rules} , and so any physical process can be represented as a computational process.... In cellular automata the correspondence between physical and computational processes is particularly clear. A cellular automaton can be regarded as a model of a physical system, but it can also be regarded as a computational system closely analogous to an ordinary digital computer. The sequence of initial cell values in a cellular automaton can be understood as abstract data or information, much like the sequence of binary digits in the memory of a digital computer. During the evolution of a cellular automaton the information is processed: the values of the cells are modified according to definite rules. Similarly, the digits stored in the memory of the digital computer are modified by rules built into the central processing unit of the computer."

We have now arrived back at the Universe-as-a-computation scenario. An on-going computational system, the Game of Life vividly demonstrates how initial conditions and some basic state transition rules can give rise to organised complexity and the emergent phenomenon of self-replication.

The real computational game of life in which we have been born similarly depends upon a well defined initial state at some distant moment in the past and a set of rules, in this case the rules being the laws of physics and constants of Nature which act upon the current universal state. We can see that the Game of Life cellular automaton is an on-going computation in which its formal informational state changes as the computation progresses. Likewise, we can see that some of the informational patterns or forms which arise in this computation are remarkably lifelike, especially the ones with a capacity to replicate. Now, if this entire system is to be understood in computational/informational terms, then clearly the Universe at large can be approached in the same way. The only difference is that we are inside the Universal Computation, much as gliders are inside of cellular automata.

A DISCRETE LOOK AT TIME

The case is still not watertight however. Cellular automata, and indeed any computation proceeding within a computer, move in discrete steps. If the Universe is an on-going computation, then, strictly speaking, it ought to proceed in discrete state transitions, frame by frame as it were. Mathematician Martin Gardner who originally introduced the Game of Life to readers of the Scientific American, was one of the first to speculate upon this. He wrote:

"There is even the possibility that space-time itself is granular, composed of discrete units, and that the Universe....is a cellular automaton run by an enormous computer."

In other words, if the Universe is a computation, there is likely to be a smallest unit of time (time is granular) which cannot be broken down further. Such a hypothetical smallest unit of time is known as a *chronon*. A chronon is an absolute moment in which the Universe is in a particular state. This state will then proceed by a discrete 'jump' to form the next chronon according to whatever laws are operating on that state, much like the movement of electrons which are supposed to discretely jump from one orbit to another. There are believed to be no intermediary states between successive 'jumps'.

One might now be tempted to ask why we experience time as flowing. There is no surprise here, for to talk of discrete time is like talking of the successive frames of a film. If the frames are presented quickly enough the illusion of continuity becomes apparent. Such an illusion of continuity is also manifest in the Game of Life. The state transitions of Life automata can be processed by a computer so quickly as to give rise to patterns which, on the computer monitor, appear to flow across the 2-dimensional playing field. In fact, *all* computer displays move in discrete stages, even in the most advanced programs. For instance, computer games might look as if they are flowing smoothly, yet in actuality they are proceeding in rapid state transitional jumps (at the current time this fact of computational 'jumpiness' is a problem being tackled by virtual reality engineers who are striving to speed up their computerised VR graphic displays in order to make their necessary complex virtual worlds flow smoothly like the real world).

The 'illusion' of flowing forms which seem to constitute the Universe must therefore be due to the presence of stable patterns within the computation, patterns which endure from one moment to the next. If one were to take one snapshot slice of reality, one chronon as it were, then one would not be able to properly discern any patterns, rather the patterns we observe, like planets and people, are patterned structures which emerge over a multiple succession of such slices. Likewise, I would assume that consciousness seems to flow precisely because it is an informational pattern which endures across successive frames of granular time.

There have been attempts to quantify the hypothetical chronon. For what its worth, it is assumed to be the shortest conceivable length divided by the velocity of light. For obvious reasons, I'll take this definition

on trust. Anyhow, this yields what is sometimes called the 'Planck time', and this may represent the elusive chronon. Intuitively it seems there must be discrete time, for otherwise a second could be divided into an infinity of moments. If so, then it is hard to see how time appears to flow at all. An echo of this 'timely dilemma' is found in particle physics. Are there any smallest bits, or does scale and size continue indefinitely? As with time, it makes more sense to think of a smallest unit of matter/information and a smallest unit of time. The case remains open however, though it is doubtful that any measuring instrument could be built to observe the discrete moves in time. Alternatively, it may still be possible to hold the computational view of the Universe with non-discrete time. This is a task someone else can tackle.

WHAT GAVE OUR UNIVERSE IT'S LUCKY BREAK?

Once more assuming that reality is indeed a kind of on-going computation in which language-like information is everywhere being processed, and in which the moment 'now' is the leading edge of the computation, we can return to the question of its software, that is, the laws of physics which determine how the Universal Computation progresses. As I said, the nature of the Universe is completely tied up with the particular laws of physics and the initial conditions prevailing at the beginning of time. Now, just how significant or random are these two sets of variables?

With the Game of Life, Conway's three rules or laws were specifically designed to ensure that enduring and interesting forms of information could arise as the game proceeded. The 3 rules were chosen from what is basically an *endless* amount of possible rules. Indeed, it took Conway a great deal of time to discover these 3 rules. If you just took any old rules and applied them to the game then nothing much of interest would happen. And if anything of interest did crop up it would only be likely to vanish soon after. It is because Conway's Life rules were so permanent, precise, and constraining, that his game took off and was ultimately able to yield lifelike forms. Moreover, to get really interesting results (like getting a virtual computer to emerge), one must *engineer* the initial state, set it all up in advance so to speak, in order that the system develops in the way you wish. Conway was clearly God of the Game of Life, or at least his intelligence was. For a glider speeding about the Life plain, it could do a lot worse than worship the great and holy Conway of Cambridge as its creator.

So, what about the laws of physics and the initial conditions in the real game of life? Just how precise do they need to be in order that we are now here to reflect upon them? This is somewhat hard to ascertain since we only know of this Universe. We can't examine other Universes with slightly different laws and

initial states in order to see if they also bring forth life and consciousness. However, many scientists have concluded that for conscious life as we know it to have evolved, then the laws of physics and the initial conditions had to have been exactly the way they are. Indeed, it seems that there are many 'cosmic coincidences' which have 'conspired' to elicit life.

Davies, for example, has commented upon the combined effects of hydrogen, sub-atomic neutrinos, and physical law in their impact upon the emergence of organic life:

"It is particularly striking how processes that occur on a microscopic scale - say, in nuclear physics - seem to be fine-tuned to produce interesting and varied effects on a much larger scale....thus we find that the force of gravity combined with the thermodynamical and mechanical properties of hydrogen gas are such as to create large numbers of balls of gas. These balls are large enough to trigger nuclear reactions, but not so large as to collapse rapidly into black holes. In this way stable stars are born."

Davies goes on to describe how some stars eventually explode, and how the remains of such supernovae form the basis of planets like the Earth. Apparently, every heavy atom in our bodies had to go through many such supernova cycles before ending up as an integral part of terrestrial life. The force of an exploding star derives, in part, from the presence of neutrinos, which Davies refers to as 'ghostly entities'. He concludes:

"The life cycles of stars provide just one example of the ingenious and seemingly contrived way in which the large-scale and small-scale aspects of physics are closely intertwined to produce complex variety in nature."

In other words, the long and complex chain of state transitions of the Universal Computation which eventually yielded life and consciousness, was determined by the precise manner in which the universal dialogue unfolded. An appropriate set of grammatical rules/physical laws which would eventually generate life and consciousness were seemingly 'set up' at the very beginning of time. Once the laws of physics and an initial input state had been specified, they eventually went on to facilitate the evolution of planets and people made of stardust. Even our Mr Sceptic must concur that this has been a somewhat fortuitous turn of events. One has to be near dead not to marvel at least a little at our conscious existence at this stage in the Universal Computation.

Consider also the so-called constants of Nature, like the mass of the electron, and Newton's gravitational constant. Their value is considered absolutely precise, and they determine how the language of physics is conducted. These constants also seem to be fine-tuned to allow organic life to emerge. If their value was but a fraction different then life as we know could not exist. Some scientists have introduced what they have called the *strong anthropic principle* to account for this phenomenon. This principle holds that the fundamental constants of Nature have the value they do precisely to allow life and consciousness to develop somewhere and somewhen in the Universe. It sounds like design. Needless to say, other scientists heave at such talk, preferring to seek a less astounding explanation.

The 'life-friendly' nature of Nature is seen elsewhere. The element carbon which is so crucial for life on Earth, is generated inside stars by an extraordinary series of what Davies has termed 'lucky flukes'. It just so happens that normally rare high speed collisions of three helium nuclei are favoured to occur within stars due to fortuitous quantum effects. The resulting carbon which is formed eventually gets blasted out into space when stars go supernova. Since carbon is the basis of all organic chemistry, we really can thank our 'lucky stars' for its biologically constructive presence here on Earth.

And let us not forget good old H₂O. Water is indispensable for life. The various unique physical and chemical properties of water like its role in photosynthesis, in nutrient transport, in osmotic cellular processes, in heat reduction via sweat evaporation, in encouraging the organic creativity of the primeval soup, and so on, make water a form of fluidic information fundamental for life.

Even the expansion of the Universe has to be constrained so as to allow time enough for galaxies, planets, and life to form. If the expansion of the Universe were too fast then galaxies could not form and if the expansion were too slow then it would re-collapse before anything interesting happened. According to some estimates, if the velocity of expansion in the first second of the big bang was a mere trillionth slower, then the Universe would have collapsed within 50 million years, during which time the temperature would have remained above 10,000 degrees, clearly a state unfit to yield life as we know it.

These are but a handful of the countless examples which show how finely tuned the Universe is in order that it bring forth organic life. This situation echoes the precise conditions (the exact three rules) needed in the Game of Life in order that the cellular automaton brings forth elaborately organised forms. In both

cases, the real world and the model world, it is clear that specific fundamental laws in association with specific fundamental constants and precise initial conditions are needed so as to ensure that organised forms evolve.

NOW WAIT JUST A GODDAM CHRONON!

We might protest here and argue that life has merely exploited the conditions which happen to prevail. In that case life will have just seized upon whatever 'chances' are on offer, where 'chances' is the appropriate word. Life might therefore reflect what *can* be achieved in an essentially uncontrived Universal Computation. But how can we be positive that life and consciousness could have evolved in 'any old kind' of Universe? Could one just throw some dice to determine, say, the mathematical nature of the laws of physics, and then still expect to get life and consciousness at some stage in the resulting reality? Could one think of any number between one and a million, add five, randomly shuffle the decimal point, designate this number as the value of a constant, and then still expect to come up trumps with the subsequent Universe?

It appears impossible to conclusively prove that an evolutionary process in which consciousness is eventually formed has to have had our particular type of Universe with its particular initial conditions, physical laws, constants and so on. And yet it is easy to imagine stupid and very silly Universes in which nothing of interest happens. Letting our imagination go, we can picture Universes in which the laws of physics stop complex structures forming, or in which the constants of Nature force the Universe to form into a bland conglomeration of stagnant banality. More chaotically, we can imagine Universes with little or no law and order at all. Or, even more absurdly, we can imagine a Universe in which life starts only to be inevitably destroyed soon after by some immutable principle of physical law. There are zillions and untold trillions of possible boring lifeless Universes, just as there are zillions and untold trillions of possible uncreative cellular automata. So, why is our Universal Computation so very, very interesting? And why us?

One 'fast-food' solution is to suppose that the Universe expands from a big bang only to eventually contract into a 'big crunch' at some later stage. Out of a big crunch a new Universe evolves and the cycle continues, only this time the successive Universe has slightly different laws and initial conditions. This 'pulsation of Universes' is presumed to have been going on forever without any reason whatsoever - an infinite chain of Universes with no end and no beginning. One of these, ours, just happens to be one of the significant ones amongst a literal infinity of boring ones. Aw shucks, there is no significance to our

reality after all....

A similar scenario to this is the arch-cunning Multiple Universe theory touted by a disturbing number of quantum physicists. They view the Universe dividing whenever a quantum event takes place in which more than one outcome is possible. This happens more than a lot. Thus, the Universe is forever branching into an endless amount of Universes. Again, we merely happen to be in one of the more interesting ones.

Finally, there is the 'birthing Universe' theory, also of appeal to some cosmologists. This imaginatively fertile scenario views black holes giving birth to new Universes with slightly different laws and constants, one of which.....well, you know the score by now.

Are the above proposals tenable in explaining our very special Universe? On reflection, these 'you want it your way, you got it' schemes are a trifle absurd, for in them there must be, by definition, not only an infinity of Universes but an infinity of ones like our own, differing perhaps only in some minor detail like, say, your surname. In one of this infinity of Universes, or perhaps in 582, each of my readers will be called Mr or Mrs Banana. But, since we can never ever observe or experience these other Universes (apart from in Star Trek or the Twilight Zone) then what on earth is the point in invoking them? In other words, is it really legitimate to speak about that which cannot in any way be verified? I think not.

The popular principle of Occam's Razor (perhaps we should now call it Occam's Laser) holds that one should always stick to the simplest theory possible whenever one has to choose from amongst competing theories. This tenet has come to attain a kind of hallowed status within science these days. If we introduce it here, then we see that there could be *no more blatant departure from the use of Occam's razor than in an inference that a literal infinity of unobservable Universes exists*. And even if you did still choose one of the Multiple Universe scenarios, *it will still not explain why the infinite chain exists in the first place !!!* Basically, what all of these imaginative Multiple Universe scenarios reveal is that physicists and cosmologists are in expletively, and I mean expletively, deep water when it comes to accounting for the 'why' of our most creative Universe.

Alternatively, some people just shrug their shoulders at the presence of life and consciousness in the Universe, happy to heed the Beatles and just let it be, let it be. As long as dinner is on the table and

there's a good film on TV, who cares why the reality process is so organised and integrated? And as for the agnostic who denies that one can acquire knowledge about the ultimate nature of the Universe, unless they have explored all possible approaches to the mystery, then they are merely being lethargic, happy to shrug and shrug again at unexplainable brute facts. Alas, we have no time for such shruggers here.

I happen to think that it is a bit of an intellectual cop-out to dismiss the finely tuned software running our Universe as being no more than a brute fact to be mindlessly swallowed and forgotten about. It also betrays the inquisitive and adventurous spirit of our species. It is not just that a Universe should exist in the first place (why not absolute nothingness - it seems a lot more simple), and it is not just that such a Universe should endure for so long. Why should the something which does exist be so darn complex and reach a state where it can contemplate itself through the mind of *Homo sapiens*? How come we ourselves are so highly tuned to the mystery?

Ultimately, the choice as to what significance one attaches to our Universe is a personal one. One can only mull over the facts about reality, the rules of the game as it were, and then interpret them in the light of contemplation. One's unique life experiences will also shape ones conclusions about the nature of reality. If you tend to see and be awed by beauty in Nature wherever you might look, then you are perhaps more likely to be dissatisfied with brute-factual explanations. What I have tried to highlight is the sheer fantastic nature of Nature for reality deserves this at least. For my part, I side with Davies. There is most definitely something fishy going on both in and around us. What is more, this fishiness is very subtle and mystifying. And a source of wonder.

At the end of *The Mind of God*, Davies sticks his neck out and suggests that one cannot get at the ultimate meaning of reality by logical and rational thought alone. These are brave words coming from a respectable scientist with an award-winning reputation to defend (he has money to fall back on though). And Davies knows that an appeal to other forms of thought for ascertaining answers to the 'why' of the Universe, is controversial to say the least. He writes:

"Although many metaphysical and theistic theories seem contrived or childish, they are not obviously more absurd than the belief that the universe exists in the form it does, reasonlessly. It seems at least worth trying to construct a metaphysical theory that reduces some of the arbitrariness of the world. But in the end a rational explanation for the world in the sense of a closed and complete system of logical truths is almost certainly impossible....If we wish to progress beyond, we have to embrace a different concept of "understanding" from that of rational explanation. Possibly the mystical path is a way to such an

understanding."

There ends Davies' exploration of God's mind. Whatever one concludes about the fine-tuning of the Universal Computation in which we find ourselves, there will always be some factor involved which cannot be grasped by our normal conception since the factor in question is *uncaused*. If we side with the clumsy and arguably nutty Multiple Universe scenario we must admit that the infinite multitude of Universes were not caused by anything, that they just are, were, and will always be. And if, like myself, you opt for just this one remarkable Universe, there is still the matter of the initial set-up, which also indicates some uncaused factor. In other words, there must always have been an eternal 'something' which existed. A chain of cause-and-effects cannot be extended back in time indefinitely. Eventually we will have to invoke something which cannot be explained in terms of something else. One cannot escape this disturbing yet mildly innervating conclusion.

A RETURN TO SHAMANIC WISDOM

If we want answers to these most difficult questions we need to be armed with new forms of consciousness. Our normal frames of thought cannot hope to cope with forms of understanding which involve notions of eternity and the like. And here we must once more face up to the potential power of Nature's entheogenic allies in elucidating the living mystery of existence. The knowledge attained during the entheogenic experience, as well as the revelatory insights gained through superconscious perception of the world, arguably represents the most direct path alluded to by Davies for accessing information relating to the 'why' of reality. As far as I am aware, Davies is not cued up on the epistemological virtues of visionary agents, for he explicitly states that he has never had a mystical experience. Open-minded scientists like himself would therefore do well to explore natural entheogens like psilocybin, since their numinous effects are in the here and now and not limited to the pages of mystical religious literature.

Entheogenic substances can provide new and enhanced states of consciousness, and it is precisely in such a state that one may come to glimpse an answer or two to the riddle of reality. Of course, if you are happy with a simple god scenario in which an omnipotent being just sits around and studies its creation then good for you. However, many of us will want to pursue the mystery further, hoping to attain some deeper insight into the nature of reality. Without doubt, entheogens can be utilised in such a pursuit.

As the first part of this book made clear, entheogens like psilocybin are where its at in the quest to find the ultimate meaning of this Universal Computation within which we are so intimately writ. Nature's entheogens work, just as mathematics works. And it is precisely because they *do* work, and because they *do* allow one to confront big truths, that they elicit fear and mistrust in the West. As McKenna attests, much of the new-age movement for instance - ostensibly a movement devoted to forging spiritual awareness - is a move *away* from Gaia's entheogens:

"People are in love with the journey. People love seeking answers. If you were to suggest to them that the time of seeking is over and that the chore is now to *face* the answer, thats more of a challenge! Anyone can sweep up around the ashram for a dozen years while congratulating themselves that they are following Baba into enlightenment. It takes courage to take psychedelics - *real courage*. Your stomach clenches, your palms grow damp, because you realise this is real - this is going to work. Not in 12 years, not in 20 years, but in an hour! What I see in the whole spiritual enterprise is a great number of people supporting themselves in one way or another on the basis of their lack of success. Were they ever to succeed, these enterprises would all be put out of business. But no one's in a hurry for that."

A somewhat harsh evaluation perhaps but the point is taken. We are so immersed in the hypnotic spell of our material culture that we are unused to forms of perception and conception in which our normal frames of reference fade into obscurity. For in the innervating and inspirational glow of the psilocybin-induced neo-shamanic experience, we suddenly find ourselves transported to a spiritually charged realm where metaphysics and theological theory dissipate, giving way instead to a direct perception of the Other, a Gaian Mind that somehow holds the keys to the purpose of life and consciousness.

With the gradual emergence of information relating to the entheogen-based shamanic experience, we now have a raised platform upon which to stand in order to further our understanding of the nature of reality and consciousness. Just as Newton claimed to have stood on the shoulders of giants in order to discern more clearly the nature of the Universe around him, we have now reached the point in our culture where we can re-launch the shamanic spirit now vanishing from the rainforests of the Amazon and use it to blaze a trail into the depths of the Mystery. Entheogenic agents, especially the fungal sort indigenous to European and American shores, can yield knowledge otherwise unobtainable via the traditional approaches of our perception and conception. Herein lies their potential virtue. Until we take up Nature's entheogenic option, our understanding of reality will remain incomplete.

We have seen how the Universe is a kind of utterance built upon the integration of information, that information is everywhere being processed, and we have seen how consciousness is itself a kind of 'finer' form of information arising from the wealth of informational relations converging in the neuronal architecture of the brain. Thus we are like playing pieces in a universal game of chess, pieces whose function, role, and meaning are determined according to our positional relationship to all else. And, in our attempt to apprehend this computational game, we have reached the point where we wonder at the ultimate software whose rules govern the field of play.

If, as seems highly probable, the major pattern-inducing properties of the Universe are not accidental, then we might discern some will or intention lying at the very heart of Nature. We might wish to shake hands with Nature and say 'nice work' or 'good game'. I have to employ a modicum of humour here since the situation we are now in is somewhat bizarre. For we really need to somehow get outside of the Universal Computation and see where, if anywhere, it is headed. Since a speedy flow of informational integration appears to be focused upon our planet, then it must surely be directed towards some culmination point. What then is the final output of this particular evolving part of the Universal Computation to be? What on Earth is the point? To where are we being drawn? What pattern has yet to evolve or be resolved?

A VISION SHARED

Before we move on to a final look at the implications of the neo-shamanic experience for an understanding of 'the meaning of it all', let me summarise the heady ideas outlined in the last few chapters in the form of a vivid visual metaphor. This metaphor embraces everything of significance in the computational/informational paradigm, allowing us to view everything at once, in one great image. So, relax and get your mind's eye ready as I present to you the River of Life thought experiment (incidentally, I came up with this metaphor independently of evolutionary biologist Richard Dawkins who uses a somewhat similar metaphor in his book *River out of Eden*).

Picture a big lake of still water. This is an informational void, endowed only with capacity and potential. All the myriad particles of the water can be likened to potential bits of information, though all are in the

same uniform state. There is just still water, no forms whatsoever, nothing of interest, no dialogue-like flow of information or anything. Still, it is an initial state; the lake of formless water exists. You and I creatively imagine/format it.

Now, take a monstrously-sized stick and begin to stir the lake. The stirring action corresponds to a law or rule or *intent* operating upon the state of the water in the lake. Already, the stirring action begins to create currents, eddies, and vortices of turbulence. As you continue to stir up the lake, evermore of these forms and patterns emerge in the water. Notice that the ripples, patterns, and waves which are forming and which flow across and beneath the surface of the lake are all facets of one whole entity - the entire lake. No one part of the water is isolated, rather there is just one fluid system swirling and slopping about. This is the continuous and non-bounded informational 'stuff' of the lake which has been transformed from a featureless state to an in-formed state via the stirring action (the rules or laws operating on the water). If you cannot picture the water in the lake as being an interconnected continuum then scale the lake down to a bathtub of water. When you slosh the water around in a bath, it is clear that there is just one fluid entity lapping about, no single part is isolated.

If we continue to stir the lake in a particular way, then more and more complex patterns may emerge. Let us also allow the water in the lake to be drained by allowing it to flow out and form a river, the leading edge of which contains the most self-organised patterns so far generated within the water. Swirling vortices might form which persist indefinitely. Indeed, we could imagine these forms meeting with one another in the frothy forefront of the rushing river. Somehow they may be able to replicate themselves according to the precise manner in which we have done the stirring. So now we have a flowing river containing replicating patterns of fluidic information bearing a definite language-like relation to one another. When such forms meet, a kind of dialogue ensues in which the forms in-form each other creating yet more diverse patterns.

We can add to the laws inherent in our stirring by incorporating some new laws in the form of some precisely shaped rocks over which the river flows (akin to constants). These rocks will further determine what kinds of forms arise in the water. As the river progresses over the contrived rocks, perhaps there may be different types of swirl generated, such that new forms emerge even more complex than their predecessors. As the amount of forms increase, so too will the amount of relations between them increase likewise. And yet they are all remain part of the same integrated watery informational stuff. What one pattern does at one part of the river will eventually be felt everywhere else for there is but a single interconnected system in which all these events unfold.

Let a long span of time elapse. If we look to the leading edge of the river we might now find that the patterns which have emerged due to the precise stirring and the precisely carved rocks, have evolved to be truly lifelike. Forms which bear a specific and enduring role in relation to the rest of the water are organism-like. It does not matter that they consist only of water, what matters is their complex form/structure and their formal relations to the rest of the water.

Now we reach the climax of our metaphor. Picture the river cascading as a waterfall over some rocky cliff-face. Take a close slow-motion look at the leading splashes, the leading edge of the creative flow of water. Elaborate human-like life forms have now emerged representative of the most evolved patterns of flowing information. Consciousness itself might eventually be formed within these informational creatures, consciousness being yet another pattern born out of informational fluid, albeit of a highly evolved kind dependent upon a huge array of informational relations converging upon it.

History foams into being across the face of rocks, cities flow in and out of existence, cultures come and go in the complex splashes emanating from the onrush of water. And at the very edge of the flow we see informational entities like ourselves. And yes, such conscious beings might even come to wonder at the nature of the stuff around them, and conclude that it is all but one integrating, confluent substance - that of fluidic information in process.

It is important to hold in mind that the eventually conscious property of the fluidic flow of information was determined by the precise way in which we stirred the water, and the precise form of the rocks over which the river flowed. It was not accidental, rather the flow was deliberately organised and integrated in such a way as to produce, eventually, consciousness itself, the most evolved kind informational pattern. In this way, the river of information has come to know itself and its origins. The river literally woke up to its true nature.

Perhaps then, the actual river of organic life which has spawned us has already attained its ultimate purpose, for we are the means by which Nature has become self-aware. Does this mean that we should now sit back comfortably because all is complete? Is the goal of Nature self-awareness of the kind we have already attained? Surely not. There must be more to it than that. I would surmise that the 'climax' of reality has yet to become manifest, at least in our neck of the woods. After all, complex computer programs often yield a final output, this result depending upon what the user wanted from the program. In the river analogy above, this would mean that there would be some final climactic state emerging at

the bottom of the waterfall, a state willed into being.

Because the information-integration processes displayed by our culture in the wake of evolving computer technology and computerised telecommunication systems shows no signs of abating and appears to be speeding up at an unprecedented rate, and because of the type of information accessed during the entheogenic experience, I believe that the destined output of the Universal Computation in terms of our biosphere, or Gaia, is something that human culture will eventually usher in. In other words, the 'intent' of Nature is now being revealed through the evolutionary development of human culture and human consciousness. If so, this would imply that conscious human culture with its attendant technology is a kind of penultimate *function* within a certain part of the Universal Computation, just as different organs play differentially timed functional roles in the developing body. This is the sort of speculative idea taken up in the next chapter.

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CHAPTER NINE

WRESTLING WITH REALITY

Our aim now is to discover more about the nature and intent of the intelligence seemingly lurking behind the scenes of the on-going reality process. This intelligence seems to be the causal force driving the formation of stable and enduring patterns of information throughout the fabric of Nature. These patterns of information appear to behave according to various systems of logic such as 'physico-logic', 'chemo-logic', 'bio-logic' and 'psycho-logic'. In every case, the patterning process is wholly natural and leads to phenomena like stars, molecular compounds, organisms and ideas.

The forms of logic cited above are language-like, computational and operate within and upon particular systems of information, the systems being enfolded within one another in a sort of nested hierarchy. The language-like logic of physics acts as a substrate in which the language-like logic of chemistry emerges. In turn the language-like logic of chemistry embodies the language-like logic of molecular biology. And so on. Eventually, highly advanced bio-logic leads to brains which embody patterns of information we call minds. Conscious minds are subsequently able to reflect on the intelligence which surely governs such astonishingly creative processes. All forms of logic must derive from some original and fundamental property of Nature, a property which is best explained by invoking some non-human wilful intelligence, the very same intelligence which entheogens like psilocybin bring into sharp focus.

We can boldly refer to this quixotic reasoning as being but one corollary of the *fantastic hypothesis*. The fantastic hypothesis views reality, or Nature, as a meaningful and intelligent system as opposed to some mindless accident going nowhere. According to the fantastic hypothesis, we are woven into an orchestrational tide of information, interconnected throughout, whose glorious and spectacular purpose awaits us. For if the natural tendency of the Universe is to foster the integration of more and more information, then, as with gravity in the 'physical' realm drawing together atoms and elements, the result of this tendency in the realm of human consciousness might be to draw some kind of 'truthful solution' into being like an ultimate pattern falling into place.

Such a fantastic hypothesis is waged against the prevailing null hypothesis, a morose state of affairs in which our Universe is accidental, but one of an infinity, and in which the earthly psilocybin experience is no more than a trap-like aberration distracting us from more pressing concerns. In which case pension schemes and the amassing of property do make good sense in a purely temporary way.

However, it really does seem evident (sometimes obviously so) that some mysteriously intelligent presence pervades Nature. We have seen that life and consciousness were destined to emerge out of the Universal Computation right from the start, maybe in many locations throughout the cosmos. Now that *we* are here, and now that we have realised the breathtaking situation in which we are so intimately involved, we can rightly demand that the mystery of the Other reveal itself to us in more detail. The momentum gathered by our enquiries is thus set to lead us into absolutely new territory. There is no point in backing down now. If I were to stop before making a last leap into ideospace, then I would be no more than a psychedelic *homme fatale*, withdrawing supposition before a climax worthy of our subject matter had been attained.

That we have already posited an intelligent Other made of information which can manifest within an individual psyche through the medium of sacred plants and fungi is perhaps not all that controversial. In effect such an 'intelligence of sorts' has been a kind of abstract quasi-scientific pillow upon which to rest our stretched minds once the visionary effects of entheogenic compounds and the implications thereof have been acknowledged. Whereas the religiously minded might well be firmly acquainted with such a comfy and reassuring pillow, those of us who eschew traditional religion might only be willing to maintain the idea of some kind of intelligence over and above that of *Homo sapiens* as long as the idea can be properly fleshed out. This is especially true if one has not personally imbibed the numinous power latent within organic entheogens.

Anyone can suggest or imagine that some sort of wilful intelligence infuses reality. Many might intuit such. But to pursue the idea so as to resolve a coherent framework with which to understand the inferred intelligence and its possible aims is another matter entirely. Indeed, the risk of heresy and banishment from the scientific community can only escalate if one prosecutes such speculation to its farthest limits. However, since I have no scientific tenure to defend, no office to be summarily kicked out of, then I am at liberty to set forth some more 'millennial' ideas, ideas which will hopefully bind all that has gone before into some aesthetically pleasing whole, which is, after all, the way reality looks to be - an integrated whole. So, keeping our minds open, let us ponder the idea that the Universe be blessed with some kind of computational intelligence above and beyond that of our species.

FACING THE OPTIONS SHOULD WE GO THE WHOLE HOG INCLUDING THE POSTAGE

If we accept, even if but for the duration of this chapter, that our species (or at least consciousness) is a preordained component of some immense computational system that was meant to be right from the beginning of time, then the future surprises in store for us might be great indeed. Since we are presumably the first species of earthly life to be able to fully confront the mystery of being (at least through science and art), then it seems likely that our conscious role within Nature's informational hierarchy must be of some functional import. If some of the radical ideas which I will shortly be introducing have any bearing upon this issue, then our collective future will be awesome to say the least. If we consider for a moment the dramatic leap in complexity and informational integration which separates the primeval emergence of a single-celled bacterium (in itself highly complex) 3 and a half billion years ago from, say, the emergence of *Tokyo* in all of its wealth of informational activity, then what would a comparable leap in evolution produce? If Nature is a giant information processing intelligence then what surprises still lie in store? What forms of integrated information await us? Can consciousness evolve to some new level, substantiating some new global pattern of integrated information perhaps?

Before we can assess such questions, it makes sense to look more closely at the type of intelligence that we are conceiving. According to all the information we have so far ploughed through, I can think of 3 basic options concerning the nature of such an intelligence: either that the intelligence exists outside of the dimensions of normal reality just as a programmer lies outside of a computer system; that the intelligence is representative of some extremely advanced form of life existing elsewhere in the Universe; or that the Universe is organism-like such that the intelligence exists throughout Nature.

Already we appear to have gate-crashed the pulp storylines so beloved of sci-fi writers. In defence of such a move, we should hold in mind that, whatever the case, reality *is* like fiction. Why things should be the way they are in this neck of the cosmos is decidedly strange with or without psilocybinetic speculation. Indeed, as Einstein pointed out before reality terminated his mortal existence, the most incomprehensible thing about the Universe would appear to be its very comprehensibility to the human mind.

To suggest that reality is anything but remarkable and mysterious is to be a victim of life's hypnotic aspect. Because we are so conditioned to reality, we are generally oblivious to the fact that, compared to most of the Universe, the processes of informational integration occurring here on Earth are astonishing and indeed science fiction-like. In fact I am prepared to go as far as saying that there is 'nowt as strange' as human history and human consciousness within the on-going reality process.

It is only because we are so used to being self-aware components of the historical process that we do not continually marvel at the fact. Upon careful reflection however, life and its evolution to the point of consciousness-embodiment human brains is truly extraordinary and points to the fact that the Universe be purposeful, that information is continually re-forming itself in ways sublime and meaningful according to the way Nature is configured. In any case, we seem willing to accept plenty of other far more radical notions about Nature without as much as a murmur of disbelief. Not surprisingly, McKenna has made the point that a belief in the big bang in which the entire space-time continuum sprung out of nothing represents; "the limit case for credulity...if you can believe this then you can believe anything".

Quite. If you still don't see this strangeness to reality, then locate some pictures of galaxies and supernovae, study them closely, and then step into a packed train during rush hour. Do you not detect a curious twist to reality here? Is it not a trifle odd that the Universe should have yielded such bizarre arrangements of information, that it should have generated we sentient bipedal hominid creatures who patter busily around the surface of a rock circling a star? Above you lie billions of miles of space and billions of suns. So too below you and all around you. We are literally a suspended anomaly within a twinkling starry mystery whose solution remains suspended. If any scientist or philosopher tells you different, tells you maybe that conscious existence is some petty product of the Universe with little or no consequence, then almost punch him on the nose, or shove a custard pie in his face, for he is surely asleep or an automaton whose view serves only to seal minds away from the Mystery.

Given the very fictional quality of existence *as it is*, I feel not too unperturbed in outlining the possible nature of the intelligent Other in more detail. In the last analysis, it is no less crazy than to elaborate upon the null hypothesis which asserts that all this 'astonishingness' is without reason. Indeed, it is arguably nuts to suggest that all and everything exists for no rhyme or reason. One even suspects that such a mindless interpretation of life and consciousness stems from an ego-obsessed psyche hell bent on describing itself, and solely itself, in terms of high intelligence.

Back to the chase. The aforementioned 3 options concerning the Other, should we care to elaborate upon them, have been explored in one way or another by the late sci-fi writer Philip K. Dick who used fiction as an unbounded medium in which to put across some decidedly mystical ideas about what he believed to be the true nature of reality. By looking at some of the relevant fictional scenarios he created, we shall be able to more clearly divine the feasibility of at least one of the options open to us.

DO PSYCHEDELIC SHAMANS DREAM OF VALIS?

For most people, P.K. Dick is best known through the films *Blade Runner* and *Total Recall* which were based upon his writings, the former movie being dedicated to him by director Ridley Scott. What is less well known is the fact that P.K. Dick was a bit of a latter-day mystic, a man who spent the last decade or so of his life struggling to come to terms with a series of visionary experiences (not related to psychedelics) which befell him in the early 70's. In these experiences, P.K. Dick felt as if some vast cosmic intelligence was communicating with him, as if a deity were on line and divulging secret information. Such was the impact of these theophanies that he chose to incorporate their thematic content into a number of novels as well as an eight-thousand-paged exegesis. To the consternation of his peers, P.K. Dick had begun to be not a little obsessed by ideas of 'divine invasion' and the like, his last books testifying to his escalating interest in theology and theistic philosophy.

Since his death it has been speculated that P.K. Dick suffered from what is known as temporal lobe epilepsy - a brain disorder that can lead to hallucinatory experience - and that this explains his mystical encounters. However, leaving aside the contentiousness of this claim, it does not deal with the burning issue of immediate mystical experience. To label an experience in order to explain it away is to avoid the very real nature of the mystical experience *however* it should arise. In fact, as Huxley noted in *Doors*, we should not be surprised if there was *always* unusual neuronal activity concurrent with a mystical experience, for, as we have seen, modified neuronal firing patterns are related to expanded forms of consciousness. Altered forms of awareness *demand* altered brain processes, and such a change in brain state can be achieved in many different ways whether through psilocybin mushrooms, endogenous DMT, yoga, meditation, fasting, or spontaneous epileptic disturbances. Mystical experience is therefore not to be conveniently disposed of with a label.

Even before his visionary experiences, P.K. Dick had long fought to discover the true nature of reality. It was his pet fascination. In a talk he delivered in the late 70's, he admitted that for all the years he had thought about the question "what is reality?", he had gotten no further than concluding that reality was

that which remained even if you stopped believing in it. Admittedly a thin definition, it is nonetheless indicative that the true nature of reality is not so easily pinned down.

P.K.Dick juggled with countless explanations for his mystical experiences. Some involved the God of the Judeo-Christian variety, others involved the Logos outlined in some of the Gnostic gospels (these are the 'alternative' gospels dug up at Nag Hammadi, Egypt, in 1945), whilst others even opted for an advanced extraterrestrial intelligence. In either case, Dick was certain that he had been 'contacted' by some form of advanced supra-mundane intelligence-cum-Other.

One of his more enduring theories concerned VALIS, which is an acronym for *vast active living intelligence system*, a notion which accords well with our intelligent Other. According to P.K.Dick in the semi-autobiographical novel of the same name, VALIS was a hidden entity of immense power and sentience which was in the process of infiltrating our reality by establishing communications with certain individuals. Such disclosures were experienced as theophany. For our purposes, the key point is that VALIS was essentially *outside* of our dimension, but able to penetrate our world. The question arises as to the feasibility that some superior intelligence exist in some other dimension with the capacity to move across into ours. This is one of our fanciful options concerning the Other.

To more fully conceive of what Dick was suggesting consider the plot of his acclaimed novel *Ubik*. In this story, the main set of characters are seriously blown up in an explosion at the start of the story and then placed in a kind of collective suspended animation machine which keeps some of their brain processes functioning. In this way, the characters enjoy what Dick calls a 'half-life'. What is more, the collective nature of their half-lives ensures that they experience a *simulated reality*, a reality so real that the half-lifers fail to realise that they are no longer in the 'real world'. Which is to say that they don't realise that they are really wired up in the half-life unit of the Beloved Brethren Moratorium. Indeed, they falsely believe that they survived the explosion with just a few scratches.

Our interest grows when we see what happens when someone *outside* of their simulated reality system attempts to communicate with them (via the standard headphones of course). At one stage in the tale, the protagonist Joe Chip, who is unaware that he now exists in a pseudo-reality, is contacted by someone from the 'outside'. This communication is experienced by Chip as an eerie sequence of synchronistic events in his simulated reality. For instance, he begins finding significant messages everywhere - scrawled upon washroom mirrors and turning up on matchbook labels and in bits of consumer junk. Personal messages even begin interrupting TV shows. In short, the communicator has invaded Chip's

world in such a way that the communication gets distributed across different media, turning up in the most unlikely of places rather than as a big booming voice coming out of the sky.

I think that it was this kind of cunning idea, which P.K.Dick used to great effect on many fictional occasions, which captures his views on the nature of VALIS. VALIS was an 'outside' intelligence able to penetrate our world revealing itself through mystical experience and through the unlikely juxtaposition of meaningfully related events. Can we possibly utilise this notion and map it onto our idea of the Other?

If we were to do this then it would be tantamount to suggesting that the 'programmer' of the Universal Computation is able to 'jump into' the program, reaching in as it were in order to influence the state transition of the computation. Or perhaps this transcendental influence can only be felt in the psyche, in which case all theophanies would represent the manifestation of the Other as it penetrates our reality.

But what does it mean to be outside of the system, outside of the Universal Computation process? Can there be an outside? It is possible to imagine that in the future we will be able to create a kind of artificial computerised reality, perhaps a simulated universe or an elaborate Virtual Reality world in which one can enter for years if not a lifetime. And yet despite the fact that there will indeed be an outside to such a simulated reality, we cannot say with certainty that there is also an outside to our present reality. If we do entertain the notion of a dimension outside of our world, then we run up against the old infinite regress pit of despair, for surely the 'outsides' could be continued indefinitely. In other words, if the intelligent Other exists outside of our reality, then what lies outside of it?

It is these dilemmas, which would appear to be insurmountable, which lead me to think that the solution to the Other cannot be found by appealing to the 'outside of the system' option. Instead, the Other is surely more likely to be found firmly entwined *within* the Universal Computation along with ourselves. If we once more restrict ourselves to this one Universe, then at least our theoretical model will be somewhat constrained and bounded, and be more amenable to a single holistic explanation. This does not deny the existence of P.K.Dick's VALIS, rather it locates VALIS within our reality. Somewhere.

SOPHISTICATED ET'S

Could the Other be connected to a highly advanced extraterrestrial intelligence? I don't know about you, but I have a strong dislike of talk of precocious ET civilisations. Perhaps this is due in part to the often ridiculous depictions of aliens conceived of in sci-fi movies (notwithstanding the intelligent film *Contact* based upon a novel by the late Carl Sagan). Be that as it may, the notion that highly advanced life forms exist elsewhere in the Universe is far from being an unacceptable idea. As I briefly noted in an earlier chapter, NASA has spent millions of dollars funding SETI, the search for ET intelligence.

This use of the term intelligence is interesting. It is not the search for ET life, ET art, or ET real estate, but the search for the intelligent communicatory signals of some other intelligence apart from our own. The assumption is that intelligence is a universal phenomenon, a life *capacity* if you like, which will, wherever it should arise, be similar in kind. Furthermore, such an intelligence is presumed, like ourselves, to have a strong urge to communicate its presence across the vast depths of space in order to search for another such intelligence. Which is why the SETI program has sent out radio signals bearing mathematical formulae (like chemical formulae and atomic numbers), which are assumed to have a universal significance which would be appreciated by any advanced ET intelligence. If the Earth were to detect such signals from some other star system then it would indicate like-minded beings to ourselves. Alas, no such signals have been detected thus far.

Our assumptions about ET intelligence determine how we go about trying to establish interstellar communications. Since we only know of human intelligence and human thinking, it is by no means certain that an alien intelligence should be exactly like our own. If intelligence is a capacity - moreover a capacity to exhibit purposeful behaviour and intentionally create things with some end in mind - then as intelligence evolves so too might the intent of intelligence evolve. The intelligence of an advanced ET civilisation, should one or many exist elsewhere in the Universe, might have evolved way beyond our ken, so much so that we would not recognise its presence should it be upon us already. Alternatively, such an intelligence might be so far away as to make it a practical impossibility to establish effective communications. Although there are estimated to be millions of planets potentially hospitable to life processes in the Universe, most are many millions of light years away. Should an intelligence on one of these planets have sent out a 'standard' radio wave message, by the time it is received elsewhere they might well have become extinct.

If we put aside notions of radio broadcasts, it may still be possible to conceive of other types of communication involving radically different means. Here, I can once more look to our old chum Terence McKenna who has suggested various alien scenarios to account for the psilocybin experience. Before I

lay his ET ideas on you, I should stress that McKenna is one who likes to oscillate in his psychedelic speculation. On the one hand he has consistently pushed for an earthbound Gaia-orientated explanation for the Other (which I will deal with later), whilst on other occasions he has invoked the idea of an alien intelligence as lying at the heart of the visionary state. He has been led to entertain such extreme speculation because of the equally extreme nature of neo-shamanic phenomenology. This I understand and I completely support his claim that the Other often appears distinctly alien in nature, though I am less enthusiastic about attributing this alien quality of visions to an actual ET presence.

In *True Hallucinations*, McKenna speculates that alien probes might have once visited our planet in the distant past and injected 'seeded genes' into the prevailing ecology. These 'seeded genes' are the DNA portions of plants which code for the tryptamine alkaloids such as psilocybin and DMT. These alien genes will then be carried along in the terrestrial flow of evolutionary events until they are encountered by a species open to the information which they broadcast from the probes. The precise communications issuing from the alien probes will depend upon the intelligence of the species which encounter the 'loaded' plants.

The first point to make about this controversial suggestion is that interstellar automated probes with the ability to transmit information is not a new or crass idea. A number of SETI scientists, in thinking about ET communications and the major problem of galactic distance, have concluded that one solution would be to design self-replicating probes which are able to multiply at an exponential rate during their voyages throughout the galaxy. Through such replication over aeons of time, the network of probes would eventually cover entire galaxies. This is an intriguing idea which has its origin in the work of Von Neumann who, you will recall, proved that it was possible in principle to design self replicating machines. If such machines could be built by advanced technology, then it would offer a way to eventually make contact with other life forms in distant star systems.

McKenna has taken this idea a step further and argued that once Von Neumann probes of this sort locate a life-bearing planet, then they do not broadcast binary radio signals or a "How do you do?" signal, but carry out a much more subtle and long-term form of communication. In McKenna's view, the probes have engineered specific message-conducting genes whose signal becomes active in the entheogenic experience which results from the ingestion of those plants and fungi carrying the alien genes. In his final analysis, McKenna claims that once a species like our own has reached a certain point in its cultural development, then the probes will yield information on how to complete the contact.

Well, these are truly lip-smacking claims. I also detect the spirit of P.K.Dick in them as well, for in the book VALIS an ancient ET satellite (somehow connected with an 'outside' VALIS) circles the Earth selectively firing information into people's brains. There is nothing intrinsically wrong with such alien probe scenarios. To the contrary, they serve to remind us that advanced alien intelligences might well have radical technologies at their disposal - after all, we grant that they *are* alien and advanced - and that we should maybe think again about how we go about sending out signals and looking for signals.

The biggest problem I have with such an ET scenario is that it fails to account for the significance of the Universal Software which, as we now know, is bound up with our very existence and all forms of informational patterning. Furthermore, we are left without an explanation as to how the alien species itself came to be. It is also not clear why the alien intelligence would want to use seeded genes to conduct communications. Though they are potentially long-lasting, it still remains a rather haphazard and totally unpredictable method of information transfer and runs the very real risk of total failure through plant extinctions. If such an ET intelligence were indeed able to build sophisticated Von Neumann probes with which to scour the Universe, then surely when the probes have encountered an intelligence worth contacting they would use some direct and unambiguous method of communication rather than having to construct 'tailor-made' genes. And then there is the problem with the age of such probes and the distance of the probe senders. If such an intelligence were a million light years away, then is it really feasible that a useful contact could be made? Unless faster-than-light technology has been developed (which immediately introduces paradoxes) then any hope of interstellar communications as we know them across such distances is all but futile. And if the ET's had telepathy or some kind of advanced capacity like that, then why bother with cumbersome probes in the first place?

On other occasions, McKenna concedes that the alien is merely the Other in one of its many symbolic guises, and I think that this is more likely to be the case. As I discussed earlier, the alien or the advanced ET is a major symbol peculiar to the late 20th century. Perhaps this is one of the Other's 'favourite' metaphors with which to express its nature. If this is so, then we can dispense with all notions of ET civilisations millions of light years away and concentrate upon our final option, namely that the Other is somehow built into reality like ourselves and that its intelligence is not far away but all around us. What follows is a prelude to the final option.

IS THE REALITY PROCESS INTELLIGENT?

One scientist who believes the Universe to be home to a vast and highly evolved intelligence is the

unconventional British astronomer Sir Fred Hoyle. However, the intelligence conceived by Hoyle and outlined in his appealing book *The Intelligent Universe* does not belong to some ET species existing elsewhere, and nor does it refer to God for Hoyle is at heart an atheist. Rather Hoyle believes that there existed a non-omnipotent intelligence which *preceded* us and helped to create life on Earth. Let me explain.

Hoyle has suggested that life did not start in the turmoil of the soupy primeval oceans of the Earth as is commonly accepted. Hoyle argues instead that pre-life molecules and simple micro-organisms exist throughout the Universe amidst interstellar dust clouds and within the interior of comets and meteors. He bases this belief upon the known fact that comets contain the same proportion of carbon, hydrogen, oxygen, and nitrogen as the Earth's biosphere and are therefore capable of giving birth to primitive replicating micro-organisms. Through their 'free lift', these micro-organisms come to be dispersed onto the planets which lie in the path of their cometary hosts. Since the Earth and indeed any planetary body is continuously bombarded with such cosmic bodies, it is only a matter of time before the micro-organisms and molecules surviving their trip find themselves in a sustainable environment in which to further evolve. Hoyle reckons this is how life started on Earth - from its being seeded by simple life forms and molecules formed throughout the Universe in interstellar dust clouds and inside comets.

To bolster his theory, Hoyle has pointed out that what appear to be fossilised micro-organisms have been found inside some of the various meteorite fragments which have been recovered here on Earth. Furthermore, it is also the case that many micro-organisms have evolved such a hard protective layer that they are able to withstand massive doses of radiation (some bacteria have even been found living contentedly within nuclear reactors!). Such a form of protection is an essential requirement should micro-organisms have formed in interstellar space but an inexplicable adaptation according to the conditions here on Earth. It has also been found that micro-organisms exist up to 45 miles above the Earth's surface, which is consistent with the theory that the Earth is being continually bombarded with life-bearing cosmic debris.

Hoyle goes further. He claims that not only did life originate from space, but that the evolutionary process on our planet has since been 'directed' through the continuous arrival here of such micro-organisms. Under a continual 'invasion' of micro-organisms, Hoyle suggests that some are able to attach their own DNA to the host organisms which they encounter, much as viruses function by incorporating their own DNA into the host's genome. With the continuous arrival of virus-like interstellar micro-organisms, although some might be harmful (think of the Aids virus or influenza viruses), some would be sure to confer an advantage should their DNA successfully incorporate itself into the DNA of a compatible host organism (think of mitochondria, the energy-producers of animal cells, which are

thought to have once been free-living bacterial organisms which developed a symbiotic relationship with animal cells). In this way more and more genetic information is able to be integrated from the basically unending source of DNA reaching the Earth from space.

Hoyle does not give up there either. In accounting for the 'monstrous' series of cosmic coincidences which have facilitated the emergence of organic life, Hoyle suggests that the micro-organisms in interstellar clouds also serve to influence the formation of stars and planets (by means of physical processes). In other words, the universal processes we observe are the results of an active intelligence which is striving to survive in a Universe whose physical laws change. He writes:

"...the apparent coincidences which allow carbon-based life to exist throughout our galaxy and in other galaxies might well be temporary possibilities in a Universe where the applications of the physical laws are changing all the time. This point of view suggests....that in the future the Universe may evolve so that carbon-based life becomes impossible, which in turn suggests that throughout the Universe intelligence is struggling to survive against changing physical laws, and that the history of life on Earth has only been a minor skirmish in the contest."

Are we to believe then that the Universal Software gradually changes and that at some distant time in the past a powerful intelligence engineered things so that in the future carbon-based life would utilise the newly prevailing Universal conditions? This is indeed what Hoyle asks us to believe. He sums up his thinking in the following singularly profound sentence in which he states this about our species:

"We are the intelligence that preceded us in its new material representation - or rather, we are the re-emergence of that intelligence, the latest embodiment of its struggle for survival."

When I first encountered Hoyle's radical 'panspermia' theory, I was naturally perplexed. Shortly after this whilst my head was still spinning, some new scientific evidence coincidentally emerged which seemed to support at least part of his theory. A 'newsflash' in the *New Scientist* declared that "molecules of life" had been detected in space. Hawk-eyed American radio astronomers had spied glycine - an amino acid, and a potential building block of organic life - in a dense interstellar dust cloud near the centre of our galaxy just as Hoyle would have predicted. A few years later in 1997, the comet Hale-Bopp was analysed as it passed near the Earth and it too was found to contain the molecules of which amino acids are made.

Therefore we cannot rule out all of Hoyle's theory, and we must consider his assertions more closely.

The compelling aspect of Hoyle's proposal is that it is assuredly grand, employing as it does a healthy mix of science and almost-mystical speculation. It attempts to account for the fortuitous nature of the Universe by arguing that the initial widespread presence of micro-organisms somehow influences star and planet formation. Everything was engineered by some previous intelligence. However, this does not explain where or how this previous intelligence emerged. In fact, Hoyle appeals to the so-called steady state theory of the Universe which he himself helped to develop in the late 40's as an alternative to the big bang scenario (it was, in fact, Hoyle who originally coined the term 'big bang' in order to make light of such an explosion-from-nothing theory). The alternative steady state theory holds that there was no big bang at all (only 'little bangs'), and that the Universe has existed indefinitely. Within this eternal Universe an intelligence has been forever modifying itself in order to survive the subtly changing laws of physics. Hoyle even concludes that the religious impulse of our species arises because we are born with an instinct which leads us to 'remember' our origins, an instinct written into our DNA by the intelligence which preceded us.

It all seems very neat and tidy, and I am sure that there is some grain of truth in Hoyle's 'eternal intelligence' theory. However, the element which is lacking is the role and effect of entheogenic agents, unless of course they were also engineered by the intelligence which preceded us. If they were, then Hoyle's theory might well offer us the ultimate truth about reality. Then again, we must accept that the Universe has been in existence forever with the caveat that the laws of physics continually change and force the intelligence to re-create itself. To my mind, this is not an aesthetically 'clean' solution. As I said, how did the intelligence develop such sophistication and creative power in the first place? And how and why should the Universal software change? If it was to continually change then the Universe might surely run the risk of losing its existence completely at some stage due to 'destructive' physical laws. And Hoyle has not convincingly shown how micro-organisms are able to mastermind the formation of stars and planets, nor has been able to deal a deathly blow to the big bang scenario currently accepted by most cosmologists.

As we have seen, it seems much more likely that all of the cosmic coincidences so necessary for life and consciousness to arise were written into the Universe in its original state at the time of the big bang. If this is the case, then we are again left with this one significant Universal Computation set up from the start. Or, to put it another way, we are left with Nature, a system in which the drive to always and everywhere integrate its information reflects some intelligent or intentional quality of the system.

Still, Hoyle's 'intelligent Universe' is certainly one of the most cogent scenarios I have yet come across which attempts to explain the mystery of reality in essentially scientific terms, even despite its failure to specifically address altered states of consciousness. I think it is possible to utilise some of Hoyle's ideas and rework them. The prelude to the final option is over. And so, armed with the fantastic hypothesis outlined at the start of this chapter, we are just about ready to focus upon what I consider its most likely and most brilliant implications.

RECALLING THE GAIAN MIND

On many an occasion I have referred to the Other as the Gaian Mind, a term coined by McKenna which captures the organic planetary character of entheogenic flora and the visions they often induce. Sacred plants and fungi appear like carefully distributed organic 'access codes' which allow a different set of informational relations to converge within the brain so that one's meaning in the context of the rest of Nature gets shifted up a notch. In this way, as if tuning into the otherwise occluded 'higher frequencies' of Nature, one can come to behold the numinous and intentional presence of the Other. Can we therefore locate the Other here upon the Earth, somehow woven into the living fabric of the biosphere with its jungles, oceans, and electronic cities?

CONTEMPLATING EVOLUTION

The fine-tuning of the Universe really comes into being through the evolutionary process which has dominated the Earth's surface regardless of whether this process originally began on Earth or in space (we can concede that Hoyle maybe right in his panspermia theory). Either way, organic evolution can be looked upon as an *information-gaining process* for life has gone from simplicity to astounding complexity, from relatively simple arrangements of organic information to highly organised arrangements, and all due to the fact that the Universal Software is fine-tuned to permit the evolution of carbon-based life *at least somewhere* in the Universe. That evolution is essentially an information-gaining process is an important concept to bear in mind for what follows, for information-gaining is strongly associated with *intelligent systems* and I am from here on arguing that Gaia, or the biosphere, is just such an intelligent system.

In its broadest sense, the evolutionary process is currently being channelled through human culture. Information/knowledge acquired by our predecessors can be stored in books, folklore, music, dance, computer networks, spoken language etc, and this information accumulation - the growth in advantageous wisdom if you like - can be passed on directly to each successive generation. In this way accurate information about the world grows as uncertainty decreases, such informational accretion allowing our species to dominate and understand the planet in next to no time compared with the otherwise slow rates of (biological) evolutionary development which preceded our species.

With the swift evolution of computerised telecommunications acting to connect up the Earth's store of information, Gaia looks to be wiring itself up into a bio-electronic superorganism. Our bodies may no longer be evolving, but our culture and our technology is, especially our digital communications technology. Just as the neurons in our brains are able to transmit information to one another at astounding speed, so too are we now able to electronically 'synapse' with each other across the globe.

This leads me to think that the assertion that the human brain is the most complex organ we know of is in fact a fallacy and that the biospheric Gaian system in its interconnected totality is far and away more complex and integrated than a single human brain. It must be. A brain cannot be understood properly unless the *context* in which it exists is taken into account. This context is the environment with its vast network of language-like relations. Nothing remains isolated within the environment. All organisms derive their meaning and their function according to the role they play in the entire Gaian system. The point then, is that Gaia is unimaginably more complex than the parts of which it is composed.

Since the human brain is complex enough to embody intentional intelligence and since much of its firing activity can only be understood in the light of its intentional intelligence, I believe it tenable that, in an analogous way, evolution itself represents the on-going intent of an intelligence somehow distributed throughout the biosphere, or at least *concentrated* within the biosphere (or any biosphere for that matter). In other words, somewhat like Hoyle has suggested, the *evolutionary process which has dominated the surface of the Earth is the focussed manifestation of an intelligence of some kind.*

This is not to deny the reality of natural selection within the evolutionary process. Far from it. After all, to argue against natural selection (the process whereby certain genetic variations and mutations are favoured due to their ability to eventually produce more offspring) is to commit perhaps the cardinal sin against the life sciences. I would not dare embarrass myself like that. No, what I am inferring is that the 'natural' component of natural selection represents a *natural intelligence* (hereby Natural Intelligence) as

opposed to, say, human intelligence.

If we selectively breed dogs or cats then we are carrying out a process of artificial selection whereby we select those animal features which we would like to see strengthened. Therefore, in the case of selective breeding, human intelligence governs the process. In the Gaian system at large, natural selection governs the process of evolution over longer stretches of time than those involved with artificial selection. Whereas this is taken to mean that Nature is essentially dumb, random and purposeless, I believe that we can view Nature in its entirety as being a form of active intelligence, though of an order of magnitude well above that displayed by our species. And by 'Nature in its entirety', I mean that we should view the biosphere as a complex continuum within which individual organisms are in fluidic connection with each other and the environment. Influences pass all ways. There is but one interconnected system in which evolution occurs. Remember our River of Life metaphor where all forms of the water were part of a coherent integrated whole? This is how we can think of Gaia now; as representing a single intelligent system in which information is integrated into greater and greater patterns of complexity. Moreover, Natural selection can be interpreted as Natural Intelligence at work, quite literally a *response of Nature to its own significant contextual configuration*.

NATURE IS AN EXPERT IN MAKING SENSE OF ITSELF

If Gaia represents an on-going intelligence at work, in other words, an intelligent response of Nature to its own intelligibility, then perhaps this explains those fortunate environmental circumstances which constantly serve to elicit evolutionary change. When minor new abilities, minor physical variations or minor behavioural capacities are expressed via random mutation/variation, then the inherently meaningful aspect of Nature ensures that a fraction of those variants will be selected for through reproductive advantage (the inherently meaningful aspect of Nature also ensures the emergence of DNA upon which life and its evolution depends). The key word here is 'ensures', for what this means is that Nature is literally *determined* to yield life and its evolution. Which, in turn, means that the living environment, as a context, *always* serves to make sense of certain variants and thence evolve sensible changes within any gene pool. Because Nature represents a meaningful and ordered contextual system (it is intelligently configured) then evolutionary events can thence unfold *in response* to that meaningful context. Indeed, the very tree of life germinated in accordance with this significantly prefigured context.

THE IMPORTANCE OF CONTEXT

To get a firm handle on this highly salient notion of intelligent context consider that well-worn story of the monkey at the typewriter. We are asked to imagine this monkey typing feverishly away at random for ages and ages, most of the time producing gibberish. Eventually we can see how, by pure chance, the monkey manages to type some Shakespearean sonnet or at least a meaningful sentence (in which case any grinning on the monkey's part becomes suddenly apt).

Now, although this story is assumed to show how meaning can be generated from a non-meaningful system by pure chance (meaning out of nothing and for free), this is patently not true. Indeed, if one can grasp why such reasoning is false, then one will alight on the previous point I was driving at - namely that Nature is an intelligently configured contextual system guaranteed to grow the tree of life by making sense of DNA and subsequent genetic eventualities.

In the monkey yarn, we do *not* get meaning out of non-meaning at all. Far from it. Firstly, we have 2 meaningful systems to start off with i.e. the monkey and the typewriter. Secondly, and more importantly, it is the context of the human psyche which gives meaning to the typed responses of the monkey. This means that one is not getting meaning out of nothing, but that there was *a priori* meaning present in the monkey/typewriter/us-as-observer system. It is precisely this *a priori* meaning - in the form of an intelligent and patient observer - which serves to highlight that tiny fraction of the monkey's typed responses which make sense. If there is no meaningful context surrounding the monkey and its typed output (i.e. no intelligent observer is present), then no meaning can be begotten and thus nothing that the monkey types will ever make any sense.

The same holds true for evolution of course. *If Nature were not an already sensibly configured system, if Nature were not highly organised in terms of its laws and its lawful logical relations, then organisms and DNA-writ structures would not make any sense. That they do make such good sense and that more and more sense can be made through organic evolution, reveals the a priori intelligent context provided by Nature.* If the reader can grasp this then the notion of Natural Intelligence - the ultra-smart quality of Nature - becomes self-evident and everything we take for granted changes.

Since more evolved life-forms are generally more organised in their structure, and since DNA likewise increases its informational content as life continues to evolve in complexity, then the environment of the Universe and the environment of the biosphere can, together, be viewed as the sensible and contextual

impetus which drives evolution to produce more and more organised and integrated forms. This had to happen. Nature is imbued with meaning and is coded so as to make sense of itself. This sense becomes manifest in the organisms wrought by evolution and in the evolutionary thrust towards more and more complexity and informational integration.

ENVIRONMENTAL AWARENESS

I should point out that I am not suggesting that the numerous life forms we observe in Nature were all bound to arise through evolution as if every single species was programmed to emerge. It is rather the case that more integrated forms of life *had* to emerge due to an *inherent* property of Nature. This inherent property of Nature (i.e. Natural Intelligence) is its unfailing contextual capacity to select more organised biological forms, a fact which is unfortunately taken for granted by most evolutionary thinkers. In other words, it is not usually remarked upon just how much a role Nature/the environment plays in the evolutionary process. It surely did not have to be that way, for we can imagine a state of affairs in which Nature is such that it does not continually foster the evolution of complexity - in the same way in which we can imagine a monkey typing away at a typewriter for eternity and never ever making written sense because there is no context available with which to highlight any sense.

It seems though that Nature is arranged in way that literally demands that a real kind of self-stimulation occurs in which information - in the form of genotypes in this instance - continues to organise itself due to continual contextual feedback from the environment i.e. the combined system of interacting organisms and the environment feeds back upon itself and provokes yet more evolutionary progress. In this way new organisms can continually evolve because the natural environment surrounding them is able to act as the context which highlights their sensible structure. By making sense in the light of Nature's sensibility, organisms can be selectively evolved. The point to bear in mind is that sense and meaning of one kind or another are clearly required in order to elicit further forms of sense and meaning. Only meaning can beget meaning, only intelligence can beget intelligence. Again, this implies that Nature is replete with a priori sensibility and meaningfulness (some of these qualities are those discussed in previous chapters and which were referred to as the Universal Software).

To take another example, if we think about the unusually rapid evolution of the human brain, then each incremental increase in size (presumably derived via mutation/variation) must have met with many specific environmental circumstances with which to immediately highlight those slight increases in capacity so that a reproductive advantage was achieved. Each mutation in hominid brain size was

therefore *nourished* by a contextual set of environmental conditions in order that its new capacity had an edge over the hominids with non-mutated brains. In other words, Nature was able to make sense, or highlight the sensibility, of these mutational/variational changes in the hominid brain. If this were not so then it is difficult to imagine why so many small changes in brain size were so rapidly selected for by the environment.

One assumes that the sort of cerebral capacity we humans have is a highly neat adaptation to living in the world. Indeed, if more and more refined methods of sense-making are the stock and trade of natural selection, then consciousness and language are capacities which almost certainly had to evolve somewhere and somewhen since they are capacities which enable good sense to be made of the environment on a *moment-by-moment basis*. And the only reason consciousness and language were able to evolve, the only way they manage to make sense, is because Nature is already sensible and can be made sense of. This is most apparent when thinking of language. Nouns, adjectives and verbs exist in Nature - old leaves fall gracefully to the ground for example. The language we possess merely reflects a logical linguistic property of Nature. This means, in effect, that Nature is, and was, always sensible, this sensibility, or Natural Intelligence, coming to be reflected within organisms through the equally intelligent 'angle' of bio-logic as it were.

What I am really driving at is that evolution must be understood as one single system of programmed intelligence which feeds back upon itself, stimulating itself into progressive action and the progressive synthesis of meaning. A bit like bread dough being kneaded. The dough corresponds to DNA and organisms, the kneading action to the contextual effect of the environment or Nature in driving evolution. Through evolution, meaning is expressed through the language of DNA which constructs precisely those structures, organs and behaviours which make sense in the 'kneading' context of Nature (like lungs, livers, bone structure, light-sensitivity, semi-permeable membranes etc). Not only are genome variation and genetic mutations crucial for evolution, but the intelligent configuration of Nature must also play a key role - if not the main role - in supporting the advantageous potential of a tiny fraction of the mutants/variants whose altered genes are not deleterious. Eventually, nervous systems and brains endowed with consciousness were destined to emerge somewhere along the evolutionary line. This line happens to be the primate line and our species *Homo sapiens*.

LATENT INFORMATION, LATENT PURPOSE

In effect then, the environment is just as much a part of the evolutionary process as are the organisms

which are elicited. This means that Gaia is a self-stimulational informational system able to achieve highly integrated forms of information (organisms) because *all the information needed for this process was written into previous states of the Gaian system*. Once more, if we think of Gaia in terms of an information processing system, then it was clearly set up with an amazingly creative capacity which has emerged over time. With hindsight, we realise that every creature around us and every organ or behavioural capacity we care to think of was written or coded into the ancient conditions of the Earth. Every form of life, including conscious *Homo sapiens*, was latent within the Earth's organic chemistry (or within interstellar chemistry), just as the organs composing bodies are latent within the DNA of a fertilised egg cell. And, just as a complete functioning human being is latent within the language of the human genome, so too was the process we call evolution written as an *immanent faculty* into the entire field of conditions here on Earth in the distant past. And the emergence of these earthly conditions were themselves written into the Universe at large. Nature is thus sensibly coded with the *all* information necessary to bring forth life, its evolution, and the subsequent emergence of consciousness in some form. Such a sublime state of affairs can be understood as reflecting an innate and intelligent capacity of Nature, namely Natural Intelligence. Natural Intelligence can therefore be formally defined as a contextually derived property of Nature which is most clearly expressed through evolution and the organisms which evolution produces.

THE SHEER POWER OF NATURAL INTELLIGENCE

As long as Nature is set up so that there *are* continuous mutations and variations within replicating DNA, and as long as a fraction of the mutations *are* favoured through *some* set of circumstances at *some* time, then that is all that really matters. This is reminiscent of an *exhaustive* search approach to solving a problem, a fail-safe method guaranteed to work in the end. Although all possibilities are tried, only one or a few will gain ground.

In fact, this might be the very essence of natural selection and evolution. The certainty that such exhaustive search approaches always work and always produce results is evinced in the popular science of genetic algorithms. Much loved by the Artificial Life and Artificial Intelligence fraternities, genetic algorithms are computational procedures employed to evolve smart programs that humans could not hope to write and design on their own. You start off with a variety of trial programs (binary strings) written to achieve some end, you run them on a computer in some sort of software-governed trial in which their success can be measured against some criteria, then you breed from the most successful of the programs. Repeated millions of times within a fast computer, genetic algorithms eventually yield highly smart programs, programs which have quite literally homed in on making sense of their pre-configured computational environment. In a virtual environment set up within a computer, as long as

there is sense of some sort to be made, genetic algorithms will ensure that programs evolve able to reflect that sense.

The lesson of such an exhaustive search option to building smart structures is that evolution works. It represents a simply magnificent process able to yield, eventually, smart things (actually, evolution is not exhaustive in the absolute sense since it builds upon each success, moving step-by-step fashion towards more evolved forms). However, the *most* important lesson is this: The only way such evolutionary events can happen - whether in a computer or within a biosphere - is if the entire system be imbued with meaning and sensibility to begin with. For it is precisely this axiomatic contextual effect which allows meaningful phenomena to be selected. It was, of course, this very axiomatic contextual property of Nature which so intrigued Einstein.

Life and its auto-catalytic evolution then, can be seen as the manifestation of an immense intelligence which has, willy-nilly, built up forms of integrated information to the level we see in the world around us today. In order for this to have happened, factors which induce mutation are constantly required (mutagens like cosmic radiation which are 'handy' in the long run) as well as conveniently malleable DNA, and as well as a sensible environment able to continually ensure that a fraction of the mutations which arise are fostered due to their ability to match the sensible context which surrounds them. Once again, it is most fortunate that the Universal Computation is such that all these components are met. Although these fortuitously creative factors are commonly considered to be 'brute facts' about Nature and not worth a second thought, they can be also be interpreted as evidence for the presence of Natural Intelligence throughout the contextual fabric of the Universe.

A SMART UNFOLDING POTENTIAL

That some form of highly organised carbon-based life was always poised to emerge from out of the Universe is a remarkable fact which I have not seen documented in much detail anywhere else (notwithstanding Santa Fe complexity scientist Stuart Kauffman whose 1995 book *At Home in the Universe* admirably highlights the self-organisational and life-bearing potential of molecular chemistry, a potential I would explain by invoking Natural Intelligence).

I once remarked upon this immanent aspect of life to a university philosopher. "Look," I said eagerly.

"Here's this nucleic acid stuff which, when put together in digital strings, causes precise amino acids to form. And these cause precise proteins to form. And the proteins combine to form fully functional organs more complex than computers. Why is that? From whence cometh this astonishing linguistic capacity of Nature, this remarkable computational precision? Why should Nature be endowed with such latent creative magic?"

Well, this academic chap thought little of it, declaring that the things humans invent are just as much latent within 'matter' as is life and that we do not marvel at that. At the time I was unable to come up with a rejoinder to his careless dismissal. Now however, it seems clear that his impressive salary was undeserved in that moment for most of our inventions are based upon principles already expressed by Natural Intelligence. Aeroplanes were preceded by natural bird flight. Electrical telecommunications were preceded by natural electrochemical communications occurring in nervous systems. Sonar technology was preceded by natural echolocation in bats. Solar energy technology was preceded by natural photosynthesis. Nuclear power generators were preceded by natural stars. Information processing computers were preceded by natural information processing systems of which the Universe is made. The list goes on. In fact, had Nature not provided us with the above examples, then we might never have been prompted into developing our own technological equivalents (surely no-one would ever have conceived of flying if it were not for the tangible presence of birds or winged insects?). Not only has Natural Intelligence taught us all we know, the evolutionary process is itself a manifestation of this intelligence at work. What we are witness to here on Earth then, is the emerging constructional capacity of Nature, a process completely determined by the way Nature is contextually configured. The evolution of life is no less than a wondrous promise woven into Nature and, over time, orchestrated and delivered by Nature.

ARE WE SMARTER THAN NATURE?

Despite the above reasoning, the notion that Nature represents a self-responsive intelligence working over immense time scales is an idea, I am sure, that many of us will probably find hard to swallow (unless swallowed with a dose of psilocybin!). Yet to assert, say, that evolution is *not* an intelligent process is to rate the process which allowed this assertion to arise to be less smart than we are. In other words, over 3 and a half billion years, the evolutionary process has managed to forge conscious human intelligence (the capacity of the human cortex) which is then able, if it so chooses, to deny that such an evolutionary process is itself intelligent. Think about it. Can a non-intelligent process really yield profound intelligence? Can a genetic algorithm instantiated within a virtual environment deliver neat programs without first ensuring that the virtual environment be specifically designed to facilitate this? Or, could one of Conway's Life games have yielded a virtual computer able to exhibit artificial intelligence without having first been set up in an intelligent way? Can we really explain all and

everything without recourse to invoking intelligent contexts?

Clearly, the neo-Darwinist alleges that the evolutionary process is not intelligent. Yet life is undeniably more complex, organised, integrated, and 'naturally smart' than we can possibly grasp. Indeed, it has generated our species who can appreciate that fact. Science, especially biological and genetic science, is still coming to grips with the elaborate complexity of living systems, and this pays homage to the intelligence which both elicited life and which is inherent in all living organisms from bacteria to badgers to buzzards. Natural selection undoubtedly happened, yet how we interpret the meaning of 'natural' is not necessarily a foregone conclusion. To suggest that natural selection is the manifest methodological intent of Natural Intelligence is merely a new way of approaching and appraising the reality of evolution in the light of contextual considerations .

HAVE WE STOLEN NATURE'S GLORY?

Scientific discoveries whether in biology, chemistry, neuropsychology or in physics invariably point to the smartness of Nature. Indeed, the entire edifice of science is built upon the discovery of the intelligibility of the reality process. Every university science department in every city of the world owes its existence to the smartness of Nature - a smartness which science merely reflects. Almost every scientific researcher, almost every PhD student, is sailing on a sea of accessible knowledge provided by Nature. Whether a geneticist marvelling over replicating mile-long compact strands of DNA, a botanist spellbound by bee-mimicking orchids, or an entomologist fascinated by fungus-cultivating ant colonies - all are caught up in the magic woven by Natural Intelligence over billions of years.

Similarly, almost every science book available owes its existence to Nature's intelligibility. Science is therefore to be understood as an attempt to mirror or reflect the intelligence of Nature in a worded form. And yet whatever facet of Nature we care to investigate, whether this be the intricate structure of a single cell, the elaborate grip of the Venus Flytrap, or the delicate balancing mechanism of the inner ear, science is always committed to accounting for such phenomena as being no more than the end products of a natural but purposeless process, a process which just happens to be extremely constructive, and which just happens to result because the contextual laws of Nature just happen to be of a kind which allow interesting evolutionary events to unfold at some time and in some place. Things just tend to happen that way. And a lucky thing it is too, for if Nature did not possess intelligible and sensible contextual qualities, then the scientists would be out of work and out of life.

However, it does not matter what science comes across in its pursuits, for no matter how smart some animal, plant, or biological process is, it can always be reduced to a 'mere' aspect of natural selection, where 'natural' means only 'the way things tend to happen'. If we were to discover, say, some new plant which yielded a massive fruit out of which popped an organic flying machine complete with handlebars and a comfy seat, then two things would probably happen. Firstly, scientists would immediately account for the machine in terms of 'mere' natural selection, by inferring that such a fruit was a potentially advantageous adaptation. And secondly, the machines would be seized upon by people and exploited to the hilt without a second thought as to the nature of the process which led to them. In no time at all, both scientists and the regular community would be completely used to this useful new production of Nature. It would have become yet another 'mere' incident of the natural world.

The imagined state of affairs above parodies the often blithe attitude of the science community toward the creative processes exhibited by the natural world. All organisms, no matter how intricate, no matter how refined and sophisticated, no matter how well adapted, are 'merely' the products of a blind process which just seems to produce smart and enduring structures over vast spans of time. Brains certainly carry out intelligently driven processes, but not so Nature we are told. But, as I consistently point out, natural selection is indeed a *process*, and since it is the most efficient and successful information-gaining process we know of, then it can be interpreted as being the manifestation of an intelligence.

Perhaps Nature should be awarded Nobel prizes and not the scientists who discover the mechanisms and pathways of its intelligence. If a scientist begins a detailed discussion about the double helix structure of DNA, then we might be taken aback at his or her grasp of the subject matter. We would say he or she is someone very intelligent who understands the complexities of DNA, deserving perhaps of prestigious respect and admiration. Yet he or she is in actuality merely reflecting the intelligence of Nature. Thus it is the discoveries of science which should be described with a liberal sprinkling of the popular adjective 'mere', and not the actual processes which science documents. Nature is ultra-smart, and it is we who 'merely' reflect the fact.

Similarly, terribly thick text books detail the physical and mathematical processes underlying cosmological phenomena like star formation and supernovae. Again, the neat equations and so on which govern precisely these phenomena are in a real sense written by Nature. Consider also the text in a leather-bound book about the highly organised micro-structure of paper and leather - the integrated and mathematically precise atomic configurations of carbon and other organic elements of which leather and paper consist. You would certainly require a highly refined intelligence to really understand such a book.

But, surely the *book itself* (the actual paper and leather) is more representative of intelligently constructed units of information than the text it carries? Science serves only to reflect the intelligent structures already 'out there' in reality.

The living proof of Natural Intelligence is everywhere around us and inside us. Our bodies are spun from it. The text found in a biology book detailing the fantastic biologically constructed 'inner wisdom' of, say, the immune system, is merely a reflection in the formal system of words of the formal system which we call biology. Both forms are intelligible. And a hallmark of intelligent systems is precisely their intelligibility. Which means that both biological systems and their evolution can be regarded as a manifestation of Natural Intelligence. Thus, NASA's hubristic SETI program in which communicatory cries are broadcast out into space reveals a distinct failure to look more closely at organic life itself, for it is Gaia and Nature in their totality that is the highly advanced intelligence we are so keenly interested in locating.

AH, BUT CAN NATURE PASS AN IQ TEST?

If we find it difficult to accept that Nature is intelligent then perhaps this represents a too limited view of what it is that constitutes intelligence. Don't be fooled into thinking that intelligence is something to be measured solely by IQ tests. These are mere inventions of the psychologist designed to tap specific aspects of intelligence. In its strictest sense, intelligence means the capacity to understand. But such a definition also implies the *capacity to increase information such that uncertainty is reduced*. If you use intelligence you can work things out and increase your internal state of knowledge/information. Intelligent processes foster the integration of more information. Consider the following definition of intelligence by the neurophilosopher P.M.Churchland:

"A system has intelligence just in case it exploits the *information* it already contains, and the energy flux through it (this includes the energy flux through its sense organs), in such a way as to *increase* the information it contains. Such a system can *learn*, and this seems to be the central element of intelligence."

As I consistently maintain, evolution is precisely an information-gaining process and this can be considered a form of natural learning. As information is built up within Gaia, so too is uncertainty

reduced, the result being specific organisms with specific capacities and specific relations to the environment. Natural Intelligence has learned to express itself through the language of DNA, has learned to utilise the sun's energy through photosynthesis, has learned to fly through wings, has learned to breathe, sleep, dream, think, communicate, reproduce, recycle, and so on. The evolution of living organisms therefore represents a natural learning process inscribed in DNA, and emerging in response to an environmental context which serves to elicit the learning. Ultimately, it would appear that Nature is in the business of making sense of itself, the human cortex representing a particularly fine and focussed method of so doing.

NATURAL INTELLIGENCE IS EVERYWHERE

Although Natural Intelligence becomes apparent everywhere we care to look in the natural world, the modern version of *Homo sapiens* seems to miss it. If, say, we venture into a desert and stumble across some strange whirring solar-powered machine that converts sand into circuit boards so that it can, say, replicate itself, then we will certainly take notice and infer that the machine has been designed by an intelligence. Yet if we later stumble across a hardy cactus quietly converting sunlight into useable energy and eventually sophisticated reproductive organs that cunningly engage insects into transferring its pollen, then we immediately infer it to be 'merely' the design of natural selection and not of an intelligence. No doubt we would probably pass over the cactus and return to the ostensibly more interesting artifactual machine. To date, science stubbornly refuses to equate the process natural selection with intelligent information processing, despite the fact that the most complex things we know of are living organisms.

Recall Mr Von Neumann. He was considered a highly intelligent man because, amongst other things, he showed that in principle self-replicating machines could be built. Von Neumann was himself a replicating machine, albeit of the organic kind. Why should he be considered intelligent whereas the process which generated him is not? Given the fact that, like us, Von Neumann was built of billions of cells tightly woven into an orchestrational triumph of organic engineering, the case for Natural Intelligence becomes even more conspicuous. Nothing Von Neumann did came anywhere near matching the genius of evolution itself. Only the human ego can deny this. And yet the human ego is itself dependent in some way upon the human cortex for its existence. And we already know how brilliantly designed the cortex is.

Let us also consider photosynthesis a tad more closely, embodied as it is in the green film covering the

Earth. Without this downplayed biomolecular wizardry (which has yet to be technologically mirrored in a globally viable cost-effective way) there would be no life at all, for all life stands upon this ultra-smart process. Yet it is easy to play the imagination game and hypothesise a reality in which organic chemicals could not in any way form themselves into neat negentropic energy-utilising organisms. For life to flourish it had to reside as an immanent capacity within organic chemistry, and the context of the Universe at large had to be conducive in eliciting such a capacity right down to the formation of suns which eventually go super-nova. In short, I would argue that it is valid for us to wonder at why reality is so amenable to the process of evolution, just as it is valid to ask why the Universe is intelligible at all.

Traditional Darwinism cannot adequately answer such questions. As stated, it can only shrug and state with nonchalance that Nature just happens to be that way, that Nature has been, well, jammy or lucky - lucky in the sense that it eventually brought forth conscious brains able to grasp the processes which led to conscious brains. However, if we conceive of evolution as reflecting Natural Intelligence, then we can connect up this process to those other fortunate aspects of the reality process which have allowed interesting things to happen in the Universe, and we eventually discern that reality is, at heart, a smart process. Don't forget, I am not implying some new process here, rather I am suggesting that overall, in its entirety, Nature is smart and that this smartness is part and parcel of reality. Such a view, such a new angle through which to conceive reality, is not merely a case of words, rather it is to re-define our place within Nature and to re-perceive the significance and meaning of our conscious existence.

UNNATURAL BIAS

I think there are three principal reasons why evolution is not generally viewed as an intelligent process. Firstly, intelligence often has connotations with consciousness, and many of us would doubtless find it hard to attribute consciousness to Nature. Secondly, evolution happens over lengthy time spans, as opposed to the relatively short spans of time over which human intelligence operates. Thirdly, we are a terribly proud and arrogant species who like to imagine that we ourselves are the smartest thing on two legs. Intelligence belongs primarily to us, and not to the more abstract systems of which we are a part (I presume that this outlook is connected to the human ego as alluded to earlier).

However, intelligence, when understood as being a process, does not necessarily entail consciousness (at least not of the sort we are familiar with), nor does it have to be limited in the method and timescale over which it operates, and nor should it necessarily be confined to brains alone. If intelligence is tied up with information-gaining processes and learning, then clearly evolution is Natural Intelligence at work. Life,

in all its manifold organismic glory, has learned to live, cope, behave and act appropriately in what is basically a tough reality, though one which is just the right toughness to engender evolution. The only real difference between Natural Intelligence and human intelligence is one of magnitude and duration of effect.

Reductive science will not discern Natural Intelligence because reductive science looks to isolated entities and attempts to seek explanations for their existence on lower levels. To glimpse Natural Intelligence is to view the larger systems of which the components are a part. This larger system is the entire Universe, an algorithmic backdrop which provides the essential physical and chemical conditions necessary to foster the digital computational procedure which is evolution. These essential conditions are things like the convenient formation and enduring presence of 'free lunch' suns, the facilitated formation of DNA with its conveniently plastic and linguistic nature, the continual presence of factors which conveniently induce DNA to vary and mutate, and the conveniently inherent feedback nature of ecological systems upon genotypes. If we think in Gaian-sized terms then Natural Intelligence emerges. Darwin's groundbreaking legacy therefore resides in his discovery of the procedural intent of Natural Intelligence.

SUPERFLUOUS ICING ON THE DARWINIAN CAKE?

It might be objected that to infer that evolution represents an intelligent process is to introduce superfluous and scurrilous gossip-making baggage to what is already a sufficient theory. In other words, why infer Natural Intelligence when it is not absolutely necessary to use such terminology for our understanding of the mechanisms by which evolution proceeds? Well, this might be true, yet to refuse to elaborate upon evolutionary theory is to impose limitations upon our understanding, especially if we want an holistic and ultimately metaphysical view of Nature. Perhaps this is why there have been so many attempts to do away with Darwin's theory (like the theory of vitalism for instance), not because it is wrong but because there is some conceptual element missing, an element which can more properly capture and appreciate the amazing power of evolution.

As far as I can see, without inferring that evolution is smart is to be unable to explain why exactly Nature should be such that it allows and indeed fosters evolution. As I said, why should organic chemistry be so plastic in the face of the environment? Why should the emergence of DNA coding be inevitable? Why should certain prevailing influences continuously mutate DNA composed genes? Why should life forms, composed as they are of multicellular functional organs, be latent within organic chemistry? Why should

sensitive patterns of consciousness inevitably become focussed within nervous systems? The questions go on. The fortuitously creative brute facts mount up. The self-organisational properties of Nature abound. Something important is clearly happening everywhere.

THE ULTRA-SMART COMPLEXITY OF ORGANISMS

Allow me to reiterate upon previous reiteration: Your own self-repairing body, your acute visual system processing these words, your autonomic breathing system and autonomic digestive system; all are far more smart than any man-made computer or man-made software program currently in existence (especially when one considers how these functions are integrated into a tight and enduring unity). Perhaps you are familiar with some latest piece of Microsoft software, some program embodied in several megabytes of computer code. You will certainly concede that this code is smart. Yet reflect upon the *700 megabytes* of digital DNA coding etched into almost every one of your many *billions* of body cells and you will realise that human-derived programs pale in the face of those written by Nature.

Regarding the evolution of the human organism and how we have yet to fully conceive of the extraordinary complexity involved, here is what noted Artificial Life and genetic algorithm expert T.S.Ray has to say:

"It is generally recognised that evolution is the *only process with a proven ability to generate intelligence*. It is less well recognised that evolution also has a proven ability to generate parallel software of great complexity. In making life a metaphor for computation, we will think of the genome, the DNA, as the program, and we will think of each cell in the organism as a processor (CPU). A large, multicelled organism like a human contains trillions of cells/processors. The genetic program contains billions of nucleotides/instructions.

"In a multicelled organism, cells are differentiated into many cell types such as brain cells, muscle cells, liver cells, kidney cells, etc. The cell types just named are actually general classes of cell types within which there are many subtypes. However, when we specify the ultimate indivisible types, what characterises a type is the set of genes it expresses. Different cell types express different combinations of genes. In a large organism, there will be a very large number of cells of most types. All cells of the same type express the same genes.

"The cells of a single-cell type can be thought of as exhibiting parallelism of the SIMD kind {SIMD =

single instruction multiple data - all CPU processors do the same things upon their data, even if data is different for each}, because they are all running the same "program" by expressing the same genes. Cells of different cell types exhibit MIMD parallelism as they run different codes by expressing different genes {MIMD = multiple instruction multiple data - CPU processors can be executing different code but all are orchestrated towards a common goal}. Thus, large multicellular organisms display parallelism on an astronomical scale, combining both SIMD and MIMD parallelism into a beautifully integrated whole. From these considerations, it is evident that evolution has a proven ability to generate massively parallel software embedded in wetware."

(my italics)

A good point worthy of astonishment. Somewhat paradoxically though, I would suggest that it is precisely because Nature is so very, very smart that we do not acknowledge it. Biological processes, in the main, are so perfected in their natural execution that we fail to comprehend just how much complexity is involved (recall my detailed discussion of neuronal events for instance). It is only when biology *goes wrong* that we suddenly become aware of just how smart it usually is in its operation. Similarly, if computers were so perfectly designed that mankind was to utilise them en masse for a thousand years without one single breakdown so that repairs were not needed, then we would soon lose sight of just how smartly they were designed. We would become completely accustomed to computers and take them for granted without a thought as to their intelligently designed infrastructure. However, should malfunctions begin to occur then we would suddenly wake up to their underlying contrived functionality.

Returning to human biological processes, they are generally so impeccable that they take care of themselves. Which is to say that Nature is a pretty smooth operator. For most of us, we grow from babies to adults faultlessly, yet the myriad steps in such a morphological feat are absurdly sophisticated, and this is a creative manifestation of what I am calling Natural Intelligence - a natural process which has yielded as part of its output we beings endowed with consciousness, a process moreover which has been operating over an immense stretch of time. Yet just because the information-gaining evolutionary process which led to you and I took billions of years does not mean that the process was non-intelligent, as we have been led to believe. To infer that high intelligence exists only in our species is to be blind to both the tremendous Natural Intelligence which facilitated evolution and the Natural Intelligence embodied in all biological systems. Moreover, this non-human intelligence extends into all of reality, since, as we have seen, Nature was always poised to 'grow' an eventually conscious tree life. The entire meta-context of Nature is therefore replete with intelligence.

Again we have arrived back at the idea of the Universal Computation (or cosmic seed even), for it would appear that all the information necessary to construct suns, planets, molecules, amino acids, cells, micro-organisms, plants, animals, and conscious brains, was written into the contextual fabric of Nature, lying dormant as it were until the right conditions had developed somewhere in which this information could be 'read out'. This is a breathtaking idea, and if it should generate a small gasp of wonder, this is but nothing compared to the awe generated by entheogens like psilocybin, an awe which is intimately connected to realisations of our potential significance in the reality process.

Nature thus emerges as being incredibly smart as well as deadly and I can close this chapter with an apt Einsteinian quote, this time pertaining to the reverence felt by at least some scientists toward the Universe with which we interface. Einstein openly notes that this emotion:

"...takes the form of a rapturous amazement at the harmony of natural law, which reveals an intelligence of such superiority that, compared with it, all the systematic thinking and acting of human beings is an utterly insignificant reflection."

I almost second that emotion. Human thinking might not be an "insignificant reflection" at all. Far from it. Indeed, I presume that if we divine Natural Intelligence, acknowledge it, feel it, then this quite literally represents a significant reflection of that intelligence. Which suggests that such a cortex-embodied reflection has some functional import, a sort of self-realisation factor of Natural Intelligence as it were. We explore these issues in the next chapter.

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CHAPTER TEN

A NEO-SHAMANIC CLIMAX

As we have seen, the brilliant fine-tuning of Nature is most clearly indicated in the evolutionary process which Nature has facilitated here upon the Earth. Over some 3 and a half billion years, our planet has transformed itself from a lifeless mass of rock into a veritable metabolising organic matrix in which countless replicating patterns swarm about the Earth's surface, each pattern or organism an informational expression of Natural Intelligence. Yet, like the hour hand of a clock, science has failed to see the contextually directed movement of Natural Intelligence, claiming instead that evolution is essentially a pointless and mindless process. But this can only be a subjective inference likely drawn according to the perceived duration over which evolution works, a duration so great that the intelligence operating over such spans remains all but invisible. If we instead imagine viewing a time-lapse film of Gaia wherein 3 and a half billion years of information-gaining evolution are compressed into but one intense second, then modern electronic human culture and human consciousness explodes instantaneously into existence, bursting forth out of the earth's ocean of elemental constituents. This awesome pattern of self-organisation can be no mere accident. To those who would still scoff at such an assertion, I can only ask them this: if the aforementioned capacity of the Universe does not suggest a great intelligence at work then what sort of Universe would?

Notwithstanding sullen detractors, if we embrace our River of Life metaphor, the totality of life clearly represents the thrust of an intelligent process of information-integration, and I argue that this is the essence of reality, the essence of the process which bred and killed Einstein and which controls our destiny also. Since all the information needed to support confluent patterning is etched into the 'software' of the Universe, then life and the emergence of consciousness can be viewed as a kind of *translational* process whereby the informational code or meaning inherent in reality is deliberately read out over time. Somewhere within the reality process a biosphere had to form, since it was coded for in the lawful contextual fabric of the Universal Computation. And within such a biosphere - of which there may be millions in the Universe - evolution was destined at some time to produce nervous systems, and, eventually, brains capable of embodying consciousness. Patterns forever falling naturally into place like some cosmic jig-saw.

The conscious aspect of *Homo sapiens* thus resolves itself as a potent expression of the latest and most *reflective* form of information-integration to emerge out of the language uttered by Natural Intelligence - reflective because our kind is able to reflect upon how we came to be, as if the human cortex be a biologically wrought mirror able to catch the face of Natural Intelligence upon its refined surface.

As with all other forms of information, consciousness really was poised to emerge; it was determined by the Universal Software once the appropriate contextual relations had come into being. And so here we stand, the as-yet supreme hominid species, upright, balanced most precariously atop the jungle and atop the technology we have created, our gaze now set upon the expanding intelligible cosmos. Each human psyche, imbued with meaning from the Universal context in which it has arisen, is able to wonder at the mystery of it all, the reality of the intelligent Other in whose hands we lie collectively like transformed clay. In an instant of cosmic time, consciousness has arisen out of physics, chemistry and biology, a living mirror able to reflect the forces and the processes which so engendered it. As information comes to be organised and integrated in ever more elaborate ways, eventually all information will have been integrated and all uncertainty will have been vanquished.

FORECASTING THE FUTURE

The evolution of life on Earth, the gradual elaboration of the Gaian system, and the emergence of conscious human culture - all dependent upon the intelligently configured context of Nature - strongly suggests that we are inside a most interesting and creative part of the Universe. It is as if one of the mightiest currents within the computational River of Life were flowing around us right here and right now, focused within our modern electronic culture. In other words, if the creative centre of the Universe be the place where the most complex forms of information-integration are being channelled, then we are surely in or near the centre. Or at least we are amidst one of the focus points of Natural Intelligence. The amount of information being organised in one way or another all around us is so dense that one can feel it. Actively flowing information bombards us at every turn as it seeks resolution. The late 20th century, as a collective experience, is like some shimmering effervescent informational protoplasm exuded by Gaia as she seeks to attain cohesion and stability at some higher level of organisation.

Those scientists who diligently propound the myth that we are mere bystanders on a speck of dust remote from the heart of the Universe do the phenomena of life and consciousness a major disservice. As far as we know, in terms of informational activity, the existence of humanity (some 6 billion interconnected

minds), perched as it is upon the millennium, is far and away more complex and intriguing than anything else in the known Universe. Gaia, in its totality including all of human culture, is surely the place to be.

If reality is indeed a rushing river of integrating information, then it must surely be destined to meet some final organised form. This would appear to be an inescapable conclusion if my reasoning so far is correct. For if the processes of organic life and human consciousness were a latent capacity woven into the fabric of reality, then there must surely be more information yet to be read out of the Universal Computation. If Natural Intelligence is anywhere as massive as I suspect, then there absolutely must be some final point or solution to its prodigious algorithmic Gaian-sized endeavours.

To give the reader a flavour of this further-information-read-out scenario, consider the following thought experiment. Geneticists tell us that a fair proportion of the DNA found in all organisms serves some as-yet unknown function. On a world-wide scale, the total amount of this affectionately termed 'junk DNA' must be immense. But what if it were a form of latent information that was set to go into action only when environmental circumstances were in a particular state? What if the biosphere suddenly assumed a context to which this globally distributed DNA was tuned? Anything might happen. All organisms might suddenly mutate and forge themselves together. The possibilities are endless since DNA is so rich in its capacity to organise chemical and biological processes. Perhaps the reader can think of some alternative possibility.

I offer such entertaining speculation not because I believe it to be true, only that this kind of idea highlights, in principle, how reality as we know it might well be coded to produce some climactic output at some stage of its evolutionary progression. Equally plausible is the idea that our computer technology might spawn some new level of information-integration - the so-called emergence of *cyberspace* for instance - a kind of virtual or digital computerised dimension into which the agency of human consciousness can be transferred. In point of fact, as I remarked in the last chapter, through the rise of telecommunications and computing technology, the Earth does seem to be wiring itself up into an integrated digital network, a bio-electronic entity in which widely dispersed informational systems like the human psyche can communicate with one another virtually instantly across the globe. This magical technology, similar as it is to the communicational activity of the synapsing neuronal brain, is clearly evolving at an unprecedented rate, and with the development of transglobal computer networks like the internet, the eventual emergence of a 'tangible' cyberspatial dimension of some kind seems assured. Indeed, judging by the unprecedented boom in speculative documentaries about the near future of computing systems now appearing in the media, it would appear that a fully interactive cyberspace of one sort or another is almost in reach.

What this kind of rife pop divination reveals is just how forcibly the future now looms upon us. It is as if we were moving ever more rapidly toward some new technological breakthrough involving information-integration which will transform our culture, a transformation not only inevitable but whose shadow is already upon us, stirring us into prophetic thinking. For when else in our history has there been such concentrated speculation about the very near future? More to the point, if some unimaginable fully integrated state *were* to be reached in the near future, whether mediated through computer telecommunication or some other orchestrational medium, then clearly Nature has always been coded for such an eventual output. Maybe this could be considered the ultimate output of the Universal Computation, for it would represent the translated rebirth of the Other, the blossoming of Gaia, a final planetary condition which Nature has been pre-programmed *in some way* to achieve.

Most of us however are content to allow ourselves to be drawn almost passively along within the computational River of Life. We build sturdy rafts made of material goods and social status. We surround ourselves with items which our culture injects with value, and these are what keep us afloat. And yet our rafts, no matter how robustly they may be constructed, and no matter how much wealth they contain, will eventually be destroyed, eaten up by the process in which they are swept along. The time allotted to our DNA is finite, we are digitally programmed by Natural Intelligence so as to grow old and die, just as surely as we are built to grow through puberty and reproduce. We are patterns of information which swirl into ordered existence within the Universal Computation, only to break up in the wink of a cosmic eye. Good reason then why we should think more carefully about where the river is headed, for then we might discern our proper role within the integrative flow.

NEAR THE RIVER'S END

As a conscious species riding upon the crest of an intelligent wave, our collective knowledge represents a kind of growing certainty about the Universe. As this certainty or information continues to increase, we will gradually realise exactly why we have evolved. The intelligence of Nature - all of Nature from the Universal software to Gaia - is thus becoming fully reflected through human consciousness and in the knowledge systems held within our culture. This is suggestive of a kind of birth. The computing agency running the Universal Computation *is* the intelligence, the Other, and is in the process of 'downloading' itself onto human culture, particularly human consciousness, just as a caterpillar 'downloads' itself into the form of a butterfly. The intelligence of the Other is therefore undergoing metamorphosis through the process of evolution. As information-integration continues to build up within Gaia, so too is the Gaian system being informed by the intelligence which constructed it. If this is so, then the purpose of life must

indeed be to embody a new form of the Other.

Such a possibility is clearly similar in kind to Fred Hoyle's speculations. However, I do not believe that Natural Intelligence is itself descended from some previous form of intelligence. What I suspect is that the entire Universal Computation - Nature and all its information - is the manifestation of the intent, or will, of the Other. Which is to say that the Other, or Natural Intelligence, *is that which is doing the computing, that which is 'holding reality in mind'*. After 15 or so billion years of reality in which the grand scheme of the Other's intent has been realised, consciousness has now emerged which can assimilate the Other.

It is as if information, like energy, cannot be destroyed, and that the informational content of reality, which remains constant, is in the process of reforming itself from moment to moment. If we think of a computer program able to take as input some text and then output that text in the form of a new language, or smoothly morph one image into another image, then likewise the reality process around us can be viewed as a 15 billion year long translation of the Other from one language-like form into another which lies in the future. Thus the very nature of Nature (the Universal Software) was rich in organised information from the start, and this information comes to be read out, or be translated, or be transformed, through the evolutionary process. Consciousness of the Other i.e. knowledge pertaining to our true situation in the reality process, therefore represents the translation of the Other into a new form so that, in some sense, consciousness may actually serve to *become* the Other. Again, this suggests a kind of birth, albeit of an awesome kind. Indeed, life can be considered as just that; the living meta-symbolic birth and growth of the Other into some new form, with human life, global culture, and particularly human consciousness representing the 'coming of age' of the Other's translation. It sounds unbelievable, yet if we are pressed to provide some kind of metaphysical explanation for an ultra-smart Universe, then I believe that ideas such as these must be near to the mark.

THE OMEGA POINT

One mystic who anticipated these ideas was the eminent Jesuit priest and palaeontologist Pierre Teilhard de Chardin. He was one of those rare breed of Christian thinkers whose faith *increased* due to knowledge about the evolutionary process. Indeed, this explains his scientific interest in fossils and evolution (and, I might add, his excommunication by his religious 'superiors').

Teilhard believed that evolution was a purposeful process which would reach a climax at some time in the future, this point representing a kind of totally integrated state of life. For him, this would be the Omega Point, the point to which the Universe is destined to reach. This future state was also considered by Teilhard to somehow send influences back in time as though the Omega Point were an eternal sun able to shine its light upon the surface of human history.

Although Teilhard's thinking was deeply mystical, some of his work was respected by a number of traditional evolutionary theorists, most notably the biologist Julian Huxley. However, for most 'hard-nosed' scientists who chance upon Teilhard's work, he remains no more than a mystic dreamer, a refined P.K.Dickensian soul whose ideology is basically unfit for serious consideration and open to cheap ridicule. Unless that is, one has repeatedly experienced the numinous presence of the Other, in which case his ideas become rather alluring.

In *The Future of Man*, Teilhard writes about the Omega Point in the following rather poetical way:

"Let us suppose that from this universal centre, this Omega point, there constantly emanate radiations hitherto only perceptible to those persons whom we call 'mystics'. Let us further imagine, as the sensibility or response to mysticism of the human race increases with planetisation {the unification of humanity}, the awareness of Omega becomes so widespread as to warm the Earth psychically while physically it is growing cold. Is it not conceivable that Mankind, at the end of its totalisation, its folding-in upon itself, may reach a critical level of maturity where, leaving Earth and stars to lapse slowly back into the dwindling mass of primordial energy, it will detach itself from this planet and join the one true, irreversible essence of things, the Omega point? A phenomenon perhaps outwardly akin to death: but in reality a simple metamorphosis and arrival at the supreme synthesis."

Teilhard's mention of a cooling Earth was probably a response to the growing realisation at the time he wrote the book that the Universe appeared to be 'running down' due to the dreaded second law of thermodynamics. This revered law states, in no uncertain terms, that the Universe is 'wilting' and faces a heat death extinction. All of the Universe's energy, it is said, will eventually be converted into a meaningless expanse of useless heat. Now that's a gloomy thought for sure and a dangerous weapon in the hands of our archetypal reductive scientist who might begin to prod us with it even now. However, according to our reasoning, the Universal Computation must have surely required such a 'negative' law in order to function in the way it has. Evolution has thus had to circumvent this 'running down' tendency by

building 'dissipative structures' - metabolising organisms - in order to convert energy into a useable form. So, although closed systems do run down and reach equilibrium (a boring state in which nothing of interest happens), *open* systems like Gaia are able to build up order (from our sun which itself depends upon the nature of the Universal Computation for its existence) by giving off disorder (like infrared heat radiation) into space. In this way, Natural Intelligence has defeated the spectre of the second law of thermodynamics, and informational integration via evolution has taken hold. Or perhaps it would be more accurate to say that Natural Intelligence has engineered a certain kind of tension in the Universal Computation which life must continually 'struggle' against in order to develop, a process which, if you think about it, is strangely reminiscent of will.

When Teilhard wrote about the Omega Point, he was probably less aware than we are today of the fact that the Universal software is highly specific and conducive to life. Hence he saw the second law as a threat to life, but foresaw that life would reach the Omega Point, just in the nick of time as it were, before the Universe ran down, or at least our poor sun ran down. In other words, he located the Omega Point far, far ahead in time. But, as we have seen, science has now reached the stage where it can appreciate not only the computational quality of reality, but also the fine-tuning of Nature. In my mind, this is strong evidence that we are in the 'good hands' of the Other, and, more significantly, that the Omega Point might be nearer than Teilhard supposed. Of course, it is preferable to think of such an event as being near as opposed to far away. Yet, with the growth in entheogenic epistemology initiated in the 50's and 60's, and the emerging interest in shamanism and organic psilocybin, it might well be that the illuminations caused by the Omega Point are on the increase, which in turn suggests that we are moving ever nearer to this climactic point.

THE END OF THE WORLD AS WE KNOW IT AND I FEEL FINE

Not surprisingly, Terence McKenna has echoed the mystical claims made by Teilhard. He has assumed the unenviable role of psychedelic prophet by consistently claiming that human history will be utterly transformed (or end) in late December 2012. This date derives from his mathematical 'fractal theory of time' which views time as a cyclical patterning process involving a continual 'ingression of novelty', and which implies a definite culmination point. The date also coincides with the mysterious end date of the Mayan calendar, the Maya being a time-obsessed civilisation (this Mayan end-of-time prophesy was not known to McKenna when he first developed his theory).

At this time, so says McKenna, the full purpose of reality will become manifest as information-

integration, or the ingression of novelty as he calls it, reaches its zenith. There lies the 'transcendental object', the eschaton, which, like Teilhard's Omega Point, "sheds reflections of itself into the past", reflections which inspire and illuminate saints, mystics, and the mind of the visionary shaman. Also in line with Teilhard's Omega Point, McKenna suggests that this future state of transcendence somehow exists now, or in eternity, and it is towards such a state that we and the reality process are being inexorably drawn. One can imagine the future state to be like a magnet, that life and the evolutionary emergence of consciousness be akin to the process whereby iron filings assume structural alignment according to the nearness of the magnet. Indeed, all of Nature's fortuitous self-organisational properties - like the emergence of DNA for example - can be seen as deriving from the presence of some future 'magnetically-charged' state which 'pulls' them into being.

In terms of the Universal Computation we have been entertaining, the Omega Point must represent the final output state or full rebirth of the Other within the Gaian system. The willed metamorphosis will be complete. The Universal code will have been fully expressed, all information/knowledge achieving a state of coalescence. The Other, Natural Intelligence, will have completed its translation from one unified state of being into another.

McKenna has also used the term 'attractor' to describe this final eschatological state to which life is destined to reach. An attractor is a kind of abstract final state towards which physical systems are drawn. In the case of a swinging pendulum encountering friction, the attractor of that system is the state of the system where the pendulum is at rest. In whatever position one starts the pendulum moving, it will always end up in the attractor state. Likewise, in the case of chess, the attractor is the state of checkmate towards which the game discretely progresses. Attractors are thus inherent in various systems and are akin to the metaphorical magnet I previously described.

In terms of the Universe at large, it could be argued that the attractor towards which it is being inexorably drawn is a kind of 'big crunch' whereby the Universe collapses into a singularity due to the effects of gravity. However, we can also view the attractor as being not a super-concentration of 'matter', but an *integrated state of information or meaning*. When human culture and human consciousness has succeeded in realising its true role and function within reality, and when the Other has fully transformed or reflected itself within the totality of Gaia, then this will represent the attractor or final stage of the reality process *as we know it*. At that point, Nature will have made maximum sense of itself.

If we posit an attractor, we should also bear in mind that the nearer it is, the greater its effect and the

greater the patterning procedures co-ordinated into place. Such a process might even explain recent and unusually rapid forms of evolution like that of the hominid cortex, as well as the subsequent speedy evolution of human culture and the more recent *yearly* evolution of digital technology. Dwelling upon this, one automatically thinks of a spiral process, or self-tightening gyre, in which Nature is frantically assuming a state through which more and more information-integration can take hold. Perhaps the end-point of any Gaian system will be a kind of 'local' singularity, alike in nature to the assumed singularity from which the Universe sprung, a state of informational unification although this time embodied through a planet-wide shared *experience*.

If such a fantastic phenomenon were to actually realise itself in the near future, then it would surely have to be preceded by a tremendous surge of information announcing or heralding the event. I do not mean angels blowing trumpets, but rather that science ought to make some new discoveries which indicate the intentionality and intelligence of Nature. Or, if the paradigm of a naturally intelligent reality process were to grow, then it would mean a re-interpretation of the data already amassed through science, and this might further highlight our unique position within the evolution of the cosmos. Alternatively, some new technological innovation or natural phenomenon might serve to make everyone more conscious of the interconnectedness of the biosphere, both in terms of the biosphere's life forms and its mindful elements. This could then set the ground for holistic and synchronised global action experienced en masse. Either way, if the evolutionary process as we know it is indeed smart and destined to 'conclude' in some way according to its inherent code, then it will simply have to proceed just as an organism has to grow. Natural Intelligence cannot be stopped; it can only be observed and be appreciated whilst in action.

That we *can* experience the Other through entheogenic plants or by contemplating the intelligent nature of Nature, indicates that *something* is indeed emerging before the collective human psyche, that some great coherent pattern lies behind the hypnotic glare of secular reality, and awaits our perception. Or perhaps the Other has been dormant, as though asleep, hibernating as it were, only to gradually awaken through the vehicle of consciousness which it has prepared for in advance.

I am the first to concede that much, if not more, mystery remains. But at least the mystery of our being has been more clearly defined. And at least we know where to look should we want to explore Nature more deeply than a casual glance allows. When one has encountered the Other through the visionary effects of psilocybin, then it becomes quite evident that, whatever its ultimate intent, consciousness is an essential part of the plan.

OUR ROLE ON THE EARTH ROCK

According to the neo-shamanic view of things running through this book, I think cultural conditions are ripe to re-view Nature or reality as being an ultra-smart, ultra-intelligent process. By doing so, the context by which we live and act out our lives becomes somewhat altered (another feedback effect). If we conceive of reality as a mindless material accident then we will not think twice about ruthlessly exploiting Nature for short term gain and short term profit. Or if we believe Nature can only be understood by tearing it to pieces and examining the smallest fragments, then we shall not divine the greater picture.

If, on the other hand, we embrace the ideas outlined in this book, then our view of Nature begins to change, and we might come to respect the Earth in the same way as aboriginal peoples. Of course, it is not necessary to entertain all the ideas in this book in order to be environmentally conscientious. It is rather the case that should Natural Intelligence be real, then we would do well to refrain from breaking harmony with its flow. If we veer too far from the destination of Nature's intent, then we will run the risk of being abandoned by the great system which birthed us.

Not that I really think such a thing could come to pass. Too much natural concerted effort has been invested in hominid brain evolution for *Homo sapiens* to be crushed because of our currently dangerous habits, although natural homeostatic forms of population restriction are a distinct possibility. One cannot overestimate the power of Natural Intelligence. It is not like evolution is an old car which could splutter and give out all of a sudden. If the progress of the Universal Computation were that frail, then it would surely have faded long ago.

It might be that the severe environmental crises our species has set in motion of late are a kind of violent prelude to the cultural changes and transformation of the scientific world view which lie ahead. Indeed, our global disruptions of the biosphere obviously serve to make us reflect upon our important causal role within the web of life. When weather systems run riot around us, when otherwise unchanging ice-caps begin to melt, when entire lakes and oceans become spoiled by pollution, when an estimated 3 species *per hour* become extinct due to our oft-belligerent presence, when acid rain ruins forests and crops, when fires burn uncontrollably in tropical areas where the land has been decimated by farmers pandering to the West's greed, and when primarily profit-motivated faceless biotech conglomerates cause unforeseen ecological disruptions, then it is evident that our species is not a passive spectator of Nature. Rather we actively influence its progress at every moment.

SHIFTING PERSPECTIVES

As Fritjof Capra has remarked in *The Turning Point*, the Chinese written character for 'crisis' contains two elements - danger and opportunity. Which implies that we now have an opportunity to make a change for the better. We can learn from our mistakes, respond to them, as if they were parts of a global enzyme coded into the historical process (enzymes facilitate reactions). For through acknowledging our devastational impact upon Nature, we must perforce reappraise our relationship to the Earth. In so doing we dimly perceive that we are bound to Gaia as much as Gaia is bound to us. Moreover, until we fully realise our purpose at the hands of Natural Intelligence, it seems doubtful that we will be fulfilling our true role within its magnificent scheme.

I would like to believe that as we move into the third millennium, the realisation of our true purpose will become evermore apparent. Which is to say that the old worn chestnut "what's the meaning of life?" will be realised as the elusive meaning continues to unfold. In fact, if what I have written of bears any truth, then such a realisation will be inevitable. Perhaps others will explore Nature's wild entheogenic flora and fungi and reach the same conclusions as have I. Or perhaps scientists will begin to discuss more those aspects of reality which have conspired to facilitate a self-conscious Universe, and thence conclude that our Universe really is of profound significance, especially the presence of consciousness. And if science should come to accept that everything is made of information, including of course consciousness, then perhaps science will also see that this information is becoming evermore integrated through the intent of Natural Intelligence which bears the Universal Computation within itself.

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Our unusual quest is now over. We set out to uncover the essential face of Nature and discovered that, as a naturally evolved conscious species, we are caught up in a rapidly accelerating information processing computation that is all the Universe and whose leading edge is partly focused here on Earth, particularly within our conscious perception and within our digital telecommunicational culture. This unfolding process would appear to be impressively smart and directed toward some culmination point, a point which is woven or coded like DNA into the present. Only the future can reveal the truth of these bold

psilocybin-driven assertions. In the anticipatory meantime we can do no more than contemplate the issues and ideas raised and hope for the best. May the sacred wisdom of Great Nature be with you always and everywhere.

[Go to Epilogue](#)

EPILOGUE: TRICK OR TREAT?

Well, it certainly was a long and winding trek from the backwaters of Mexico where Gordon Wasson first discovered the sacred power psilocybin, to a vantage point where we were able to view Nature as an ultra-smart process whose ultimate purpose awaits us. At any rate I am exhausted. My mind weary, my bones heavy, my three score years and ten almost at an end, it was perhaps my last deed that I set forth a book dealing with the assuredly spiritual and intentional nature of reality. At least I can now meet death head on, knowing full well that I attempted to comprehend the nature of the reality by any means necessary.....

Actually, not all of that is true. But it is the case that a book about, say, fire extinguishers would have come easier. Then again, such an inane book would not have been able to shed light upon the nature of reality if reality be our metaphysical adventure. Uncertainty has its virtues I suppose, in terms of its relative ease. To break free from uncertainty about the implications of our true situation as refined biological components of the reality process entails an attempt to access a deep understanding of the world both within and around us. Essentially, this means elucidating the nature of consciousness since consciousness is what we are and what mediates our models of reality.

I hope that I provided a plausible model of consciousness which views it as a flowing pattern of information generated within a vast computation-like process. Once one has accepted that we and all other patterns of information are the natural expressions of a prefigured language-like Universal Computation, that Nature is everywhere smart and contextually significant, then one is compelled to go on to examine the 'meaning of it all'. Only when the bigger picture has begun to be glimpsed will we realise more fully our function within Nature and what integrative global events to expect in the near future. As I hopefully demonstrated, one route to ascertaining the bigger picture is to alter the information converging in the psyche by utilising Nature's ambient entheogenic agents. To do so is to suddenly change one's relationship to the rest of the reality process such that one comes to access and be informed by the transcendental Other; a will, or intention, or intelligence, which infuses all of Nature.

It only remains for me to give some more information as to the particulars of the psilocybin mushroom. After all, without verifying my claims, you will not know whether I made up the principal subject matter

of this book. Indeed, perhaps the themes outlined herein have been a kind of fake, nothing more than a few wild and woolly tales built upon the fertile imagination of my mind during periods when it was too wet to venture outside. Maybe, at heart, I am really one of the archetypal 'merelyist' reductionists of the bleak 'null hypothesis' persuasion, but one who felt like writing an entertaining reality yarn in which the Universe could be conceived as being meaningful instead of a mindless accident.

The message of course, is that one must always think for oneself, and never take anything for granted. That, surely, is indisputable. Which leaves the psilocybin experience itself as the chief substance for my unusual claims. But the reader must make up their own mind as to this claim of mine that the mushroom affords useful knowledge. Let no-one accuse me of reckless pointing. This book has been my pointer. You choose. You decide.

As previously stated, it is currently the case that psilocybin mushrooms of one sort or another grow throughout the world - in Europe, North and South America, Australia, New Zealand, Indonesia, Thailand, and Africa for example, One species - *Psilocybe semilanceata* - is perhaps the most cosmopolitan variety native to Northern Europe and parts of North America. At the time of writing, this species - known in the vernacular as the Liberty Cap due to its characteristically pointed umbo - is legal to possess and consume in its unprocessed state in Britain and in some other European countries. In this case, left on their own without any kind of treatment or processing, the mushrooms are legal, and thus the entheogenic experience that they can potentially elicit, is legal also. Unfortunately, this is not the case in many other parts of the world. There, possession of the freshly picked mushroom is deemed a criminal offence. One only hopes that in parts of the world like Britain (in this instance Great), civilian access to the mushroom continues to remain free of state intervention.

Psilocybe semilanceata mushrooms can be located from late August till as late as December, especially after heavy rain, in most wild, green places (like pasture, grassy valleys, heaths, and moorland), certainly within a radius of no more ten or twenty miles should you live in Northern Europe or on the east coast of North America. Often there are lots of them to be found, the mushroom being widespread and gregarious if contextual conditions are just right. However, one should be prepared to look long and hard. Undoubtedly, first excursions may end with empty hands, and thus perseverance and patience are necessary virtues to be practised on the quest. You might have to impersonate someone who is searching for a lost contact lens for a good few hours before finally stumbling upon a specimen or three of the mushroom. But at least the fresh air will do you good. Alternatively, if you find yourself in Amsterdam, it is possible to legally purchase psilocybin fungi as well as specialised kits and manuals for growing them at home.

Before attempting to gather psilocybin mushrooms from the wild, one should be highly familiarised with their appearance. This can be achieved by referring to any number of good mushroom guidebooks that contain colour photographs, especially the many guidebooks now on the market which specialise in documenting psilocybin species. Although there are no poisonous varieties which can be mistaken for *Psilocybe semilanceata* if one carefully analyses their physical appearance, it makes sense to be absolutely certain that you are picking the right type. If there is *any doubt whatsoever*, then the dubious mushrooms should be discarded. And, as always, when trekking around the countryside, one should cause as little disturbance as possible.

As to dose, no more than 35 of the diminutive *Psilocybe semilanceata* need be ingested in order to experience some sort of psychedelic effect. Other often larger species require a much smaller amount to be ingested, in which case it is advised to consult either a relevant guidebook for more information on dosage, or the many relevant sites on the internet dealing with entheogens.

Stronger entheogenic doses of psilocybin should only be employed with plenty of experience. Most important are one's state of mind prior to consumption, and one's surroundings. One should be in a highly positive frame of mind as well as being in a friendly and safe place free of any unwarranted distraction. I would also suggest a period of sexual abstinence prior to ingestion since one will then be in a more 'pure' state befitting a potentially sacred experience. And unless one is particularly competent in the ancient art of self knowledge, then it is advisable to have a non-bemushroomed close friend around to act as a kind of anchor. If all the conditions are right, then a fantastic experience in which one's perception is 'freed' is almost certain to follow.

Of course the opposite also holds true. I suppose that if I had my way then only 'mature' people possessing a 'good heart' and a robustly sound mind free of underlying neuroses would be allowed access to the mushroom. But as that's impractical, a trifle elitist and a rather vague suggestion to boot, then all one can do is provide advice and hope people heed it. Once again, should you choose to seek out the mushroom, then be careful, be cautious, but by all means be good....

To experience the mushroom's visionary effect, one should lie down in silence with eyes closed during the period when the psilocybin is most active. Although this is a decidedly daunting venture, the colourful splendour of psilocybinetic visions and their unmistakable revelational quality makes it all

worthwhile.

If psilocybin mushrooms are consumed on an empty stomach (which is preferable since they are stronger that way and also the act of fasting prior to ingestion becomes, like sexual abstinence, somewhat ritually symbolic), then their effects may be felt within as little as 20 minutes especially if some kind of mushroom brew is consumed (a brew would likely be deemed illegal though since preparing a psilocybin solution constitutes a form of illegitimate processing as does deliberate drying although, of course, if the mushrooms were found naturally in such a dried state due to hot and sunny conditions, or if they 'dried of their own accord', then they are, legally speaking, lawful in certain countries since they have not been deliberately processed).

If consumed after a meal, the effects of psilocybin can take up to an hour to an hour and a half to emerge. In either case, the first changes that one notices are likely to be somatic, in that one might feel a little restless and edgy. This would appear to be the body and psyche's initial reaction to psilocybin, a sort of 're-tuning' process. Most reports suggest that these mild uneasy feelings soon vanish, as one's perception suddenly opens up and one is graced by the stimulating and numinous aura of the mushroom.

It is my firm hope that others will be able to bring back some of the profound insights to be gained from the psilocybin experience in order that a kind of neo-shamanic knowledge base develop. In fact, you might recall that in an earlier chapter I detailed the second wave of human-based psychedelic research. Much of this research has been supported by the Multidisciplinary Association for Psychedelic Studies whose website contains all the latest news about entheogenic research (<http://www.maps.org/>). The other organisation I mentioned - the Heffter Research Institute - can also be located on the net (<http://www.heffter.org/>). Fortunately I am not alone in my avid pursuits it seems. After a socio-politically engendered empirical hiatus of some 30 years, science itself is once more set to face the entheogenic mystery. Perhaps this time around, we shall enjoy the fullest fruits of Nature's most wild and informative side.

I find it curiously apt that an adventure into the nature of reality should end with advice about a wild fungus growing in the natural environment. It really is the case that we must turn to Nature in order to fully comprehend her. This is like a faerie tale in the best of English traditions. If we genuinely wish to gain self-knowledge and realise our ultimate place within Nature's endlessly creative agenda, then we must deliberately seek out and consume the 'truth'. Through a kind of meta-symbolic act we can make contact with the Gaian Mind, an experience that is guaranteed to be educational and memorable. Like

cosmic actors, by performing an age-old ritual act in time and space, we can experience transcendence.

And so I end my enthusiastic tale of natural magic with a call for others with a strong, mature and healthy psyche to join in with the adventure. God's flesh now beckons, affording us communion with the Natural Intelligence of which we are a part. Astonishingly, such a natural intercourse is near at hand, no further away than autumn itself. The choice is wholly yours. Born in the 50's and 60's, the sacred endeavour in which the doors of perception are thrust wide apart is set to blossom over the millennium. Be there.

TO BE CONTINUED UNTIL THE FEELING GOES...

