

Introduction: Sex, Paradox and Existence

This book is about sexual paradox, the nemesis of our pretensions, yet the genesis of our living destinies. It demonstrates that sexual paradox is at the core of all descriptions of reality, lurking in the quantum realm and in the relationship between body and mind as much as in our hormone-steeped bodies and rising pulses. It presents the idea of sexual paradox, not just as an inscrutable icon for the vagaries of sexual intrigue, but a cosmic principle spanning the widest realms, from physics, through biology to our social futures - an ultimate tension between contraries and complements, out of which verdant complexity emerges.

*Without Contraries is no progression. Attraction
and Repulsion, Reason and Energy, Love and
Hate, are necessary to Human existence.*

William Blake - The Marriage of Heaven and Hell

The nature of this paradox is well-portrayed in the Maori creation (Alpers R9), where the primal pair, Papa and Rangi, Earth Mother and Sky Father, are unwillingly pushed apart by the very complexity generated by their primaeva complementation, to let light permeate, enabling their children to multiply, amidst the ramifying prisoners' dilemma of betrayal:

At the beginning of time stood Te Kore, the nothingness - Io.

*Then Rangi the sky, dwelt with Papa tu a nuku the Earth,
and was joined with her, and land was made.*

But their numerous offspring lived in darkness,

for their parents were not yet parted,

Tane mahuta, god and father of the forests

and all things that inhabit them answered

"Let the Sky become a stranger ,

but let the Earth remain close to us as our nursing mother."

Over vast time, the Kauri pushed them apart.

With heavy groans and shrieks of pain, the parents cried

"Why did you do this crime, why did you slay your parents' love?"

Sex and Paradox: Founding Aspects of a Complementary Reality

For all the trappings of civilized society, and our attempts to restrain and civilize it, sex remains forever the chaotic vital force, eclipsing our hearts and capturing our minds, winging on the airwaves in the throbbing beat of rock and roll, ensnaring all, in love's enticements and torments, from our founding creation myths, to our greatest dramatic performances. Its mountains of spice span the great divide between divine comedy and stark tragedy. It is *sine qua non* our universal, mortal, yet fertile condition, celebrated in the seclusion of bedrooms and boudoirs, in the back seats of drive-ins, in thatched huts, behind bushes, in the wilds of nature, and even under the lurid neon of red-light districts.

Although the sexual quest is seemingly a simple act of fertilization in a reproductive dance shared by even the simplest organisms, its consequences for our lives and culture are profound and inescapable. The term 'falling in love' epitomizes the devastating way the psychic power of sexual love lays subterranean claim to our hearts and minds, to our very sense of being, and to our life directions, in the twists of fate our relationships entwine us into. Lubricious sex is the animal force of 'defilement' that religion and conventional morality seek to tame, sometimes through dire punishments, from stoning to infibulation. It is both the ultimate transgression and our liberating fulfillment. Just as sex divides us, so it unites us in our moments of 'splendour in the grass', being both the source of mortality and our vital quest to the ultimate mysteries of existence, with promise of endless regeneration.

This work is not just about sex (p 322), orgasm (p 354), or sacred love (p 453), but the ultimate cosmic paradox, which is itself a sexual paradox. Just as sexuality is at the foundation of our continued biological existence, so sexual paradox is at the foundation of our existen-

tial condition. This emphasis on sexuality at the very root of cosmology might seem a contradiction in terms. Sexual reproduction (p 328) is a recent development in the evolution of higher organisms (p 317), themselves ephemeral and fragile in a universe of annihilating energies, whose origin is far more ancient and mysterious (p 291). Yet it is not just biological reproductive sexuality we are describing here, but cosmic complementarity. The cosmic condition manifests, from its source, as an implicitly sexual paradox - between subjective experience and objective reality, wave and particle, chaos and order, each dependent on the other for their existence, in a way which makes the 'other' both the ultimate genesis and nemesis of each, in the dance out of which climax diversity (p 321) emerges.

The core idea of sexual paradox is an extension of complexity theory (p 492) to deal with the paradox that arises when a division occurs into two domains of order that can neither resolve their outcomes fully by cooperation, nor by conflict. Complexity theory suggests they will achieve optimal complexity in a state of instability in strategic paradox between the two regimes. This is a different form of complexity theory from 'edge of chaos' ideas (p 492) but is very well established in evolutionary game theory and is manifest both in the prisoners' dilemma game matrix (p 13) and the cusp catastrophe (p 14), when neither conflict nor cooperation can be resolved determinately - hence the paradox.

A paradox is "a statement, doctrine or expression seemingly absurd or contrary to common notions or to what would naturally be believed, but in fact really true" (p 436). Thus paradox may be counter-intuitive, but is yet a root truth which remains integral to our condition. By contrast with paradox, a contradiction is to specifically 'speak against'. The contradiction often implied by paradox is implicitly sexually co-antagonistic in that it arises from a logical division between two conditions, true and false, each of which denies the other. But paradox can come in more subtle forms than contradiction. For example the wave and particle aspects of the quantum are not contrary, so much as interdependent. A quantum can manifest only as a wave, or a particle, but not both at the same time. However any attempt to mount a description based on one aspect implicitly involves the other.

Division is itself implicitly sexual (p 436), expressed in the occurrence of sexuality among all 'dividing' life forms, from bacteria (p 323) to higher animals (p 323). Such 'sexual' division is not necessarily into two dyadic classes alone, even with reproductive sexuality. It may include many classes (p 330). In Eden we see it in Eve's cleaving from an 'androgynous' Adam and their ensuing 'concupiscence' (p 200). It may even be simply the primal distinction from the unified 'background' in which the undivided whole - the uncarved block (p 441), or *tohu vohu* (p 484), as primordial feminine is partitioned by masculine 'distinction', in the primeval division of existence, or manifestation. The very act of distinction leads to an endless regress into a plethora of sub-division. By contrast, the undivided whole remains a totipotent matrix for new form, possessing attributes of chaotic entanglement in so far as it resists, or complements, the intrusion of discriminating order:

*I am a tree whose leaves are trees
you are the endless colours of the night
you forever dissolve me, I slice through you
endlessly dividing your eddies of eddies.*

We have two key ways of diverting ourselves from the depths of sexual paradox. On the one hand we cling to an identification with a monadic cosmic 'self', or godhead - an all-encompassing singular identity, providing sanctuary from the uncertainty of the abyss, in a fatherly or motherly creator deity. At another extreme, we seek to dispel all such myths, in a purely physical description of ourselves, as biological machines in a material world, where selfishness and expedience are as real and enticing as any notions of ethics, or altruism. However, mind and body cannot be so easily separated. Our actual relationship with the universe, and with existential reality, is a paradox of complementarity, which is sexual in its very essence.

We can see manifestations of sexual paradox in all the ultimate complementarities. At the

core is the dyad of subjectively conscious mind and an objectively physical organism, sometimes projected into dualities of body and soul, earth and heaven, nature and the divine. From the point of view of objective science, only our brain states are verifiable phenomena, and our subjective experience seems to be merely an internal model of reality constructed by our chemical brains. But our conscious experience is the only direct *veridical* 'data' we have access to. All our knowledge of the physical world comes via our subjective experience, so it appears to have an existential status complementary to the physical universe. This dilemma is also a key to our capacity to take responsibility for our actions, rather than passing them on to a creator deity or a selfish gene. It is this principle of autonomous choice on which law and personal accountability are founded. Despite the ephemeral nature of mind, the root complementation between subjective experience and objective reality implies that our consciousness is also, in some sense, a founding cosmic aspect.

The patriarchal paradigm perceives conscious mind (p 357) as 'indivisible' - above mere particulate matter, in a frank sex reversal between 'particulate' sperm and an 'engulfing' egg, assigning to the feminine as physical an inferior world of mortal 'slime', typified by menstrual taboos (p 191), *maya* or illusion (p 445), Eve's earthly sin (p 202), and Wisdom of Proverbs (p 200) diminished to mere common sense by comparison with the higher realms.

Fundamental to the quantum world of physics we have wave-particle complementarity, which is also the source of quantum uncertainty (p 293). In the dynamical world we have the complementation of order and chaos (p 484), whose mutual interaction has recently been discovered to be key to generating climax complexity (p 492). This is reflected again in thermodynamics, where the equilibrium condition we associate with the inexorable growth of entropy, or disorder, to a maximum does not have to occur in open thermodynamic systems, which exchange energy or material with their environment.

Only then do we come to the conventional evolutionary manifestations of biological sexuality and engendering, with which we are familiar, in our conventional notions of sex as reproduction, and its symmetry-breaking into masculine and feminine genders (p 328). With the advent of the egg and sperm, we see again the shadow of wave and particle aspects in a huge enveloping ovum with its lightning wave of membranous excitation - the cortical reaction, selecting one from a multiple, essentially particulate collection of DNA-bearing sperm.

Although each of these complementarities differ fundamentally in their basis, all share key features of sexual paradox, summarized as follows:

1. **Sexual Division:** Nature, cosmology, biogenesis, evolution, reproduction, consciousness and existential reality all present as dichotomies, rather than mechanisms composed of clearly defined parts, atoms or elements.
2. **Symmetry-Breaking:** The divided aspects are asymmetric, or qualitatively distinct.
3. **Complementarity:** The aspects are mutually complementary. Neither can be eliminated from the process, resulting in a double-bind of mutual interdependence.
4. **Paradox:** Any description based on only one aspect of such a complementarity results in incompleteness, logical paradox, contradiction, conflict, or death.

Only then do we come to the additional features we traditionally associate with biological sex, (5) **genetic recombination**, (6) **fertilization**, and (7) **sexual reproduction**. The result is a sexual prisoners' dilemma (8), from which permanent escape in an outright win is generally impossible, and the best strategy available is co-evolution in strategic paradox (9).

Paradoxes of Fidelity and Deceit in Sexual Evolution

In Section A we develop the central thesis motivating the book, that sexual paradox, is the basis of cultural complexity. Evolution depends on sexuality to generate genetic variety through the vast opportunities for structured mixing and selection resulting from genetic crossing over's almost unlimited capacity to generate new combinations of viable genome

(p 324). Ultimately it is this aspect of sexuality which has made multicellular organisms possible. In this process reproductive sexuality became central to the evolution of higher organisms. While certain organisms can defer reproductive sexuality for a while, sexual genetic exchange of various types is ubiquitous to organisms, from simple bacteria to humans. We find, beginning with a viral form of pan-sexual promiscuity between bacteria (p 323), a new form of complementary sexuality emerged, making an almost endless variety of viable recombinations possible. This began firstly with identical sex cells called isogametes then becoming engendered into a large egg and multiple sperm competing to fertilize it (p 328), representing in molecular terms a subtle expression of the complementary between a single wave-manifesting membranous egg and multiple particulate packets of DNA.

All multi-celled animals depend on this engendered symmetry-broken complementation to be able to evolve the complexity we see across the metazoan realm, and in the development of higher plants as well, but it has come at a cost through a tortuous arms race (p 330). The sperm, and with it all males, have inherited a sneaky smaller investment in reproduction than the egg and with it the massive out-front 'honest' investments female animals and particularly mammals make, in gestation, lactation and child-rearing (p 334). Consequently virtually all males down to the human line have inherited a reproductive strategy of sewing wild oats by many partners, while females have been choosy about whose genes will impregnate their valuable and scarce eggs, thus retaining their own reproductive rights to covert betrayal in the amatory race of love (p 28). The extremes of sexual polarization occur in mammals, where the female has inherited the hugely significant investments of internal gestation of live young, lactation, and early child care, leaving the males more than in any other group, to seek sexual favours as their prime reproductive investment (p 28). Humans in many ways have carried this polarization to it utmost limit (p 88).

This leads us to a unique paradoxical game of fidelity and deceit, which is sometimes referred to as the 'prisoners' dilemma' (p 13), in which each participant is 'tempted' into mutual betrayal because the payoffs of deceit are great enough to make the win-win of mutual cooperation a mere consolation prize, leading to the nemesis of mutual defection. However, in the prisoners' dilemma game, fidelity and betrayal remain founding co-contributors to the complexity arising from the mutual paradox, leading to transgression of orthodox morality in a liberation, in which the outlawed aspects of affair and intrigue are as essential to our evolutionary survival as primal chaos *tohu vohu* is to the 'order' of creation. This makes a paradoxical tale for the morality of sexual commitment, for fidelity and deceit are forever two faces of the one sexual paradox. While fidelity is the 'desired condition', to maintain genetic selection, reproductive choice and hence covert 'deceit', remains essential, inescapable, and central to successful evolution (p 18), with men sewing wild oats and women covertly engaging strange affairs - all in a ground swell of public declarations of at least temporary monogamy (p 80). The prisoners' dilemma in its varied two and many person forms spans a variety of situations rearing their heads in the evolutionary process, the diversity of genetic and ecosystemic life, and in human society. Crowning this foray, we have biological sexuality as we know it, and the paradox of sexual selection, with its extensions into gender and its diverse and contradictory manifestations in human society and culture. Although the genetic process and with it the reproductive strategies of each sex in a given species are partially independent and even in conflict, neither sex can escape the double-bind of mortality in the immortal dance of reproduction.

In the Red Queen hypothesis (p 25), all sexual species are in an irresolvable arms race with their parasites, and each sex with the other, in a permanent state of prisoners' dilemma running while standing still to out adapt and hence survive one another. It is this which has generated the diversity of our immune systems and tissue recognition histocompatibility proteins. Sex has evolved to be not only a quintessential expression of the prisoners' dilemma in genetics, but permeating our very molecular architecture, our reproductive

immortality and all our displays of culture, society and politics both revered and tabooed. This dyadic sexual relation extends to other more complex forms of the prisoners' dilemma in ecosystemic relationships (p 15), to climax diversity and to all evolutionarily stable strategies of inescapable coexistence in survival in the biosphere. It also extends to many ways in which this delicate paradoxical relationship breaks down, in 'tragedy of the commons' (p 15), rape of the planet (p 407), the boom and bust (p 408) so characteristic of unmediated male reproductive investment, and many other forms of dominion and oppression.

All's Fair in Love and War

Despite male pretensions to charismatic 'sexual conquest' of the female, mesmerized by the turgid charms of an all too unpredictable member, and the hopefully not too premature heights of thrusting climax, a careful look at female orgasm leads to some very stark and dangerous conclusions - that despite some women having a tamer, or equivocal experience in our male-dominated culture, women's sexual energies are, to quote Mary Sherfey: "insatiable even in the face of the highest degree of sexual satiation". Energies that ride wild over the most hopeful pretensions to 'conquest' any male can assume. A woman's endowment of clitoral, G-spot, and uterine orgasms (p 354), amid a propensity for multiple, repeated, or continual climax, all in a context of beguiling sexual privacy (p 71) amid almost permanent sexual receptiveness, ever-so-inscrutably coloured by subtle hormonal shifts at ovulation towards sexual adventure, launch female eros into a sustained stratospheric territory, which no man alone can lay claim to, nor be sure of sustaining, in his 'own right'.

In our primate relatives, including bonobos (p 64) and chimps (p 61), female sexual incitement, particularly during estrus, (which ironically means 'gadfly') is at peak time of fertility, a play for the best male genes available, and to either side of the peak, a more general all-comers insurance that as many males as possible will be inveigled into the 'paternity net' and will thus be encouraged to support, rather than injure or kill, the ensuing offspring. No male can thus be sure he is not 'the father of the child' and will be drawn into protecting more offspring than his own and refraining from eliminating small competitors, as males are want to do, as harbingers of hunting and death as opposed to gathering, birth and life. On the side, out of sight of others, there are also covert matings with an undisclosed partner 'on safari'. A degree of 'infidelity' is also essential to optimize a female's mating with a male with complementary histocompatibility and thus superior disease resistance. Ape females also solicit sex when they are not ovulating, for socially 'manipulative' reasons, which run from such maternity insurance to heterosexual, or lesbian erotic 'love' - social bonding, easing competition, even at the sight of food.

In one short sentence - female sexual ecstasy serves to strategically **reduce paternity certainty** (p 81), just as male ejaculation serves to increase it, consistent with sexual paradox.

The advent of pair-bonding in humans has overlaid a more 'partnered' theme to this open sport, with the female's almost perpetual sexual receptiveness, enticingly curvaceous form, concealed ovulation, sexual privacy and hormonal 'incitement' during ovulation - otherwise known as 'female reproductive inscrutability' - only adding to the intrigue. Our most central and basic social mental faculties are consequently to do with detecting cheating and betrayal, with sex at the emotional centre of the cyclone. Biologists are frank that 'monogamy' as they use the term is not equatable with genetic or sexual fidelity, but social bonding, for increased reproductive gain and that females in monogamous species also do 'time on the side' with the best studs they can find, as genetic testing has confirmed human females do to a similar degree. Seventy percent of married women over 35 admit to marital infidelity in the US, confirming that this astute and inscrutable pattern continues. Hence all the archaic manifestations of male jealousy and violence, which even in socially monogamous prairie voles, with all their oxytocin and vasopressin bonding, still cause males to become aggressive and suspicious of other males the moment they have sexually 'bonded' with a female.

Given that small, exclusive female territories, amid female reproductive competition (p 32), rather than all-embracing sisterly love is the best indicator of mammalian and primate monogamy, rather than paternal parental resourcing as in birds, we have an interesting paradox. Female espousal of monogamy thus looks as much the 'two-faced' resourcing gambit, albeit for genuine reproductive investment, as is men claiming 'their' women as patrilineal 'property' in our human version of mate guarding, while also sewing wild oats far and wide. The only situations where we find what we might call loosely egalitarian female coalitions are in the decidedly bisexual bonobo, where females make love passionately together in *hoka-hoka* (p 64) and spend seven times as much time together as with males, and in baboons and monkeys a single matriline's kin altruistic affinities.

The clitoris is no dependable organ of biological fertility, like the penis, but a fickle and yet precocious discriminator of male attention - the intimate diviner of genuine indicators of fitness (p 81). The impetuous nature of female orgasm, inaccessible as an enclosed garden one minute, and an overflowing chalice the next, does not serve well the monotonous security of monogamous pair-bonding, but the intrigue, thrill and the novelty of the chase, the young buck, fine as an apple tree in the orchard, seduced by 'fatal attraction', amid our all too brief fallings in love, ephemeral as a spring breeze, incessant as the eternal triangle.

Mortal Fear and Violent Oppression

As discussed in Section B, given this perilous heritage, it is no wonder the patriarchy fears female sexuality like primal chaos, and attempts to anathematize it, to cauterize it, to cut it out, by circumcision (p 276), subincision (p 164) and infibulation (p 277), or to bottle it up in chastity belts, or hide it, by sequestering and veiling (p 194), in burkas and chadors (p 269), in closed rooms with high windows, and every form of control and repression, from stoning (p 262), to drowning (p 184), to burning alive (p 285) and throwing acid in the face of the beloved, or in more 'sexually liberated' times to tame it into a milder subservient domesticity, exciting but not too much so, with nubile pornographic appeal on the side.

Our creation myths and religious imperatives are disguised attempts by diverse peoples to mark out the boundaries of sexual transgression between women and men, rather than the innocent creation and ordering of the universe they pretend. Deities, from Yahweh condemning Eve's lubricity (p 202) decreeing her husband 'shall rule over her'; through the incestuous enticement of the Sun by Venus (p 155), highlighting the intoxicating nature of female sexuality at the root of sexual antagonism among the Amazon's 'fierce people' (p 155); to the excoriating Dogon primal conflict of sexual energies between God and Mother Earth (p 132), resulting in female circumcision (p 276), are all projections of central male sexual and reproductive anxieties, and stratagems of male control over female sexuality.

A quick look at the few existing matrilineal, quasi-matrilineal societies such as the Canela (p 162) attests precisely to this theme. Here, women are expected to share their sexual favours as widely as possible, just as chimps and bonobos do, until they become pregnant and settle into the matriarchal network of motherhood and the familial ties of child rearing. Marriage is only a token in partnership to ensure paternal care of any infant a woman gives birth to. The role of the father is secondary to the mother's maternal uncles, and males are expected to show no jealousy over their 'wives' affairs. Men are expected to be 'forbearing' and women abide no conventions of emotional control.

This is a close parallel to the *beena* marriage of the Old Testament (p 181), which Jacob rejected in leaving Laban's fold with Rachel and Leah. Conflicts over such sexual motifs are reflected in Lilith's mythical refusal to lie under Adam, rising up to the wild heavens in her own ecstasy (p 203); the whoring ways of the Queen of Heaven (p 207); the fertility rites, on every high hill and under every green tree; and the strange woman of Proverbs, her lips dripping with honey comb, but her ways going right down to Sheol (p 203).

At the opposite extreme, the polygynous, patrilocal, patrilineal Dogon summarily chop the clitorises off their women folk (p 131) so they, won't be led to stray into surreptitious affairs by their all-to-precocious genitals. They confine them to menstrual huts in full view of the men's houses (p 130), so that the men folk in the village can readily observe just who is going to be ready to be fertilized by their reproductive 'owners' and when they can best achieve it, threatening them with cosmological calamity if they break the rule.

Similarly, throughout the central arenas of our cultural emergence (Lerner), from Sumeria and Egypt, through Babylon (p 188), Assyria (p 193), Greece (p 195), Rome, Israel, Vedantic India (p 279), Islamic Arabia (p 255) and Confucian China (p 198), a consistent theme of patriarchal dominion amid confinement of women and fear and repression of their sexual nature, the abduction and capture of women (p 187) and their exploitation as slave concubines (p 188), their assignment to marriages, nunneries and brothels, along with male rights of exclusive patriline (p 189), primogeniture, and paterfamilias (p 198) often in the name of patriarchal religions, has led to a distorted, violent and unstable cultural paradigm. These diverse sources confirm our worst fears: The sex wars are the foundation of our entire human social and cultural edifice.

Sexuality in Biology and Complementarity in the Physical Universe

In Section C, we investigate in full detail the most complete expressions of complementarity, in the complex entwining of the sexes in biology, as already noted many times in this introduction. We explore the genetic, hormonal, and developmental aspects of biological sexuality, the counterpoint of male and female investments in the symmetry-broken egg and sperm (p 328), X and Y chromosomes (p 334), genetic imprinting, hormonal influences (p 341) and developmental pathways of the sex cells (p 348), the emergence of gonads and external sex organs (p 351). We then investigate the entwined manifestations of sexuality in the brain (p 367), in terms of emotions (p 368) and hormones (p 373), sexual orientation (p 375) and the gatherer-hunter cortex (p 380).

Section D shows in detail how complementarity becomes central in quantum cosmology, and how biology takes us more deeply into sexual paradox than ever before in the scientific description of the universe and nature. Quantum reality (p 291) is founded on *wave-particle complementarity*. All quanta display wave and particle aspects in a way which comes in a sexual paradox - we cannot measure both these properties at the same time. This complementarity is central to the distinction between the quantum and classical world. Every quantum manifests either as a wave or as a particle at a given time but never both at once. We experience the colour of light, interference patterns, lasers and holograms from its wave properties, but depend on its particle properties both to generate light and to perceive it or capture it on film or tape, and to exist in a molecular world of electromagnetic bonding. Any description in terms of either wave or particle aspect comes with an implicit use of the complementary aspect in the process. Neither can be fully eliminated in the physical description. The *uncertainty* intrinsic to all quantum phenomena (p 293) is a direct consequence of the indeterminacy of the particle within the extensive wave function which determines only probabilities.

Wave-particle complementarity is succeeded by an almost endless procession of ensuing dyadic sexual complementarities. Space and time have complementary roles, along with energy and momentum. All quanta are divided into two complementary types. The integer-spin *bosons* (p 304), such as photons, constitute all forms of radiation and mediate the forces of nature. The *fermions*, such as electrons and protons, with half-integer spin, can co-exist in one wave function only as opposed pairs and thus constitute incompressible matter. In supersymmetry, there is one *boson* for each type of *fermion*, although they appear quite different in the everyday world. We also have binary divisions between the emitter and absorber of an exchanged particle, and between the virtual and real particles (p 298) that

mediate forces and radiation. We finally have a complementarity between the *advanced* and *retarded* solutions of special relativity travelling in forward and backward directions in time. Many other manifestations of sexual paradox and complementarity occur in quantum *entanglement* (p 298) and in the match-making handshaking between emitters and absorbers in the *transactional* interpretation (p 301), like a chain of entwined scarves pulled endlessly out of a magicians top hat. .

In the realm of dynamics, the complementation of chaos and order is also critical (p 484). Chaos is found to be essential to the genesis of new order and to contain within it complex fractal structures (p 486) rather than simple randomness. Virtually all complex systems in nature either occur at the edge of chaos (p 492), or as a result of transitions between chaos and order. In thermodynamics, open systems, which exchange energy or material with their environment, the equilibrium condition we associate with the growth of entropy to maximum disorder does not have to occur. The most outstanding example of this is the growth of complexity of the biosphere as a 'negentropic' far from equilibrium open system, whose entropy is decreasing and complexity increasing (except in periods of mass extinction) through the photosynthetic fixing of incident solar radiation to induce chemical reactions.

We now understand the universe, and with it time and space, appear to have had a common 'origin' in the 'big bang' some twelve billion years ago (p 291). Many aspects of this origin display sexual paradox at work. In the inflationary model (p 304), the universe appears to have emerged from its own wave function as a quantum fluctuation. Trapped in an artificial low energy false vacuum, it expanded exponentially until a profound *symmetry-breaking* occurred, resulting in the highly engendered asymmetric forces of nature we experience today. Gravity then became attractive and the complex interactional process which gave rise to galaxies, stars and planets began. Throughout this process, wave-particle complementarity and interaction between order and chaotic processes have molded the shape of cosmic evolution to the planetary context in which we find life.

The establishment of life leads to a second type of interactive process, at 'the edge of chaos' in which selection and mutation give rise to endless transformations of new living form. Like the individual particles and wave amplitudes of the quantum realm, evolution is a partly ordered process molded by natural or sexual selection, and partly an intermittent discrete, seemingly random mutational process. Single mutations function like single particles reflecting quantum uncertainty, while selection operates as the superposition of many particles, reinforcing many mutations along consistent avenues. Evolution is thus a phenomenon which is not fully classical and displays quantum paradoxes in action. This is reflected in the contrast between key developments like the camera eye, which results from a continuous invagination and idiosyncratic molecules produced only by one or a few species (p 318).

Cultural Visions of Sexual Complementarity and Fusion

The appendix, investigates cultural traditions in which complementarity is implicit in the cosmology. One of the best known is the Tantric cosmic origin (p 444). Unlike the patriarchal idea of a beneficent Vishnu dreaming the universe as a lotus emerging from his navel, the Tantric origin begins in intimate conjugal embrace between two complementary manifestations, Shiva as eternal, subjective, cosmic consciousness, and Shakti, the dynamic feminine force, which motivates the universe, and all material phenomena, in time. Although she is sometimes depicted as a mere projection of the male cosmic Self (p 451), an Eve emerging from Adam's rib (p 201) in a Brahmanic patriarchal twist, Shakti's origins lie in the untamed powers of the black planter goddess Kali, creatrix and destructress of time, whose roots, are far more ancient, lying at the source of the pre-Vedic Indus valley civilizations, whose images also spawn Shiva in yogic posture, as Lord of the Animals, (p 449) a gatherer-hunter name he still bears at Pashupatinath, among the burning ghats of Katmandu.

The Tantric origin begins in a state of deep coital fusion - an annihilating ecstasy of cosmic

union (p 449). Then, as the complements step back from this conjugal communion, subjective mind becomes distinct from and complementary to the objective phenomena of the physical universe. Mind becomes aware of itself, freeing Shiva from passive inertness, and Shakti dances the dance of maya or illusion, in which the unity embracing self and world becomes endlessly divided and multiplied into the full complexity of all natural manifestations and we each become fragmented into separate conscious selves. This is portrayed as a love dance, spawning and eventually destroying the worlds. Once again the patriarchal will to order attempts to assert dominance in the form of mind being finer than the gross nature of matter, but the message is clear - climax diversity and the magical complexity of the sentient universe arises from sexual paradox between two cosmic aspects acting in complementary relationship, to evoke the dance of life's abundance.

The Chinese philosophy of the *Tao*, or 'way' of nature (p 437) brings to the surface other aspects of this fundamental cosmic sexual paradox, perceiving all natural phenomena as arising from the mutual interaction of two cosmic principles, *yin*, a receptive dark, fecund, principle identified as feminine and *yang* a shining, active creative principle identified as masculine. Each also contains the germ of the 'other'. Again here however there is an ancient deference to the feminine as the mother, matrix of time, beyond being and non-being, source of all natural diversity in the uncarved block. The Tao teaches that the universe is a product of impersonal forces and that the role of humanity is to keep the balance in nature. It is in the sexual relationship and its consequences that we engage in a participatory process of taking responsibility for the future of life, having already assumed the capacity for annihilation. Taoistic thought invokes continual transformation and change and decries any attempt to hierarchically organize or analyze into ordered categories, as flawed in this cosmology of flowing interdependence (p 438). Pivotal to Taoist philosophy is the notion of chaos as a primal progenitor of natural form and diversity, manifest in vibration, in eddies, in streaming clouds, the gnarled shapes of trees and fungi and the forms of naturally eroded objects. It notes that chance, life and consciousness are three common manifestations of the Tao, identifying uncertainty, life and consciousness as a fundamental part of the creative process. Central here is the idea that in transformation nothing repeats itself, despite the immense totality of this transformation being itself an invariant. In the I Ching oracle (p 442), the *yin-yang* division is multiplied into 256 x 256 archetypal transformations, representing the diversity of existential conditions.

Such dyadic creation myths span many cultures, from Sumeria, to the 'Elohistic origin of Genesis 1, male and female in 'Our' likeness (p 200) and the Maori creation myth (p 1). We can see these ultimate complementarities in the source Judeo-Christian tradition in the creation out of chaos, or *tohu vohu*, 'without form or void' like the 'nothingness' of *lo* (p 1). We again have the idea of god in the plural as 'Elohim, with humanity female and male in *their* likeness, implying both a feminine and masculine presence, confirmed in the exhortations of Hochmah, or Wisdom, in the proverbs:

*The Lord possessed me in the beginning of his way, before his works of old.
I was set up from everlasting, from the beginning, or ever the earth was.*

This motif continues in the complementarity between the tree of life in the centre of Eden (p 201) and the binary division of the tree of knowledge of good and evil, whose two realities together would make us even 'as god' - forming a complementarity between life-giving synthesis and an analytical knowledge, whose supremacy in dominion has led inexorably to our Fall from paradise. A complementation as fundamental as the binary division between a pregnant, vaginal, encircling 0 and a discriminating, divisive, penile 1 (p 475).

Unraveling the Gordian Knot

Section E deals with the planetary consequences. What do we do about the violent consequences of breakdown of sexual paradox? Exert some form of social control? This is exactly

what the patriarchs have done to women, violently to the occlusion of feminine nature, the detriment of human nature, and our future viability, resulting in multiple, repeated and continual warfare, genocide, apocalypse, mutually-assured nuclear (p 415), chemical and biological destruction, overpopulation (p 408), the rape of the Earth (p 407) and the entire diversity of life (p 411), climatic crisis (p 413), and boom and bust economies with no long-term stability of future (p 417), all in the spermatogenic (p 407), venture-risk, winner-take-all, competitive paradigm of the patriarchal imperative. However, real or repressed sexual conflict is neither inevitable, nor is it a fatal flaw in the human species. The complexity of human culture appears to have emerged from the creative amatory race sexual selection induces in a state of sexual paradox (p 52). Our founding genetic and cultural archetypes in the Bushmen and Pygmy Forest Peoples, such as the !Kung (p 99), Sandawe (p 111), Biaka (p 120) and Mbuti (p 115) exist in a state much closer to sexual paradox and egalitarian cooperation between the sexes than many more 'highly evolved' societies. Our gatherer-hunter origins are a manifestation of an interdependence, despite differing sexual strategies, coinciding with the deepest in female and male nature, in the resourcing of life's continuity in motherhood, and the death culling performed by the all-too-mortal male hunter-warrior.

Those anthropologists, sociologists and cultural feminists who assert the human psyche is a 'blank slate' (p 39) which has left behind its biological origins need to take into account the deleterious consequences of the patriarchal cultural adventure, when cultural prerogatives are imposed in denial, or even in affirmation, of our sexual sociobiology, particularly when applied to the role of mothering, so critical for human survival (p 33). Our genetic nature is not deterministic and remains adaptive both to individual emotional and intellectual responses and to social and cultural forces. However society and culture prosper and ultimately survive only in constructive relationship with our biological nature, not in spite of it, or imposed upon it. Rather than psychological pathology, fear of the power of female life-giving (p 170), testosterone poisoning (p 373), or the consequences of a fundamentally violent species (p 45), the rise of patriarchy appears to be a natural product of primate sociobiology, and the gatherer-hunter division of labour, driven into male dominance by many factors - inter-group conflict by male coalitions (p 44), the need for intra-group moral cohesiveness in response, resulting social stress and resource uncertainty (p 136), paternity uncertainty, and the rise of urban class and property with large-scale agriculture (p 168).

Sexual complementarity cannot be unraveled overnight and may be integral to the cosmic design. Subjective mind and physical reality present as inextricable complements (p 357) as do wave and particle (p 293). The relationship between our sexes is as polarized as the primarily-broken symmetry of the universe, let alone that between a single enveloping ovum, ripe with cytoplasmic fecundity, and the myriads of particulate sperm competing to fertilize it, only to be capriciously chosen by the shock 'neurological' awakening of the egg's cortical reaction (p 331). Failing to understand the depth of this relationship between the sexes is the root ignorance that has caused war and genocide and could bring our utopian pretensions in the genetic age crashing down, if we fail to recognize our ancient, immortal reproductive quest in sexuality and depend only on cultural fantasies and technological fixes.

IVF techniques (p 388), which already include direct injection of immature sperm nuclei incapable of fertilization into the egg (p 393), conserve deleterious mutations perpetuating and amplifying infertility in the human population. Sperm counts have been falling (p 394), partly as a result of the feminization of nature from industrial estrogen contamination (p 396), putting further pressure on this technology. Experiments are under way to see if a human embryo can be engineered from two sperm nuclei and an enucleate egg (p 396), or from two egg nuclei to satisfy the cultural desire of homosexuals of both sexes to have offspring who are children of both partners (p 398). These techniques could render sexual fertility obsolete. Massive over use of Caesarian delivery (p 388) also has the potential to make natural birth unviable by removing natural selection at a principal point of difficulty in

human evolution. Contraceptive techniques, while essential to control a burgeoning population and provide sexual freedom of choice, particularly for women, have divorced our sexuality from the reproductive quest, cutting sexuality off from its biological motivation in fertility. Consequently extreme cultural imbalances are developing in the reproduction rate. While paternity testing and the sexing of unborn infants provides valuable information to and about parents, it is both exposing our innate sexual strategies, and potentially exacerbating existing trends to cull offspring of one sex or another for cultural or personal reasons.

At the same time there are pressures to engineer the germ line (p 402) to remove genes for deleterious conditions, or undesirable characteristics, with neither a clear idea of the evolutionary implications nor the ethical implications. Proposals are afoot to begin across the board IVF combined with genetic testing as an avenue of choice for all births to screen for and avoid a variety of genetic defects (p 391). In such a brave new world scenario we know neither how interactive this process may be nor what grotesque directions runaway cultural and sentimental interference in our genetic identity could become. Both sickle cell and cystic fibrosis which many would love to eliminate confer disease resistance in heterozygous form against malaria and typhoid respectively two major world killers. The consequence of these changes for sexuality and our reproductive future are profound and can't be properly understood and debated while, despite our apparent sophistication, we remain naively in a state of cultural and personal denial about our sexual and sociobiological roots. We risk circumcising - lobotomizing, the very paradox of nature at the root of maleness and femaleness and life itself, and with it our evolutionary sustainability as a species.

Our two natures carry, hidden within their diversity, not only our sex wars, but imprints of ancient genetic wars of attrition, including cytoplasmic incompatibility between isogametes (p 329), which first consumed the cytoplasm of one sex to form the sperm, causing the male to become the 'sneaky' low-investment sex (p 334) and which carry with them all the tangled history of life between. A history of mutual genetic pot-shots that have molded our X and Y-chromosomes (p 334) and sometimes attack one sex or another with infertility or death (p 330), in a mutual, perilously unstable arms race of sexually-antagonistic coevolution (p 16). A genetic struggle between male genes which would force the female to invest all her reproductive energy immediately in his offspring, expressed in the invasiveness of the placenta itself. The female's resistance to this is also indelibly marked in our genome, in a precarious 'balance' between opposing male and female forces, in genetic imprinting which may govern the development of our emotional and intellectual brains (p 339), and can cause pathological conditions, or fetal abnormalities, when either opposing influence is disrupted.

The gender polarization of internally fertilizing (p 328), gestating, lactating mammals (p 28), where sexual and parental investment is as one-sided as it can be, has evolved to an even more radical extreme in the full-blown 'travail' and voluptuous pregnancy of the human female (p 88), with her pendulous sequelae in lactation, and her unique dilemmas of maternal care amid ambivalence (p 33) at such a huge investment in time, effort and resources in the face of fluctuating male support. Women have solved this dilemma, both in partnership with males, and in allo-parenting (p 84) with older daughters, post-menopausal grandmothers, female friends and others, in cooperative familial and tribal networks. We thus cannot expect to reduce this tangled tale to a convenient androgynous erotic simplicity, devoid of reproductive meaning. The only viable answer is to accept and reflower the paradox of sexuality for what it is - the sweetest yet most devastating prisoners' dilemma of immortality, fertilized between mortal sexual beings, where we will always, like the Red Queen (p 25), be running while standing almost still, treading water while putting the very best of our creative potential into a seemingly unwinnable race of culture, art, music, and the music of love and lust - not 'against the opposite sex', but 'with the complementary one'.

Males need to learn to accept the rewards that come from flying like a moth into the flame of female sexual desire, revering the tokens of menarche as sacred, and as good husbands, rest-

ing content if some four out of every five offspring sired by our 'ever so faithful' partner are our own progeny, accepting in love those that may not be, while sewing the wild oats we can, as the male sex has striven to do since time immemorial, just as serial monogamy has indeed become a form of 'moderate' polygyny in the US, due to differences in remarriage and subsequent fertility rates between divorced, or separated men and women. Until we bring our two natures together, life, and human society, even the biosphere, raped and exploited, will remain forever in the valley of the shadow of death, that great shadowy vagina that swallowed Maui when the fantail cried out, which all men fear, but which is also the source of life renewed. Our two orgasms, one 'a mere shot in the dark', and the other 'the perfect wave', contain an oracle - the unveiling, the key, the coda, the tattoo and taboo, the nemesis and genesis, the song of songs, the belonging and the longing, and the future destiny of our immortally entwined human sexes. The emergence of cultural complexity appears to be a result of human evolution in a condition of reproductive sexual paradox in which neither sex has had the upper hand, driven by sexual selection and displays of cultural prowess as genuine indicators of fitness. This selection involved both sexes in mutual mate choice but predominantly through the female reproductive choice common to many species despite attempts by males to preempt this through male competition and domination.

Ultimately we come back to the conscious mind and to the balance between the analytical thought often prized by men and 'feminine' intuition - between empathy and analysis and the paradoxes of how 'eureka' can emerge from the neurodynamic chaos of an unsolved problem. We are thus brought back to square one, coming now from the 'feminine' side of physical nature, looking at consciousness as an 'internal model of reality' made by the brain - potentially a mere illusion of matter, thus counterbalancing the mind-sky emphasis on primal cosmic mind of and the philosophy of the primacy of 'self' and 'soul' and again right into the abyss of cosmic sexual paradox. Here the problem lies, waiting for our apocalyptic unveiling to reveal all, no longer as through a glass darkly, but face to face - in the 'naked awareness' of sexual paradox itself. Thus we come to the present context and find ourselves as sentient conscious beings inhabiting a biological genetic organism, with a sappy biochemical brain, whose electrochemical excitations evoke the most puzzling unsolved mystery of modern science, that of subjective conscious experience and the enigma of free-will. Although materialistic views of science have endeavoured to finesse consciousness away as an epiphenomenon and free-will as an illusion, the development of consciousness research attests to the fact that subjective consciousness remains a founding phenomenon lying qualitatively outside the confines of objective description. Although mind states can be correlated with brain states they are qualitatively so different that we are brought full circle to the question "Is subjective consciousness a complementary manifestation to all objective phenomena, as fundamental as the cosmic origin itself?"

Although human culture appears to have flowered through runaway aspects of sexual paradox in human evolutionary origins among gatherer-hunter clans, a male reaction has subsequently occurred from the earliest foundings of Jericho and Sumeria with the growth of militarized urban societies, through the great civilization of the East and West to the present day against sexual paradox, and its implicit paternity uncertainty. Patriarchal human cultures have endeavoured since to assert paradigms of order over these primal contradictions. A continuing trend throughout our cultural history has been for the climax diversity of sexual paradox to become undermined, or made degenerate, by patterns of male sexual domination, which lead to breakdown of the complexity and verdant instability, into ordered patterns of control, and often of repression, violence, and genocide which lead to planetary rape and exploitation and compromise the living genesis and emergence in complexity sexual paradox evokes. We shall thus explore, along with sexual paradox itself, all the many ways in which its breakdown leads to double jeopardy and how sexual paradox is a koan and oracle for our social transformation to a sustainable society.