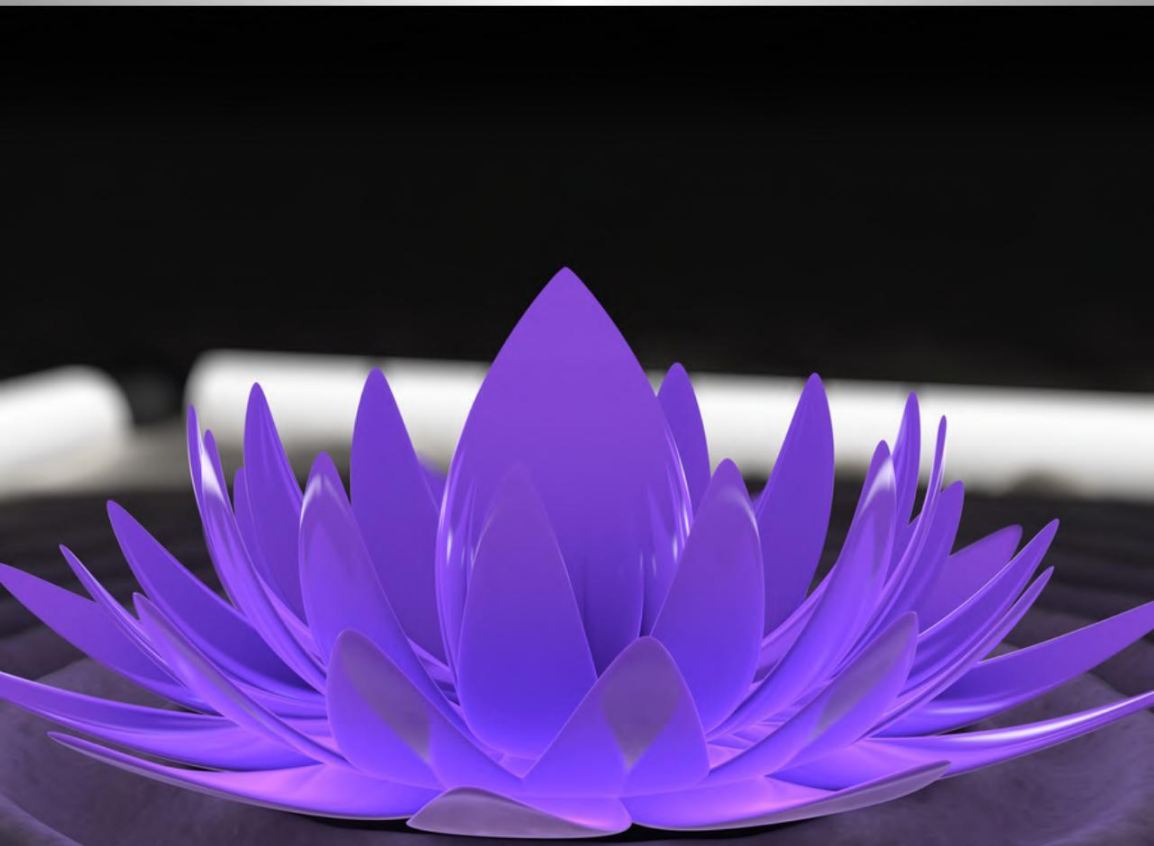
Soul Search

A Scientist Explores the Afterlife



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Introduction: The End

The event of death is always astounding; our philosophy never reaches, never possesses it; we are always at the beginning of our catechism; always the definition yet to be made. What is death?

– Ralph Waldo Emerson

What happens when we die? Does everything we are just stop? Is consciousness lost forever? Or does some vital spark inside us, a spirit or a soul, live on?

We find it almost impossible to think about not having a mind, of our awareness being snuffed out like a candle. Yet the stark fact is that within a century or so, everyone alive today – all six billion of us – will be dead. Nothing in life is more certain. Sooner or later, whatever we do, whatever we achieve, our physical remains will be rotting in the ground or have been burned to ashes. Or perhaps like Einstein's brain, blanched bits of us will be languishing in formaldehyde, pickled for prosperity and science.

We look around for comfort. But the message from the front line of brain research could hardly be more bleak. We should not build up any hope, it tells us, of being able to carry on after death. The brain too obviously plays a master role in making us what we are. When its workings are impaired, by drink, drugs, or disease, "we" alter too. And when the higher centers of the brain are completely put out of action, by a knock on the head or general anesthesia, our whole inner self seems temporarily to wink out. During life, our memories, personality, and awareness seem to depend crucially on the state of that bizarre, tofu-like mass between our ears. Why, then, should we kid ourselves? What is the point of holding out hope of being able to think and remain conscious when the brain is dead, if we can't even do it in the depths of sleep?

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Humans are the only creatures on earth that know they are going to die. But that foreknowledge has come fairly recently and it flies in the face of four billion years of evolution. Those eons have genetically conditioned us to do all we can to preserve ourselves and our kin. The result is that we are caught in a dilemma. We are programmed to survive by our genes yet made painfully aware of our mortality by our forward-looking brain. If we admit that death is inevitable, then our will to survive may be fatally weakened. On the other hand, if we deny death, we have to turn a blind eye to a patent fact of the real world.

Only one avenue of escape is possible – belief in an afterlife. With this we can face the nightmare that death poses to the rational mind.

Cults to do with souls and immortality have cropped up everywhere in human time and space. As far back as Neolithic times and possibly earlier, men put faith in the survival of the spirit beyond death. Archaeologists have found that early men buried food and weapons with their dead comrades to equip them for the life to come. In caves in Israel, Neanderthal remains up to 100,000 years old have been unearthed amid evidence of ritual burial. These include the skeleton of a 13-year-old boy found in a cavity cut into the rock at Qafzeh. The boy's body had been laid on its back with the skull resting on the grave's wall. His hands were facing upward. Across the hands and upper chest had been carefully placed the antler of a fallow deer. In the Shandir cave in the mountains of Iraq, a male skeleton was found lying on its side. Lining the grave were traces of ritually scattered flower petals.

From prehistory to the present day, we have countered the brevity of earthly life with the dream of eternity. Great systems of religion have sprung up to serve as focal points for our faith. But today, these traditional teachings and our cherished belief in an afterlife – what Sigmund Freud called the "oldest, strongest, and most insistent wish of mankind" – are under threat. Gods and souls seem out of place in the sterile, machinelike universe shown to us by science.

As the taproot belief in our spiritual nature withers, so we go to increasing lengths to deny or fictionalize death. Death has replaced sex as the big taboo. Even mentioning it is tantamount to bad taste, and when it strikes close to home we treat it as an outrage. The loved one was "struck down," we say, as if it were somehow unnatural to die. Freud pointed out that when a death occurs, "Our habit is to lay stress on the fortuitous causation of death – accident, disease, infection, advanced age; in this way we betray an effort to reduce death from a necessity to a chance event."

We distance ourselves from death by institutionalizing it. Whereas in earlier times most people spent their last days at home in the bosom of family and friends, today four-fifths of us are removed to hospitals or nursing homes. We are hidden from the gaze of the young and healthy and tended to by strangers. As the end approaches, we are discreetly moved to wards for the terminally ill and plugged into life-support machines. Technology takes over. And when we do eventually die, it is often the inadequacy of the equipment or the shortcomings of the treatment that are blamed.

Instead of accepting death as a natural and inevitable fact of life, we are in danger of convincing ourselves that, given further medical advances, we shall be able to stave it off for as long as we like. "Some people want to achieve immortality through their works or their descendants," said Woody Allen. "I want to achieve it through not dying." Now, for the first time, science seems to be holding out the slender hope of cheating death. Already, some of our vital parts can be replaced with natural or synthetic substitutes. In time, it seems, the transplant surgeon will be able to do for a human being what any competent mechanic in a well-equipped garage can do for a car.

On a different front, the search is on for ways to slow or halt the steady degeneration of our bodies. Immortality without death beckons. Perhaps over the next century, we are told, genuine elixirs of life will be freely available in drugstores as vitamin pills are today. Then the old alchemists' dream will have come true and, along with our weekly groceries, we will bring home the means to slow or even reverse our aging processes.

Some of us may not live long enough to benefit from such advances. But no matter. For a price, we can arrange to have our still-fresh remains deeply frozen – our whole body, or merely our head (a "neuro"), stored like a pickle in liquid nitrogen – to await the glorious day when technology may be able to restore is to life. How desperate can we get? British biologists Peter and Jean Medawar echoed what must be the thoughts of most rationally minded folk: "In our opinion, money invested to preserve human life in the deep freeze is money wasted, the sums involved being large enough to fulfill a punitive function as a self-imposed fine for gullibility and vanity."

Danger signs are looming; we are becoming increasingly obsessed with clinging to life, avoiding death, at any cost. And not just our dignity is at stake. We have lost touch with the natural world and our spiritual roots. No longer is there a sense of participation in the living cycle, the renewing, regenerative sequence of life-to-death-to-life. Western man has wandered into a spiritual desert where traditions of intimacy with nature, the final rite of passage, and the belief in an eternal life have all but been forgotten.

* * *

We fear death for many reasons. We fear the possibility of pain because we see it in the faces of others, the agony and angst of terminal cancer. We fear death's unpredictability, its awesome power to bring an instant end to everything we have lived and worked for. We fear the death of our loved ones – parents, spouses, and children. But above all we fear the loss of ourselves.

In the words of Sogyal Rinpoche, one of today's leading exponents of Tibetan Buddhism:

> *[O]ur instinctive desire is to live and to go on living, and death is a savage end to everything we hold familiar. We feel that when it comes we will be plunged into something quite unknown, or become someone totally different. We imagine we will find ourselves lost and bewildered, in surroundings that are terrifyingly unfamiliar. We imagine it will be like waking up alone, in a torment of anxiety, in a foreign country, with no knowledge of the land or language, no money, no contacts, no passport, no friends...*

As much as we believe anything, we believe that we have a unique, personal "self," an inner "I," that must be preserved at all cost. But if we dare to look deeply into this being, we find it is made up of no more than baggage picked up along life's way: a name tag, a character and biography shaped by our dealings with other people, memories of past events, possessions, family and friends, a hometown and everything else we have chanced across and claimed as "our own." These are the fragile props on which we depend and to which we desperately cling. Death is feared because it means a certain end to them all and, therefore, to the person we mistook them for. Sogyal Rinpoche points out: "We live under an assumed identity, in a neurotic fairy tale world with no more reality than the Mock Turtle in *Alice in Wonderland*. Hypnotized by the thrill of building, we have raised the houses of our lives on sand. This world can seem marvelously convincing until death collapses the illusion and evicts us from our hiding place."

"You can't take it with you," the saying goes." No, but you can't take "you" with you, either. And that is the prime source of our death fear.

* * *

What, then, can we hope for after death? Nothing – absolutely nothing – if we believe what many scientists say. All life, they argue, can be understood in terms of chemical reactions. Every event, all the wonders of nature, can be explained by the accidental bumping and jiggling of particles. The brain *is* the mind. Why trouble to speculate further about an immaterial soul or afterlife?

We have come to respect the judgment of scientists on almost every issue because science works so well. It makes progress. It tells us in greater and greater detail how atoms behave or the universe has evolved. It gives us a privileged glimpse at the mathematical script that nature follows. And, most visible to the ordinary person, it leads to all kinds of technological marvels that have transformed our lives.

In effect, science has usurped religion and scientists have become our new high priests. The problem is that when science takes on spiritual or moral issues, it is an unmitigated disaster. To science, a human being is no more than a complicated machine. And how can a machine have a soul? The respected neurologist Richard Restak has even gone so far as to try to find evidence for the human soul by peering into brains with a PET scanner. Needless to say, he has come up empty handed.

As a society, we have made the mistake of thinking that because science can answer some questions very well, it might eventually be able to answer *all* questions. Scientists used to be quite modest in their claims. But recently, a number of them have been growing more ambitious, as if the illusory power we have handed them has affected their judgment. The result has been a number of grandiose claims that can be neither justified nor fulfilled. For example, Stephen Hawking ended his book *A Brief History of Time* with the statement that if his theory about the nature of the universe was upheld, it would help us "know the mind of God." Hawking may be a genius, but his opinions about God carry no more weight than those of his next-door neighbor. In a similar forthright style, Oxford evolutionary biologist Richard Dawkins, author of *The Selfish Gene*, has said: "Science offers us an explanation of how complexity arose out of simplicity. The hypothesis of God offers no worthwhile explanation for anything... We cannot prove there is no God, but we can safely conclude that He is very, very improbable indeed."

Dawkins may draw what conclusions he likes. But others may feel his aggressive intolerance of religion smacks of the very dogma he is so anxious to avoid. It is not hard to see why reductionism fails to find a God or a soul, or even a subjective aspect to human experience. All of these are left out of the reductionist's agenda from the very start.

In approaching issues such as death and the afterlife, an open mind and tolerance for all viewpoints are essential. We need to look through the eyes of the scientist and of the mystic and learn what we can from both. In doing this, we shall simply be following the lead of some of the world's truly great thinkers.

Men of the stature of Niels Bohr and Albert Einstein were well aware of a link between their own work and long-held mystical traditions. Bohr, one of the most influential of all pioneers of quantum mechanics, once said:

> *For a parallel to the lesson of atomic theory ... [we must turn] to those kinds of epistemological problems with which already thinkers like the Buddha and Lao Tzu have been confronted, when trying to harmonize our position as spectators and actors in the great drama of existence.*

Likewise, the present Dalai Lama sees the possibility for much bridge-building between science and more intuitive forms of knowledge. He writes: "Death and Dying provide a meeting point between the Tibetan Buddhist and modern scientific traditions. I believe both have a great deal to contribute to each other on the level of understanding and of practical benefit."

Science would never make a good religion. By its very nature, it is chained to the material and the measurable. Far too much will always slip through its net. But because of what has recently been discovered about the world, scientists are at least being encouraged to think a little more holistically. For instance, there have been some momentous changes in the way science regards complicated systems. These are systems that, although made up of elements obeying fixed laws, are made up of so many elements that those laws are lost in a blizzard of complexity. Living organisms, it turns out, cannot even in principle be fully understood in terms of the separate particles of which they are composed. Even on a material level, we are more than just the sum of our microscopic parts.

Scientists have also had to revise drastically their view of man's relationship to the universe. From the physics of the subatomic world, quantum mechanics, we have learned that it may be meaningless to talk about the existence of particles outside our observations. It appears that by interrogating nature at the finest level we actually play a decisive part in bringing some

aspects of reality into being.

Reductionism had effectively cut man off from the universe. It had become part of the scientific canon that the experiences of human beings were somehow of a lower order of reality than were events "outside." But now, quantum mechanics insists we can no longer hold with that duality. The fleeting particles that pop up in laboratory experiments owe their brief lives to the researchers who observe them. The particles are not always there, waiting to be noticed. They are provoked into existence from the shadowy quantum realm where nothing is solid or defined. The boundary between subject and object has become blurred.

On a cosmic scale, too, we have suddenly and unexpectedly found ourselves thrust into the limelight. It turns out that we live in a universe unreasonably well suited to the development of life. About 15 billion years ago, space, time, matter, and energy came into being in a titanic explosion known as the Big Bang. Our presence here today rests on that outburst having been precisely as violent as it was; even a slight tampering with the size of the bang would have caused the universe either to fly apart or fall back on itself before stars, planets, and life had a chance to form. Other uncanny coincidences have been found in the relative strengths of the four basic forces in nature and in the particular location of energy levels in key atoms such as carbon and oxygen. Wherever we look, whenever we look, we find that nature is strangely sympathetic to the evolution of life and intelligence.

* * *

These new perspectives of the world have not really brought a spiritual dimension to science. That would be claiming too much. But they have allowed the gap between the spiritual and the material close. We are beginning see ourselves written into the narrative of nature in a fundamental and mysterious way. Mind is not just something existing in a void playing with neutral items and trying to fit them into a vapid theory; rather it “belongs” in the universe. This new scientific picture, with its holistic overtones, sits better with intuitive ideas such as reverence for the soil, water, and air. It is more in keeping with a sense of the sacred, with the wordless feeling that we are an integral, inseparable part all exists.

Nature, we now appreciate, is an elegant unity whether we care to survey the macrocosm of the stars and galaxies or the microcosm of the atom. And we, it seems, may have a role – perhaps a very profound role – to play in this unfolding drama. The universe we find ourselves in is an evolving web of space-time that has spawned everything from particles to people, from quarks to consciousness.

Now the time has come to broaden our field of inquiry. In turning to face the deeper mysteries of life and death, we need to embrace not just what is outside us, but also what is within. As Tolstoy wrote: "The highest wisdom has but one science, the science of the whole, the science explaining the Creation and man's place in it."

* * *

We wonder what is the purpose of life and why we have to die. But science has shown us that life and death, in the broadest sense, are all around us. We exist today because, billions of years ago, giant stars "lived" and "died" in great explosions that threw out the fusion-made heavy elements of which our bodies are composed. Only by living and dying have plants and animals been able to evolve into such complex forms as ourselves. Only by living and dying do other life-forms continue to provide us with food and oxygen. And only by living and dying ourselves do we contribute in some small way to the process of universal recycling.

The simple truth is, there could not be a you, and there could not be a viable universe, without death – the death of stars and the death of succeeding generations of organic life. In the

words of philosopher John Bowker:

> *If you ask, "Why is death happening to me (or to anyone)?" the answer is: because the universe is happening to you; you are an event of the universe; you are a child of the stars, as well as of your parents, and you could not be a child in any other way. Even while you live, and certainly when you die, the atoms and molecules which are at present locked into your shape and appearance are being unlocked and scattered into other shapes and forms of construction.*

We know that our bodies will eventually perish. We know that our brains will stop working. The great question remains whether consciousness is similarly doomed. Is there, as we so desperately want to believe, an afterlife waiting for us beyond the gates of death? The answer, I believe, is within our grasp.

As some scientists peer into the innermost recesses of the human brain, others continue to refine our knowledge of the near-death experience. Clues to the nature and future of consciousness are being supplied by fields as diverse as neurology, psychology, cosmology, and quantum physics. And added to all this is a growing sense that a merger between the highest teachings of science, religion, and mysticism is long overdue – a grand synthesis that will finally help us solve the greatest mystery of the universe.

Chapter 1 – Death Comes of Age

Man has given a false importance to death. Any animal, plant or man who dies adds to Nature's compost heap, becomes the manure without which nothing could grow, nothing could be created. Death is simply part of the process.

– Peter Weiss, German dramatist and novelist

Death seems certain and universal. So the shock is all the greater when we find all around us swarms of living things that never show the slightest signs of aging.

Bacteria, for instance, don't grow old in the normal sense. They can be killed by extremes of heat, toxic chemicals, viruses, and the like. But they never succumb to old age. Not for them the creeping senility, inevitable among our own species, as tissues and organs wear out and fail. Bacteria grow, but in growing retain their pristine form and perfectly running cellular machinery – right up to the point at which they neatly divide down the middle and become two.

We are not used to thinking about this kind of reproduction. Conceptual problems spring to mind. If bacteria don't age or die, then exactly what *does* happen at the moment they divide? In the human world we can keep track of individuals and their parents and offspring. But with bacteria, matters are not so clear cut. When a mother cell divides, the old organism vanishes on the spot, to be replaced by two smaller, genetically identical copies. The parent organism in effect *becomes* its offspring; those offspring in turn become their own daughters, and so it goes on. The upshot is that, barring any random genetic changes, the family tree of a colony of bacteria has no distinguishable branches or lineages. It just telescopes down to a single anonymous member, an endlessly fragmenting, endlessly rejuvenating progenitor.

Given such a reproductive style, it is hard to say whether bacteria really qualify as "individuals." On the one hand, a single microbe can be isolated and thought of as a creature apart (at least until it becomes two). On the other hand, there is no practical way to distinguish this cell from any of the others in the colony. All are clones. And, when it eventually does divide, where on earth does our supposed individual go?

Such habitually dividing organisms as bacteria are ageless in the sense that they show no signs of deterioration as time goes by. But agelessness is not the same thing as immortality, because to be immortal a creature has to preserve its individuality – its "personal" continuity – in some recognizable form.

Are there any such genuinely eternal life-forms on earth? Probably not, but the best candidates are organisms such as brewers' and bakers' yeasts. These are fungi that multiply by budding, so that the daughter cells are clearly distinguishable and chronologically younger than those of the mother. Since new buds can't form at the site of old bud scars, the mother eventually becomes sterile: after about twenty buddings it is peppered with scars and can no longer bear offspring. Budding bacteria exist, too. The photosynthetic bacterium *Rhodopseudomonas palustris* seems to sprout daughters with impunity, as do certain bacteria that grow on stalks. All these microscopic budding life-forms show definite mother-daughter relationships in their reproduction. What is not clear is whether the mother, after it ceases to bud, eventually dies. The general assumption is that it does. But, in fact, there is no firm evidence for this and it remains a tantalizing possibility that budding microbes represent the only genuinely immortal beings on the planet.

Back, though, to simple splitting cells. These we can be sure at least are ageless. But why? Human beings age. Virtually every life-form we can see with the unaided eye (the giant amoeba is an exception) ages as time goes by. We grow, our bodies slowly wear out, and we die. So why, if eternal youth is a birthright of the simplest living things, is it so manifestly denied to more advanced creatures like ourselves? Why are human cells, and the complex beings they are shaped into, apparently predestined to die?

Despite all the great strides made by medical science, most of us will be lucky to survive much beyond the biblical three score and ten years. Improvements in hygiene and the treatment of disease have done wonders for the quality of our lives. They have dramatically reduced our chances of an early death through illness. But even in the most developed nations (Japan and Sweden currently head the longevity league), the average lifespan of men and women has yet to rise above eighty. Nor, barring some revolution in gerontology, can we expect any sudden upswing in progress in the near future. Eliminating every major pathological cause of death today, including the three biggest killers, cancer, heart disease, and strokes, would still leave the normal upper limit of human life stuck at around ninety or one hundred years. It is as if each of us harbors a time bomb, primed at birth, that relentlessly marks off the seconds before we die.

* * *

We are all composed of cells – roughly 100 trillion of them. But with certain exceptions, most notably the neurons of the brain, the cells making up your body now are not the same as those that were inside you a few years ago. This is equally true of other multicellular organisms. It is an often-repeated "fact" that bristlecone pines and sequoias are among the oldest living things on earth. And in one respect this is true: the eldest of these venerable plants began life well before the Roman Empire reached its heyday. On the other hand, no living cell inside any of these ancient trees today is more than about thirty years old – less than a third of the age of the oldest living nerve cells inside some human beings. So, if we take only *living* cells as a measure of an organism's age, then it is we, not, the bristlecones, who rank among the world's extreme geriatrics.

As each of our body cells dies, it is replaced by another and that one by another and so on. The trouble is, this process of substitution and replication does not go on forever. The root of the problem was uncovered by the American biologists Leonard Hayflick and Paul Moorhead at the Wistar Institute in 1961. Hayflick and Moorhead demonstrated the reality of a time fuse in man by teasing cells from soft body tissue and allowing them to grow in a culture fluid. Working with human fibroplasts (connective-tissue cells) taken from embryos, they found that there is a definite limit to the number of times these cells will divide. Over a period of months, the cells in each culture divided repeatedly, gradually slowed down in their rate of reproduction, became visibly sick and, after a total of about fifty divisions, died.

Later experiments showed that normal cells apparently have a mechanism somewhere inside the nucleus for remembering the number of times they have divided. What is more, this "memory" survives even in cells that have been stored for long periods at very low temperatures in liquid nitrogen. Frozen at the twentieth doubling, for instance, the cells undergo thirty more doublings after being thawed, and then stop. Frozen at the tenth doubling they oblige with forty more, and then die. Always the total is around fifty. One particular strain studied by Hayflick kept accurate count of its number of doublings even after being stored for more than thirteen years at -190ºC.

No exception has yet been found to the rule that normal cells have a finite capacity to divide, as measured by the so-called Hayflick limit. In other animals, the limit is different: about

twenty in the mouse, twenty-five in the chicken, and 110 in that most long-lived of vertebrates, the Galapagos tortoise. The longer the natural lifespan of the organism, the higher its Hayflick limit – which seems reasonable. Less obvious is why there should be any restriction at all on how many times a normal cell can reproduce.

Intriguingly, this doubling limit does not apply to certain other types of cells. Cancer cells and germ-line cells (egg and sperm) in particular appear to be immune to aging. These are the jokers in the pack; both types can and do divide endlessly without showing any signs of wear and tear. A cancer looks abnormal and divides abnormally: chaotically and dangerously. A normal cell infected with a cancer-causing virus, as Hayflick showed, becomes cancerous and will subsequently divide without limit in a maintained laboratory culture. It seems ironic that for ordinary animal cells to aspire to immortality they should have to take on some of the very properties that would cause the eventual demise of their host organism – and, therefore, of themselves.

Egg and sperm cells, too, have the potential for immortality, a fact first noted as long ago as 1885 by the great German biologist August Weismann. Weismann drew a clear distinction between what he called the human "germ-plasm," the chromosomal material involved in reproduction, and the rest of the body, or "soma." In the light of this distinction, we can think about the problem of the origin of death in another way. That is, why has nature engineered a fundamental difference between cells that are ageless and those that form a mere temporary and disposable receptacle? Obviously, if we and other organisms never died, evolution would have been impossible, and we would not be here to ponder the riddle of our own mortality. But that is an argument based on hindsight. We need to avoid the suggestion that nature somehow had it in mind all along to make complex throwaway life-forms. Biological evolution, blind and undirected, simply doesn't work that way.

Instead, we need to seek out the origins of human mortality at a molecular level. The secret of the birth of death almost certainly lies among the tangled braids of that peculiar and unique substance, deoxyribonucleic acid – DNA. One of the outstanding achievements of twentieth-century science was the elucidation of DNA's molecular structure. The now-familiar double helix arrangement of DNA resembles nothing so much as a twisted rope ladder. The rungs consist of chemicals, known as amino acid bases, which are code named A (for adenine), G (for guanine), T (for thymine), and C (for cytosine). These bases are effectively the four letters in the alphabet of life. Just as we use the twenty-six letters of the English alphabet to construct specific messages and meanings, so nature casts the four amino acid bases into sequences that carry specific biological information. Genes are simply long lists of instructions rendered in the four-symbol alphabet of DNA, each gene specifying the design of a particular product, usually a protein.

The bases that compose these genetic messages have a very special property which is at the core of life on Earth – they always pair in the same way, A with T, and G with C. As a result, the rungs of the DNA ladder consist of A-T and G-C pairs. Crucially, these pairs are structurally interchangeable so that, for instance, a C-G pair can substitute for an A-T pair without disturbing the shape or stability of the DNA spiral. Holding each rung together at its midpoint is a weak chemical bond (a hydrogen bond) that is easily broken when the time comes for the DNA to divide and unravel into separate strands.

During cell division, when the double helix of DNA peels apart, two copies of the original genetic message are created. Although equivalent, these copies are not identical. One is the complement of the other, just as a mold and a cast contain the same image but in inverted

forms. For example, if the base sequence on one side of the divided DNA ladder is AAGCTATCCG, the sequence on the complimentary side will be TTCGATAGGC.

Imagine that, for some reason, a mistake creeps in during the copying process. A G, say, couples with an A instead of a C. Now, after the partner strands have separated following replication, one strand will have the correct base (G) and the other a mistake (A). Because the coupling rules are extremely unlikely to be broke twice in succession, the outcome of the next round of copying is almost inevitably one offspring DNA with a (correct) G-C pair and one with an (incorrect) A-T pair. At first sight, it seems as if this mismatching might have disastrous consequences, perhaps throwing the whole DNA molecule into disarray. However, since the A-T pair has the same basic symmetry as the G-C pair, each new DNA will preserve the original 3-D helical format. An error has found its way into the code but the architecture of the code's carrier, DNA, remains uncompromised.

In DNA, alone among known copying machines, order is preserved in the face of random mistakes, not destroyed by them. Yet the ceaseless editing and proof-reading needed to root out occasional duplication errors do not come free. They take up a sizable slice of the cell's total energy budget. Further energy has to be channeled into keeping the cell's life functions running smoothly. Damaged proteins must be quickly tracked down and disposed of before they can wreak havoc; energy has to be diverted to the machinery that monitors the efficiency of the cell's protein-making processes, and so on.

Primitive, one-celled creatures such as bacteria can easily come up with the energy required for damage control, because they are genetically and functionally simple. But with bigger and more elaborate organisms, maintaining error-free copying is more of a problem. The trouble is that tying up too many resources in genetic error-checking makes the creature less viable in other ways. Little is to be gained from having a high-accuracy body if it is defenseless against low-accuracy, short-lived predators. In any case, argue biologists Thomas Kirkwood of the Medical Research Council in London and Richard Cutler of the National Institute on Aging in Baltimore, why waste energy trying to preserve immortality when an individual is likely to be killed by environmental hazards within a fairly short and predictable period anyway? From nature's point of view, it makes more sense to invest in protective systems that ensure youthful vigor for a certain amount of time and no longer. The rest of the organism's energy can then go toward maximizing fertility – which is the main goal of the exercise.

Kirkwood calls his model the disposable soma theory and likens it to industry's practice of investing little in the durability of goods that will be used for only a limited time. In an organism's case it is the somatic cells – the nonreproductive cells making up the bulk of the body – that are eventually expendable. In contrast, germ-line cells, occurring in tissues that give rise to eggs and sperm, must retain the ability to repair themselves perfectly, otherwise the species would die out. Because genes in germ-line cells account for only a tiny fraction (typically less than 1 percent) of total body genes, the cost of maintaining high-precision error-correcting processes in the ovaries and testes is tolerably low.

At some stage in the dim past, then, it seems that evolution stumbled upon a novel solution to the problem of reproduction. It put immortal, "selfish" genes in disposable shells. This was the successful formula that led to all of the more complex life-forms on Earth – including man.

But with the evolution of ourselves there arose a special and unique complication. The perishable machine built by human genes contains the most highly developed brain we know. This brain, like the rest of the body, has a finite lifespan. Yet it is also the vehicle for our

indomitable sense of self.

Man's brain was the first on this planet to be able to project its thoughts into the future, to be able to predict events based upon experience. So, inevitably, it was also the first brain to be able to foresee its own end. That was the tragedy in the tale of the fall from Eden: with the birth of the ego, death entered our consciousness.

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Death is not nearly so old as life, but self-consciousness and the fear of death are much younger still. Other animals appear not to have these in any developed form at all, and even man, some circumstantial evidence suggests, may not always have enjoyed full self-awareness as we know it today.

From prehistoric remains it is hard, and perhaps unrealistic, to try to reconstruct the mental and spiritual worlds of our long-dead ancestors. All our theories are bound to be parochial, tainted as they are by present-day attitudes and beliefs. Fortunately, though, we have more than just fossil evidence to go by. There are folk still alive today who almost certainly preserve, in both their memories and traditions, the essence of Neolithic man.

For at least 40,000 years the Aborigines have lived in Australia and for almost all that time they have practiced the hunter-gatherer lifestyle once common to all men. Although during the last century they became permanently settled, their surviving languages and customs serve as an extraordinary window on the remote past.

That window is not always very clear. We forget sometimes that there are ways of thinking, ways of interpreting the world, that are totally alien to our own, and the truth is that the intricacies of Aboriginal traditions are often hard for Westerners to follow. But a striking feature of native Australians that does come through is their attitude toward self. Aborigines – certainly pre-European Aborigines – were far less concerned with thoughts about their personal identities than about their relationship with the land and with other living things around them. Individuals saw themselves as part of a vast, unchanging, interconnected system. They considered themselves not simply in terms of bloodlines or families, but as deeply and inseparably connected with the wider context of the social group and, beyond that, the whole mythical structure of life. All the evidence suggests that Aboriginal consciousness was, and to some extent still is, collective and communal.

Time also seems to be perceived quite differently in the Aboriginal world. To the Aborigine, time appears cyclical rather than linear, because life itself is cyclical. The grass sprouts in the spring, grows green in the summer, withers in the autumn, dies in the winter, but always returns again the following year. This is the invariably observed pattern, the wheel of nature turning round and round. And because, to the Aborigine, Man himself is an integral part of nature, he too must participate in the recycling process. In the deepest sense, the Aborigine has no fear of death because, as far as he or she is concerned, nothing ever dies.

Death, or at least our perception of it, is something relatively new. We think of death as being tragic, terrifying, even repugnant. But it has none of those qualities if you see it every day in a natural context, if you hunt and collect your own food, if you are continually in touch with the cycle of the seasons. "Primitive" men and women considered themselves inseparable elements – cells as it were – of a social organism: a Gaean entity whose life continued out of an indefinite past and into an indefinite future. What we know today as the soul was, judging by the prevailing beliefs of primitive people now, originally thought of as a larger life embodied in the successive members of the group. At death, this personalized life simply returned like a river to the collective tribal sea.

For virtually all of human history, a span of between two million and three million years, it has been this way. The rights of the individual have been secondary to the rights of the group. The consciousness of the individual has been subordinate to the unitary, indestructible consciousness of the tribe.

Then, at some point less than 10,000 years ago, there came a change. Man began to build settlements as he learned to cultivate crops and domesticate animals. He erected walls and cities to protect himself and his property. And at the same time it seems that the beam down which man looked out on the world became more and more tightly focused. Nature became detached, something "out there." The tribal links were weakened and, we may conjecture, consciousness increasingly withdrew into the individual. To a greater extent perhaps than ever before, people became preoccupied by their personal sense of self and with a new and terrible image: the specter of death.

How sudden and recent was this subtle shift in the location of consciousness? In a highly controversial thesis, first published in 1977, Princeton psychologist Julian Jaynes proposed that self-awareness was still only partially developed as late as the second millennium BC. Jaynes based his claim on analysis of several important ancient texts, including Homer's *Iliad*, written about 3,000 years ago. In these he found no reference to minds, thoughts, feelings – or to self. He concluded, therefore, that the people of this time did not recognize their thoughts and actions as their own but believed instead that they emanated from the gods. As an example, he cited an episode from the *Iliad* concerning the Greek hero Achilles. One god makes Achilles promise not to go into battle against the Trojans, another urges him on, and yet another screams through Achilles' throat at the enemies. Homer portrays mighty Achilles as if he were a puppet dancing to the thoughts and wills of higher minds.

It might well be argued, of course, that Homer intended his story to be interpreted this way: as a conflict fought out not just between men but also between the Olympian gods acting through men. After all, there is nothing new in the idea that men sometimes act of their own free will and at other times are driven to certain actions by circumstances beyond their control. While Jaynes's thesis is intriguing, it is far from convincing. He puts the birth of self-awareness at some point after 1000 BC, but in all likelihood it happened very much earlier.

The emergence of a sense of self was surely a gradual process influenced by both biological and cultural factors. It takes a brain of a certain size and complexity – though not necessarily a human brain – to subtend a sophisticated sense of self. But the blossoming of that sense of self can take place only in the right environment – an environment in which your fellows relate to you (and you to them) as if you were a free-thinking individual in your own right.

This suggests that the evolution of self-awareness and that of language were strongly intertwined. Only through language are we able to break the world down into parts, to name objects and their interrelationships. Eventually, as part of this labeling, parsing process, we must have come to see ourselves as separate beings with separate, distinct minds.

The dawning of self-awareness in a form we would now recognize probably came while there were still quite primitive spoken tongues. Yet with speech the emphasis is on interaction with others, on the communal sharing of information. The only time that speaking throws the self into sharp relief (internally) is when we talk alone. Self-consciousness seems to go hand-in-hand with the ability to hold a one-man conversation. So, conceivably, the later stages in the growth of self-consciousness were encouraged by instances when some of our Stone Age forebears turned around to find that the person they had been talking to was no longer there.

Writing, too, when at last it appeared, may have played a part in the final honing of an awareness of self. Whereas spoken language is generally communal, written language is invariably personal. The only interpreter of a given sequence of written symbols is the mind that scans it, so that reading is essentially a self-conversation between the individual and the text. For the writer, the sense of self is further emphasized because the mind that is writing has to build consciously an external representation of its own internal workings.

Self-consciousness surely evolved, for the most part, very gradually. There were no instantaneous breakthroughs, no one who woke up and for the first time in the history of the world thought of himself as "I." We cannot even quantify or make comparisons of consciousness as we can, for instance, the cranial capacity of modern man and his ancestors. So, inevitably, all our proposals about how and when the various stages of awareness arose are purely conjectural.

Yet that does not make the guessing game any less intriguing. We know that self-consciousness has grown: a mouse is manifestly more self-aware than a minnow; we are more self-aware than a monkey. So it is pertinent to ask whether there were indeed periods in prehistory and history when man's view of the world and of himself evolved faster than usual. A tenuous clue, perhaps, comes from the Sumerian folk legend known as the Epic of Gilgamesh, which in its oldest surviving form comes to us on twelve five-thousand-year-old clay tablets from the library of Ashurnasirpal at Ninevah. In this ancient tale we read that the death of Gilgamesh's companion, Enkidu, has stunned the hero. Gilgamesh laments: "Enkidu, I weep for you like a wailing woman. You were the axe by my side, the sword in my belt, the shield before me. I also will die and worms will eat my flesh. I now fear death and have lost all my courage."

It is the man, the self-aware ego, that is lamenting here. And we are left with the impression that his grief reflects a newly acquired and painful sense of personal isolation in the people in general of this time. The myth goes on to tell how Gilgamesh, by performing certain rituals, wins permission from the gods of the underworld for the spirit of Enkidu to return to tell him about the state of the dead. Enkidu speaks of a House of Darkness in which the inhabitants are compelled to stay forever, feeding on dust and clay and wearing wings like birds for garments. And, again, we are struck by the acute loss of community, a loss tempered by a new hope – that each man and woman has an immortal spirit of his and her own. Just as the consciousness of the tribe has fragmented into separate selves within the city-state, so apparently the collective, tribal soul has been perceived as broken apart into the souls of individuals.

Opinions may differ. We may never know when and over what length of time man, unlike other animals, became fully ego-conscious. But of this we can be certain: when self-awareness *did* finally arrive it inevitably led to the quest for the survival of self after death.

Chapter 2 – The Quest For Eternity

Neither a man nor a nation can live without a higher idea, and there is only one such idea on earth, that of an immortal human soul; all the other higher ideas by which men live follow from that

– Fyodor Dostoyevsky

By 3000 BC, the whole issue of life after death and the preservation of the soul had become of paramount concern for early pre-Western civilizations. In fact, with the emphasis now shifted to the individual and to the inescapable fact of personal death, these questions turned into an obsession. How else can we explain the astounding scale and extravagance of the Great Pyramid of Cheops? Built in 2720 BC from more than 2 million quarried limestone blocks with an average weight of two and a half tons, it soared 480 feet from the desert sands – a mighty challenge both to time and to death itself.

Central to the Egyptians' cult of the afterlife was the part played by mummification. Yet this process was so costly that it was not until the second millennium BC that the practice began to spread beyond the royal household. Since the pharoah was the intermediary between the gods and the earth in a society where survival depended on organized agriculture, the cult was the key not only to social order but also to fertility. Therefore when the Egyptians connected their pharoah's immortality with the cult of the god of vegetation, Osiris, they were symbolizing death and resurrection in the annual cycle of the very food they ate.

During the second millennium, the Osirian cult gained strength, and people's views on the afterlife tended to change. While mummification implied physical immortality for the body in this world, Osiris came to be thought of as the ruler of the dead in another realm. So, increasingly, the soul was thought of as having a separate existence from the body.

According to Egyptian theology a person had not just one but two or more souls, different in nature from each other. Principally, there was the *ka*, or "guardian spirit," shown in tomb paintings as hovering over the mummy in the guise of a small bird with a human face. And there was the *ba*, or "breath," which gave animation to the body. Both the *ka* and the *ba* were thought to leave the body at death – but only temporarily. In the strange ceremony known as the Opening of the Mouth, the mouth and eyes of the corpse were pried open by means of a special instrument held by a priest. This supposedly allowed the breath soul back into the mummy and commemorated the myth that Osiris, after the god Seth had killed and dismembered him, was brought back to life in the same way by his son Horus. With the *ba* restored to its rightful owner, it was left only for the *ka* to fly back and reunite with its companion. This was thought to take place in a second, parallel ceremony in the next world. Recognition of the body by the *ka* being all-important, it was essential for the dead person's appearance to be faithfully preserved by embalming.

Of course, we foster all kinds of romantic myths about what the mortician-priests of Egypt did in the cool depths of pharaonic tombs. So perhaps the truth is bound to seem a little prosaic. Magical incantations aside, the process of mummification was really quite straightforward – in fact, in chemical terms, relatively crude. The Egyptians basically salted their dead with natron, a natural deposit found in the Nile Valley consisting chiefly of sodium carbonate and sodium bicarbonate (baking soda), and varying amounts of other substances,

including sodium sulphate and sodium chloride (table salt). This mixture dehydrated the corpse and so inhibited the enzymatic activity that normally causes decay.

At the same time, most of the internal organs were removed, starting with the brain, which was drawn out piecemeal through the nostrils with an iron hook and then discarded. Viscera such as the lungs, liver, and intestines were taken out whole and stored separately in sealed canopic jars, each bearing the likeness of a particular patron god. The stomach was either removed in the same way or else flushed out with wine and filled with aromatics, while the heart was either left untouched (since it was believed to be the seat of intelligence and consciousness) or replaced with a sacred scarab. Preliminaries seen to, there followed the careful swathing of the body with bandages soaked in resins and the sprinkling with scents.

It was a lengthy procedure – in more ways than one: a mummy unwrapped in 1940 at the Metropolitan Museum of Art in New York yielded more than 850 square yards of linen. It was also a painstakingly elaborate ritual. The bandage of Nekhebt had to be placed on the well-oiled forehead, the bandage of Hathor on the face, and an impressive array of precious objects (143 in the case of Tutankhamen) at strategic positions between the wrappings. The nails were gilded, a crystal hung to lighten the face and special material applied to strengthen the steps of the deceased in the underworld. Finally, after seventy days of exhaustive preparation, the priests climaxed their work with the Opening of the Mouth.

Thus the pharaoh was made ready for his transformation into a divine and incorruptible image. Mummification and its attendant ceremonies helped ensure reunion between body and soul in the hereafter. But even with these precautions, the dead king was not guaranteed immortality. For this he still needed the compliance of the major deities. Once inside the spirit world, the deceased would be led by the jackal-headed god, Anubis, to the judgment scales, where his heart would be weighed against a feather symbolizing Maat, the goddess of justice and truth. If the scales balanced, Osiris would rule that the man had led a blameless life and so deserved to be made immortal. Conversely, if his heart proved too heavy, a less attractive fate lay in store: the unfortunate sinner would be fed to the permanently ravenous dog-monster Amemait, which lurked nearby.

It is just as well that the priests who labored so long to preserve their dead could never know what would eventually become of so many of their carefully prepared cadavers. The relatively few well-preserved mummies that have come down to us are exceptions; a great many were either burgled or bungled and long ago decayed to insect-swarming filth. Thousands of others were torn apart over the centuries to make quack cures for various ailments (the very word *mummy* comes from the Persian *mumiai*, for "pitch" or "asphalt," once thought to be a curative and for which the blackened resin of the wrappings was mistaken). Some of the ancient corpses were pulverized to produce "mummy brown" pigment for watercolor paint. And, most extraordinarily, huge numbers of mummies were used as fuel on the first Egyptian railways, their layers of resin-impregnated bandages apparently serving as an excellent substitute for coal.

Today, embalming remains a skilled and well-practiced art. In the United States, more than 90 percent of the newly deceased go through the process. Yet now it has come to serve a very different purpose. Whereas in ancient Egypt the dead were preserved exclusively for the sake of the dead and their well-being in the hereafter, in the modern world embalming is done nearly always for the benefit of the living. The only exception is in the case of those individuals who choose (and can pay in advance) to be put in a deep freeze for possible future resuscitation or, alternatively, to be mummified by the latest technology, which involves, in the final stages, being coated with an airtight seal of polyurethane.

* * *

For those today who believe in an afterlife, there is a tendency to link the notion of life after death with that of a particular god. But theology and conjectures about the human soul have not always gone hand in hand. In ancient Greece, where many people eventually grew tired of the all-too-human antics of Zeus and his cronies, philosophers started to argue about the nature of the soul from a purely academic and secular point of view. Their approach was to travel about, look at the world in a detached, almost arrogant sort of way, and then theorize. The word *theory*, in fact, comes from the Greek for "sight-seeing."

Pythagoras, in the late sixth century BC, was the first to establish an entire school of thought based on this method of enquiry. He was struck by the way that the physical world seemed to be underpinned by relationships between pure numbers. Nature, apparently, had a mathematical infrastructure. At the same time, Pythagoras pointed out that mathematical entities are somehow subtler than their counterparts in the "real" world of the senses. A circle drawn in the sand may seem from a distance to be exactly circular but, on closer inspection, always turns out to have little bumps and dimples. A mathematical circle, on the other hand, is perfect in every way and can therefore only be pictured in the mind. From this line of thinking stemmed the theory of ideas (*idea* is Greek for "picture"), or Forms, which was developed by Socrates, Plato, and others.

Pythagoras was both a mathematician and an incurable mystic. Among his many discoveries, he found that harmonious notes on a vibrating string always occur at lengths that are in simple numerical ratios to the fundamental (that is, the note made by the open vibrating string). To others this may have seemed a mere curiosity, a pleasing happenstance of nature. But to Pythagoras it was the expression of a deep mystical truth. From it, he concluded that the soul was an attunement of the body. A properly balanced body will carry a harmonious soul, just as a properly tuned string will emit a harmonious sound.

Socrates (c.470–399 BC) took a different line. His theory of the soul had its roots in an earlier Pythagorean doctrine that there are three ways of life. This was exemplified by the three kinds of men who attended the Pythian games at Delphi: the athletes, the spectators, and those who bought and sold. By analogy, Socrates argued that the soul has, in descending order, a rational part, an emotional part, and an acquisitive part. In the just soul these are properly ordered, each minding its own business and obeying the parts ranked above. Reason, at the top, rules emotion. Emotion, in turn, helps to inspire the actions that reason dictates.

Because the just soul is ruled by reason, Socrates linked it to the realm of Forms. A Form was held to be a perfect, unchanging counterpart of something real. Socrates taught that a "particular," for example a cup is what it is by virtue of participating in the Form, or picture, of the cup – the constant and unique prototype of cups that exists in the realm of ideas. The point is echoed in the way we use language: there are many cups of many shapes, sizes, textures, and colors, but there is only one word *cup*, which we use to refer to them all. Though a cup might break, the Form remains intact, as does the word.

The realm of Forms was believed to have a definite structure and hierarchy. At the top was the Form of the Good, under which all other Forms were arranged. From this, Socrates deduced that the knowledgeable soul is bound to be good; its existence will consist in contemplating the Form of the Good. Evil, therefore, springs from ignorance, which arises when the soul is ruled by the body. Since the good soul is connected to the Forms, whereas the body belongs to the world of particulars, the soul lasts but the body does not.

Unfortunately, Socrates' conjectures about the nature of the soul scarcely outlived the

man himself – thanks to Plato. Having originally championed the theory of Forms, Plato (c.427–347 BC) went on to demolish it completely in a dialogue called the Parmenides. The setting is a meeting between the philosophers Socrates, Parmenides, and Zeno, in Athens, in about 450 BC. By then, Parmenides, one of the fathers of Greek philosophy, was an old man, his disciple Zeno was at the height of his powers, and Socrates was young and (conveniently for Plato) still somewhat inexperienced. In the dialogue, Parmenides points out that the Forms fail to account for what we see because there is no way of linking them with particulars. The link would have to be either another Form or another particular, and therefore would itself have to be linked, and so on forever without resolution.

Having thus logically disposed of Forms, Plato went on to develop his idea of the soul as a prime mover. In other words, the soul is what produces motion, both of itself and of other objects. Since this happens only in living things, it must be their basic principle, so that the soul comes before the body and the feelings of the soul before the material qualities of the body. Ethical qualities – those that determine conduct – therefore spring from the soul. This holds not only for positive ethical qualities but also for their opposites; evil, as much as good, has its origins in the soul.

With Aristotle (384–322 BC) the basis for speculation at last shifted away from pure theory to biological observation. Aristotle was not exactly a scientist in the modern sense because he never went to the trouble of testing his ideas by experiment. But he was undoubtedly a great observer and encyclopedist. From his studies of fauna and flora he, like Socrates, saw the need for three different types of soul – in his case known as the nutritive, the sensitive, and the rational. All living things require nourishment, so plants, animals, and men alike must have a nutritive soul. Animals and men have both nutritive and sensitive functions. But man alone is rational. The Aristotlean relation between body and soul is the same as that between matter and form. The soul makes a man what he is but has no existence independent of the body. It is like a hallmark stamped on a bar of metal. When the body disintegrates, so does the soul. Only the rational function is not completely lost. It goes back to where it came from – a kind of reservoir of rationality, a common sea of intellectual consciousness.

Personal gods find no special place in the philosophies of Pythagoras, Socrates, Plato, and Aristotle. Yet there are clear implications for morality. Socrates considered that a good life was one spent in the pursuit of the Form of the Good. For Aristotle, goodness was directly linked with the proper and consistent use of reason – always choosing the appropriate middle ground between extremes of action. The good soul is balanced, harmonious and, above all, rational.

* * *

Strange as it may seem now, the great thinkers of the Golden Age of Greece had very confused ideas about the role of the brain. Aristotle, the most influential of them all, never considered the brain to be a possible seat of the soul or of the mind. He believed it was just a cooling system, filled with phlegm – the mucus of a runny nose offering proof. Thought, intellect and the soul, he maintained, resided in the heart – a belief we still whimsically recall today with our "heartfelt" emotions and, symbolically, with a heart-shaped love sign. (The Egyptians also held this view, which is why they discarded the brain yet preserved or substituted the heart so that it could be weighed before Osiris on the judgement scales.)

It was only in the second century AD that the Greek-born physician Galen (c.130-200 AD) pointed indisputably to the brain as the site of mental activity. Galen, who rose to fame after his successful treatment of the Roman emperor Marcus Aurelius, would publicly dissect the nerves in the neck of a live pig. As these were severed, one by one, the pig would continue to

squeal; however, when Galen cut one of the laryngeal nerves (now also known as "Galen's nerve"), the squealing abruptly stopped, to the awe of the crowd. In this gruesome manner, Galen showed beyond doubt that it was the brain, via a network of nerves, that was in charge of the rest of the body.

Although disagreeing with Aristotle on the role of the brain, Galen did accept Aristotle's theory of the tripartite soul – indeed, he embellished it. To the three basic elements, he added imagination and memory, as well as all motor and sensory functions. Later, the Roman Catholic Church appropriated Galen's ideas (along with many other off-the-shelf classical views about the universe), even going so far as to suggest specific sites in the brain where the various functions of the soul might reside. And there the matter lay. For more than a thousand years, no one cared to hazard an alternative theory, such was the all-pervasive and intimidating power of the Church in Europe.

Then came the Renaissance and, with it, the renewal of the spirit of enquiry, Giordano Bruno, an outspoken Dominican monk, was burned at the stake. Galileo was threatened with torture. But the tidal wave of new ideas was unstoppable and soon the Church was forced to abandon its long-held grip on the material cosmos.

Galileo himself staked out the future territory for science in 1623. Science, he asserted, was concerned only with "primary" qualities, in other words, those aspects of the external world that can be weighed and measured. "Secondary" qualities, such as beauty, love, meaning and value, were by implication of lesser importance and could be left in the hands of the artist and the theologian.

Frenchman René Descartes (1596–1650) expressed a similar sentiment. There were, he said, two radically different kinds of stuff in the universe. The first, consisting of physical, or extended, substance (*res extensa*), has length, breadth, and depth, and can therefore be measured and divided. The second, or purely mental substance (*res cogitans*), is both intangible and indivisible. The outside world, including the human body, belongs to the first category, while the internal world of the mind belongs to the second.

These new, clear-cut distinctions between primary and secondary qualities, matter and mind, objective and subjective, had the effect of excluding human consciousness from the scientific picture of the world. As the historian E. A. Burtt has remarked, in the eyes of post-Renaissance science, "man was hardly more than a bundle of secondary qualities" and "not a subject suitable to mathematical study."

Insofar as man was now anything at all, he was a biological machine. The only remaining point to debate was whether, connected in some way with this flesh-and-blood machine, there was an immaterial spirit or soul.

Descartes had very definite ideas about this. Having received the best education his time could offer, Descartes rejected most of the Scholastic dogma served up by his Jesuit teachers and set out to rebuild knowledge on what he considered a firmer basis. His efforts led him to become one of the recognized founders of modern philosophy.

In the synopsis of his *Meditations on First Philosophy*, published in 1641, Descartes wrote: "What I have said is sufficient to show clearly enough that the extinction of the mind does not follow from the corruption of the body, and also to give men the hope of another life after death."

In order to reach this bold conclusion, Descartes had spent many hours in seclusion – simply thinking (a habit he acquired as a child since frail health allowed him to stay in bed on many school mornings.) He thought of what he could, and could not, be positively sure about.