

LET THERE BE.... *LIFE!*



By Dennis Gordon

Imagine you are a space traveller. You and your companions have been specially selected to colonise a planet identified as possibly having potential to support your kind. Now, after many years – and untold distances behind you – your destination comes into view, a tiny speck, all but concealed by the radiance of the star around which it orbits.

Very soon, the distinctive life-supporting attributes of the new planet become apparent, especially the presence of water. It is evident in the fluffy white vapours of the atmosphere, the turquoise and aquamarine of seas and oceans, and the various hues of green smudged across the brown and red earth of continents.

This will be your new home, an unexploited jewel of a planet that surely holds promise for your race's survival. Now, to explore – for you must accurately survey its potential and report back so that others can follow you.

Your spacecraft descends low into

the atmosphere – you are now just a few kilometres above an ocean. The watery expanse is amazing, and winds ruffle the surface into white streaks and plumes. Now these are seen to converge upon a shore and you track a coastline for some distance. Unbroken forest lies below, giving way to grassy meadows and a broad meandering river. Far off are snow-clad mountain peaks. You descend even lower. Look! There are creatures, herds of them, their different sizes and colours revealing much variety, even from this altitude.

You and your companions are excited! You must land, and explore. There is so much to learn about your new home. Some of the plants must surely be cultivable and provide new foods. Perhaps some of those animals might be able to be domesticated. There must also be micro-organisms that could be cultured for various uses. You have a relatively small window of time to conduct a planetary inventory, to survey, build, farm, and prepare for others to follow. You land, open the air locks, and take your first breath of a life-supporting atmosphere.

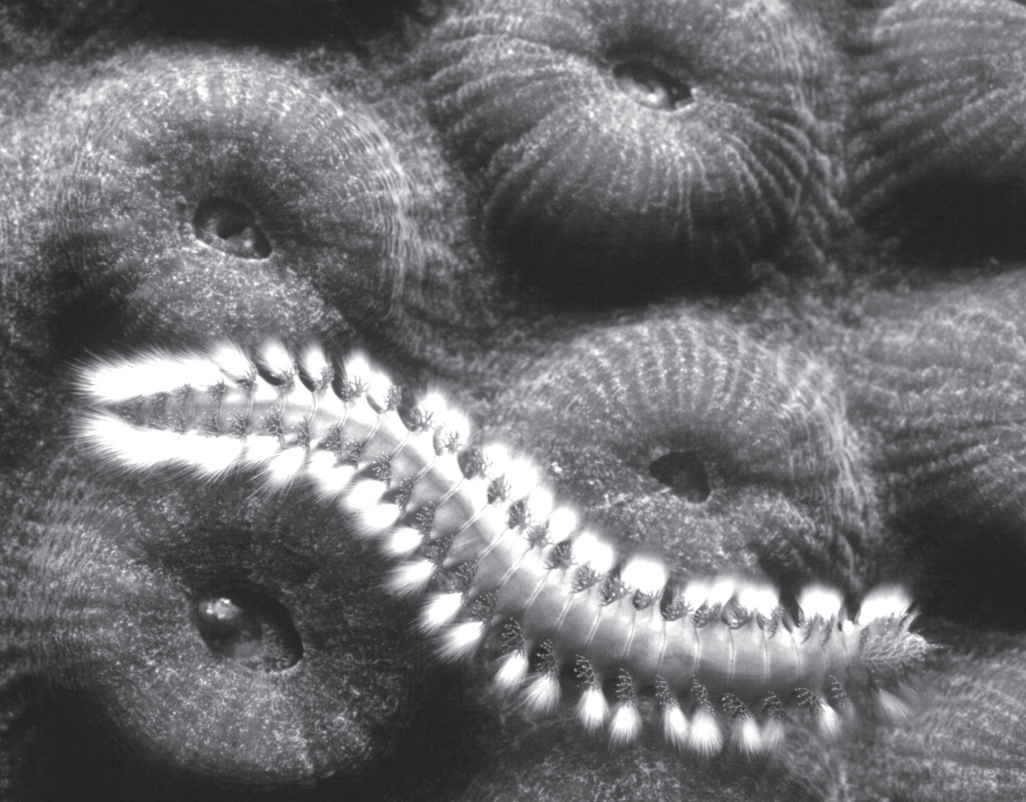
In the months that follow, you and

your companions thoroughly investigate this wondrous planet, splitting into teams, using smaller shuttles for transport to its furthest reaches – its icy poles, its highest mountains, its deepest ocean trenches. Nowhere escapes your scrutiny. You must determine all this planet's resources and ascertain if there is any threat to your long-term survival. Each team contributes to the detailed written report, which you prepare for codifying and transmitting to those who must follow you. To preface this report you record the following message:

An abundance of life

'The most outstanding attribute of this planet is its *life* – more than you can imagine, and everywhere. We have found living cells within the surface layers of rocks in icy polar wastes, in boiling waters on the flanks of volcanoes, in deep-sea mud, in salty brines in deserts, and in the atmosphere above the highest mountains. Despite our technology, I am embarrassed to report that we have not completed an inventory of life forms. So far we have catalogued in detail 1.75 million species. We have actual samples of

Photo Credit: NASA



This marine creature is a young Bearded Fireworm, about 2 inches in length. The worms can grow to be 4-6 inches. The white bristles surrounding the worm can cause a painful burning sensation and irritating wound. The background is a colony of coral polyps. Photo by Beverly Speed, agency Dreamstime.com

these, and of several hundred thousand more that we have not yet fully characterised. Our extrapolations suggest there are at least 14 million species, but the number could be as high as 100 million, not including myriads of micro-organisms with fuzzy species boundaries.'

'Life on this planet can be classified into at least six kingdoms. The lowliest kingdom includes the smallest living cells. We have named this kingdom "Bacteria". Their diversity and ubiquity are staggering. We have cultures of 333,000 different kinds so far and our tests show that a significant number have value to medicine and even in rendering certain plant and animal products into useful foodstuffs. Some of the larger kinds have blue-green pigments and resemble algae. One, which we have called *Spirulina*, shows great promise as a food supplement.'

'There are at least three kingdoms of single-celled animals and plant-like organisms, the latter being algae of different kinds. Some of these can occur in such numbers as to discolour ponds and lakes and huge areas of the ocean. In fact, we saw some of these blooms when we first flew over the planet and wondered

what they were. Other species in these kingdoms are multi-cellular and much more complex in structure. They are best developed in streams and rivers and along the coasts of the sea as seaweeds, in hues of green, red, and ochre. And, yes, we can use many in foods and medicines. What a wonderfully fruitful planet this is!'

Let me tell you about the creatures that walk, crawl, swim, and fly across the face of this planet. Their variety is astonishing.

Wait, there's more

'But there is more. The plant kingdom that dominates the land includes herbs and trees that yield fragrant spices as well as edible roots, fruits, seeds, and leaves. By a stunning quirk of chemistry, their green pigments are able to convert the light energy of this planet's star into chemical energy that is used to grow their cells. This energy is transferred to the creatures that eat them. It is further transferred to members of the unique kingdom of organisms that degrade dead plant

and animal bodies. These "fungi", along with bacteria, recycle nutrients and energy – a trick we have been able to exploit since many fungi can be easily cultivated. And, yes, they too have much potential for food and medicines!'

'But let me tell you about the creatures that walk, crawl, swim, and fly across the face of this planet. Their variety is astonishing. The lowliest, which live in the sea, are scarcely creaturely at all, having no real tissues or fixed form and are somewhat spongy in texture. Yet our analyses show they have the same proteins as other animals, reproduce sexually, and produce larvae.

Somewhat more advanced are headless creatures with stinging tentacles. Many of their kind have a mineral skeleton and form huge reefs along the coasts of several continents and around ocean islands. Some related jelly-like forms live in the open ocean.

There are myriads of worm-like creatures, among which there are at least a dozen major body designs, all very different from each other.

On land, the most abundant creatures that creep and swarm and fly are six-legged. We have catalogued 865,000 species of these hexapods so far and the end is not in sight!

The most advanced group of animals on this planet have an internal skeleton with a well-developed cranium and brain and live in all environments.

Finned species swim in rivers and oceans. Those that have limbs – four, with generally five digits (yes, like us) are amphibious in water bodies on land or scaly-skinned and more terrestrial. One group has taken to the air; their forelimbs having been transformed into wings. They are masterful in flight – ethereal and aesthetic.'

'You will be intrigued by a class of hairy creatures that give birth to live young which the mothers suckle from special glands on their chest. These include those grazing herds we first saw from cruising altitude. And also the largest of all creatures,

much larger than our shuttles, that live in the sea, their bodies streamlined and their limbs like flippers. Other species fly, some burrow, and some are arboreal. And here is a surprise – some nearly resemble us! Only they are hairier, but they have sophisticated group behaviour and a rudimentary intelligence. These caricatures of our kind are a good omen. This planet begins to look like it was made just for us!

The Creator of life is profligate and unbounded in creativity. It is estimated that 99.9% of all life that has ever lived is extinct.

Well, the report is imaginary, but all the statistics are real. They reflect our true state of knowledge about life on Earth. There is so much more to learn. If Mars were, unexpectedly, to yield huge diversities of microscopic organisms in its soils, earth scientists would launch a costly research programme to study this new life. Yet we have catalogued only a small fraction of the life that is on our own planet.

The Creator of life is profligate and unbounded in creativity. It is estimated that 99.9% of all life that has ever lived is extinct. If all the species that we know of from the fossil record (a fraction of the total) were suddenly revived they could not all co-exist with those that now live. From the moment the young earth was hospitable enough to yield the earliest forms of microbial life, Providence was at work. Life flowed, streamed, and positively flooded this earth in number and variety beyond imagining. And if we humans revel and delight in it, do not be surprised – we were meant to and we should.

Does God like worms?

What does life on earth tell us about God? Twentieth-century geneticist, J.B.S. Haldane, quipped that it reveals God has 'an inordinate fondness for beetles'. For it is true that, among the many different zoological orders, the hexapod order

Coleoptera (beetles) has more species than any other (around 400,000 species described so far). One of my colleagues (by profession I am a marine zoologist) has his own version of Haldane's quip, that God has an inordinate fondness for worms, arguing that a vermiform (worm-like) body is found in creatures differing more from one another in their fundamental body design than fish do from turtles and giraffes.

So what to you might be just a worm could be to my colleague an example of *Platyhelminthes* (flatworms and tapeworms), *Nemertea* (ribbon worms), *Gnathostomulida* (lesser jaw-worms), *Acanthocephala* (thorny-headed worms), *Gastrotricha* (hairy-bellied worms), *Nematoda* (roundworms/eelworms), *Nematomorpha* (horsehair worms), *Priapulida* (little penis worms), *Kinorhyncha* (mud dragons), *Annelida* (segmented worms, including earthworms and leeches), *Sipuncula* (peanut worms), *Echiura* (spoonworms), *Phoronida* (horseshoe worms), *Chaetognatha* (arrow worms), or *Hemichordata* (acorn worms). And, says my colleague to underscore his point, there are vermiform vertebrates – like eels, *Caecilians* (burrowing legless amphibians), and snakes.

But it isn't just beetles and worms. One could argue, from the botanical



realm, how much God likes orchids and daisies, for there are around 20,000 species in each of these great plant families.

Geneticist J.B.S. Haldane quipped that God has 'an inordinate fondness for beetles', with around 400,000 species described so far...

Incidentally, among the worm *phyla* are thousands of species of parasites, many with such complicated life-cycles that zoologists need the forensic skills of a Sherlock Holmes to unravel them. Repugnant they may seem, but we are now learning that parasites are critical in structuring and regulating ecosystems. At least some individuals (in some cases most individuals) of almost all species of life have some parasites, and there can be parasites of parasites!

Among the most mind-bending creations is the *Echinodermata* ('spiny skins'). Here are creatures shaped like stars (starfish), spheres (sea urchins), cylinders (sea cucumbers), and tulips (sea lilies). Their curious anatomy and their intricate skeleton of tiny ossicles, fitted together like the pieces of a 3-D jigsaw puzzle, have challenged all but the most dedicated specialists – which is why the late Libbie Hyman, author of a magisterial series of textbooks on the invertebrates, wrote: 'I hereby salute the echinoderms as a noble group especially designed to puzzle the zoologist'.

Loving life

What does life tell us about the Creator? Truly, if we humans revel in the creation, even more does God – in its variety, beauty, and functionality, with all of the curlicues and extravagances of design.

But here's a better question – What does the Creator tell us about life? In an allusion to the Genesis story, a biblical author wrote concerning Jesus Christ: 'All things were made through him, and without him nothing



variety has evolved, through geological time, under-pinned and upheld by the Life giver.

And here we are talking about biology, not the atheistic philosophy of evolutionism. Aptly, the word 'evolve' stems from a Latin verb, *evolvere*, meaning to unroll. It is a moot point whether every detail of this creative biological process was deterministic. Did God, in love, endow the creation with 'the freedom to be and to become' ['Let there Be ...!'], as Anglican theologian, Sir John Polkinghorne, expresses it?

Wondrously, the creation culminated in *Man* - a creature gifted with the image of God.

In speaking of the foreknowledge of a God who is outside of time, C.S. Lewis explained, concerning human freedom and human actions, 'He knows your tomorrow's actions ... because he is already in tomorrow and can simply watch them. In a sense he does not know your action till you have done it: but then the moment at which you have done it is already 'now' for him.

By analogy, in this view, evolutionary events are in the continuous 'now' of God's existence. These events are the expression of his will and what he wills he creates. Wondrously, this creation culminated in *Man* - a creature gifted with the *Imago Dei* - the image of God. The fullest expression of this image was *the man*, Jesus Christ, through whom the whole connected creation will be redeemed. Then, we shall know *real* life.

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was made that was made. In him was *life ...* Another passage states about Jesus: 'All things were created through him and for him. And he is before all things and in him all things consist'. We ponder these words when we think about the 'how' of creation.

When Jesus 'became flesh and dwelt among us', he said of himself, 'I am the way, the truth, and the *life*,' and 'I have come that they may have *life*, and that they may have it more abundantly'. He had in mind a kind of life different from that of plants, animals, and even humans. He was talking about transformed life - the eternal life of the Kingdom of God. The nature of this life was something the late Christian writer C.S. Lewis

tried to picture, as he sought to understand things from Heaven's perspective. In his classic book *Mere Christianity*, he explained how the life of Jesus and his death on the cross works to spread through all of humanity, past, present, and future. Through him, all of humanity is effectively 'saved' to experience a transformed, eternal life. All we have to do is appropriate that salvation.

In explaining this effect, Lewis used this picture: 'There was a time when every man was part of his mother, and (earlier still) part of his father as well - and when they were part of his grandparents. If you could see humanity spread out in time, as God sees it, it would not look like a lot of separate things dotted about. It would look like one single growing thing - rather like a very complicated tree. Every individual would appear connected with every other.'

Connections

This is a picture that every biologist can appreciate by analogy. All the kingdoms of life are genetically connected through a genealogy of continuous existence from bacteria to humans. Appropriating biblical language, biologists call it the 'Tree of Life'.

This continuity explains why animals and plants have bacterial genes in their cells and why even creations as disparate as bananas, roundworms, and humans share tens of thousands of other genes. This perspective explains the view of many Christian scientists and the major denominations - that life's

Great fleas have little fleas upon their backs to bite 'em,
And little fleas have lesser fleas, and so *ad infinitum*.
And the great fleas themselves, in turn, have greater fleas to go on;
While these again have greater still, and greater still, and so on.
— Augustus De Morgan: *A Budget of Paradoxes*.

