

OUR COSMIC FUTURE

Humanity's fate in
the Universe

NIKOS PRANTZOS

Translated by Stephen Lyle



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INTRODUCTION

The American anthropologist Ben Finney defined ‘man’ as an ‘exploring animal’. Today, exploration of our own world, Earth, has largely been completed. There is almost no corner of the planet in which humans have not ventured. Only the ocean bed has kept its secrets, and this will no doubt continue for some time to come.

The next step for mankind may well be space, the ‘final frontier’, as announced in the opening passage of the famous television series *Star Trek*, which is still stirring imaginations the world over. Human fascination for space, the desire to raise themselves amongst the stars, has been a constant theme since the dawn of humanity. The legends of Icarus and the Tower of Babel are witness to this obsession. However, both these undertakings ended in tragic failure. Clearly, God (or Nature?) would not tolerate excessive human arrogance and ambition.

It was only at the turn of the twentieth century that mankind finally stumbled upon the keys that could unlock the doors to space. The Russian Konstantin Tsiolkovsky realised that the only way to move through empty space is by rockets, based on Newton’s principle of action and reaction. But this herald of space travel went much further. Lodged midway between science and science fiction, his ideas were ambitious indeed: permanent residence in space, colonisation of other planets in the Solar System, and even trips to distant stars in order somehow to procure their energy, whenever our own Sun should fade. According to him, stars are the destiny of our species: ‘Our planet is the cradle of intelligence’, he wrote, ‘but one cannot live forever in a cradle’.

Tsiolkovsky’s prophesy began to take shape half a century later, in a context he would no doubt never have imagined. The space race had become one of the high stakes of the cold war between two superpowers that emerged after the Second World War. The USSR was

first to send a satellite (Sputnik), and then a man (Yury Gagarin), into orbit around the Earth. But the Americans were first to take a person to another heavenly body. On 21 July 1969, Neil Armstrong made ‘one small step for man, one giant leap for mankind’ when he set foot on the Moon.

This conquest of our natural satellite turned out to be a rather expensive enterprise, and without real interest at the time, apart from the national prestige it entailed. Despite American and Soviet determination to send men to Mars before the end of the century, no human being has ventured further than a few hundred kilometres from the cradle since 1973. This was the date of the last American mission to the Moon, and also the advent of the oil crisis, which marked the beginning of a long period of stagnation in the world economy. It was clearly no coincidence. At the beginning of the twenty-first century, humanity is confronted with serious problems, and pessimism is the order of the day. Economic slump, the population explosion, depletion of resources and pollution leave little room for cosmic dreams.

Paradoxically, some would consider human inability to solve problems on Earth as a motivation for fleeing the cradle, to colonise space and finally to set up the ideal community elsewhere. This utopian thinking, whereby people successfully overcome problems in interstellar space that they have been unable to deal with on the reduced scale of their own home, Earth, clearly manifests a certain incoherence. For others, space travel is not motivated by escape, but rather by the basic urge of the ‘exploring animal’ to range endlessly over new territories, in search of new resources and new knowledge. Yet others, sharing Tsiolkovsky’s prophetic vision, would simply say that we have no choice, that the stars are indeed our destiny. The *homo spatialis* stage in human development may be just as important as the *homo faber* stage in the long process of hominisation. In the words of Edward Young, in his poem *Night Thoughts*, ‘Too low they build, who build beneath the stars’.

Will we travel to the stars one day? And if so, how and to what end? What will be the fate of mankind in space in the coming decades, centuries and millennia? Might we meet some other form of life, possibly a kindred spirit, elsewhere in the Universe? Or are we condemned to cosmic solitude? In the much longer term, what does the future hold for Earth, the Sun, our Galaxy, and even the whole Universe? What is

the human place in the evolving Universe revealed by modern cosmology? Will the Universe come to an end, as predicted not only by millenarian eschatology, but also by nineteenth-century science? Or will life and intelligence continue for ever? These are the questions addressed in this book in the light of today's knowledge and understanding. It aims to investigate our cosmic future in the medium term (on a scale of centuries), the long term and the infinitely long term, where the latter refers rather to present limits in our ability to extrapolate into the future.

The dangers involved in any attempt at futurology are well known. This is clearly illustrated by a sketch of Paris made in the nineteenth century. The Eiffel tower is shown in the year 1940, surrounded by myriad flying machines, whilst not a single car is to be seen in the streets below! Of course, social and economic factors, so very unpredictable even in the short term, are far more significant than technical or scientific aspects in this kind of futuristic extrapolation. But should we therefore forgo any attempt at long-term conception of the future? This is not my own view. Tsiolkovsky's vision, and those of so many others before him, have shown that this ability to dream about the future is vital for the human race. It is a way of opening up new directions. Although it has no predictive power, it is a prospecting skill which can nevertheless shape the future in our collective imagination, even if only partially and indirectly, and even if that future remains by definition unpredictable. Moreover, the will to conceive of a future beyond nearby temporal horizons is a sign of youth. It is the prerogative of children and teenagers to dream of their future, ever conscious that an accident may bring their dreams to a premature end. But they are unable to prevent themselves. It is only much later that dreams of a distant future begin to fade, and with reason. For should we judge that humanity has already reached the grand old age when its days (or centuries) are numbered? Without wishing to appear excessively optimistic, I cannot say that I hold this view.

This book is not an essay about what is going to happen. It aims rather to suggest what might happen, on the basis of current knowledge and projects, or just in terms of current ideas among scientists. Apart from the feasibility or potential usefulness of these projects, it is interesting to see in what way contemporary science can give substance to the age-old dream of visiting the stars, what perspectives science

opens up for the utopian ideal and what kind of answers it may bring to eschatological questions.

The first chapter deals with some current projects concerning colonisation of our immediate neighbourhood in space, e.g., the Moon, Mars, the asteroids, and then the whole of the Solar System. Certain of these projects already raise questions of cosmic ethics, which our species must confront sooner or later. The second chapter is devoted to the next step in our conquest of space, namely interstellar travel (fast or slow). This is an undertaking which is likely to prove extraordinarily difficult. Moreover, the idea that we may one day engage upon interstellar travel raises a particularly interesting question. Any civilisation which had already acquired this ability would spread across the Galaxy in a relatively short time on cosmic scales. The fact that there are no traces of extraterrestrial life in our Solar System might then imply that we represent the most advanced technological civilisation in our Galaxy. The third chapter discusses the very-long-term future of humanity in the Solar System. It is quite likely that our descendants will be faced with cosmic disasters which endanger the very survival of our species on Earth. The most serious will be the death of the Sun itself. And finally, the fourth chapter deals with the very-long-term future of the Universe. Modern cosmology has revealed a Universe in evolution, in which it will be hard for intelligence to survive for all eternity.

Throughout the text, there will be many references to the literature of science fiction, ‘the only true literature today’, in the view of Jorge Luis Borges. Without completely sharing his enthusiasm, I believe that such scientific anticipation has today become an accepted literary form, although long despised in literary circles. The kind of problems and the way they are treated in this literature have often been a source of inspiration to scientists. There is certainly a strong connection with many of the subjects discussed in this book, as the reader will no doubt observe.