

(1996) Lecture at the International School of Museology. Masaryk University

Mankind today and tomorrow: a view of a biologist

Ladislav Kováč

Department of Biochemistry, Comenius University, Bratislava

Introduction

1. Homo mythophilus

From time immemorial, man has posed very general questions: Who are we? From where do we come from? Where do we go? Why ever is there is anything instead of nothing? Not a single tribe, a single nation, a single community can be found in the history of mankind that would have not asked such questions. And that would have not answered them – in the form of a myth. All great myths of humanity are nothing but answers to these questions.

To have the questions answered is an instinctive need of man. A fundamental one; as fundamental as are the needs of food and sex. Many fundamental needs has man common with other animals, the former one, however, is specific to the human species: man is the mythophilic animal.

Myth, hence, is a gratification of the important need. But is it, as the same time, knowledge? Human groups have been convinced for millenia that their own myths represent a reliable knowledge of the world. Greeks were the first to doubt it. From myth, but in opposition to it, philosophy was born in the ancient Greece. Philosophers, too, deal with the same general questions, but they attempt to answer them in a different way, by reasoning, by logical analyses. Yet, it seems to us today, philosophy is no more knowledge than myth is, it also just serves to satisfy that basic need to which myths provide an alternative gratification.

Evolution of the relation of man to nature has not been arrested at the transition from myth to philosophy. A new cultural phenomenon has been emerging: science, empirical and experimental exploration of the world. Science has not posed broad, general questions. The very resignation to such questions has been the main condition of its spectacular success. When Galileo studied the fall of objects from the Pisa tower, he was not asking a question on the nature of the universe, but a very restricted concrete question: what is the mathematic relation between mass of the falling body and its velocity? As science has been progressing the questions have become more and more narrow, ever finer details are being examined and immense quantities of tiny details are accumulating. If there is a saying that the philosophers know nothing of everything a sceptic may riposte that individual disciplines of science are approaching the state of knowing everything of nothing.

Scepticism notwithstanding, science as a whole is doubtless an effective knowledge of some aspects of the world. A proof of it is our technological civilisation: technological artifacts function – and they do function because they have been derived from the laws that science has discovered in nature. Why, then, do we witness a phenomenon the scope and power of which is increasing: aversion of part of the general public against science, the rise of pseudosciences, persistence of various myths and superstitions and their aggressive intrusion into means of mass communication?

Possibly because scientists, absorbed by the elegance of their concrete investigations, disregard the fact that, with the progress of science, the perennial general questions have not disappeared and neither has disappeared the universal human need to have the questions settled. Because this fact is being overlooked by teachers eager to fill their pupils' heads with ever new pieces of scientific knowledge and not attempting at their synthesis. Because it is much harder for anybody to strive for understanding of the message of contemporary science rather than to accept easy and superficial generalisations of pseudosciences and of modern mythologies.

Time has come for science to take over the general fundamental questions. Progress of science may be large enough for answering those questions no longer by myths, no longer by philosophy, but by implications derived from data and concepts of science. A reflection on mankind today and tomorrow may also be founded on strictly scientific considerations.

We should not rely upon a claim that man is a rational being, prepared to accept arguments of the reason automatically. A conclusion can be deduced from contemporary science that the human brain is not a sheer computer engaged in logical operations. The single driving force of human behaviour and its main steering device are emotions. They rule our gratifications. Rather than the current taxonomic name of our species, *Homo sapiens*, a different designation would be more appropriate: *Homo mythophilus*.

Our future depends on how fast and how thoroughly by means of science we achieve understanding and on its basis a control of our mythophilia.

2. The cosmic challenge: the loneliness of man in the universe

The age of our planet is a bit less than five billion years. As soon as appropriate conditions of temperature and pressure had been established, about three and a half billion years ago, life arose. In the simplest form of nucleic acid molecules capable of self-replication. Nothing unique and nothing miraculous; today we know almost with certainty that wherever in the universe similar conditions persist nucleic acids with self-replication capability should develop sooner or later inevitably. Presently biochemists will be able to reproduce the origin of the earliest living forms in their laboratories. If the ability of self-multiplication is one of the remarkable properties of nucleic acids, another property is the ability to change spontaneously and continually their own composition and structure, and still another is the ability to mobilize other "auxiliary" substances and devices for their own maintenance and self-reproduction and in that way to generate innovative strategies of survival and reproduction. Incessantly new variants are arising, competing with each other for survival and persisting those that prove more fit in the conditions of the surroundings. By continuous diversification and branching various types of organisms have evolved, bacteria, fungi, plants, animals. One of the branches has led to contemporary man. Great majority of branches ended in deadlocks, millions of species got extinct and were succeeded by other species, more successful. There has been no design, no predestination, no purpose in that incessant striving for existence, for onticity.

If this is the case, what is the probability that similar processes are running at other places in the universe, that life exists outside the Earth? The probability is high; it may even be not too far-fetched to take it for certain. What then is the probability that somewhere in the universe living beings similar to man do exist, intelligent, capable of developing science and by application of science creating a technical civilization similar to ours?

This is a question formulated a few decades ago by two scientists, a Russian Josip Shklovski and an American Carl Sagan. They were persuaded that there must be intelligence outside the Earth. Instead of speculating, empirical testing set in: powerful radiotelescopes were searching for signals coming from the universe that would reveal the existence of

intelligent beings. Unsuccessfully. After a long time, shortly before his death, Shklovski reached an opposite conclusion: in the entire universe, man is alone.

His conclusion has been based on the following consideration. The number of highly developed, intelligent civilizations in a galaxy, N , is given by Drake's formula:

$$N = n \cdot P_1 \cdot P_2 \cdot P_3 \cdot P_4 \cdot t/T$$

where n is the total number of stars in a galaxy, P_1 is the probability that a star has planet(s), P_2 that there is life on the planet, P_3 that life has evolved to a level of thought, P_4 that life has entered a technological era, t is the average time of persistence of the technological era, T is the age of the galaxy. Until recently, not much could be said about the first probability, there had been no indications that other stars besides the sun have planets. By the end of the last year, two stars with planets have been discovered in our galaxy. Hence the probability P_1 must be fairly high, taking into account the astounding number: there are one hundred billion galaxies in the universe and each galaxy contains about one hundred billion of stars. The other probabilities can also be assessed, on reasonable assumptions, to be quite high. What makes the number N small, approaching one, is the vanishingly small ratio of t/T , hence the very short time for which the technological civilization exists. On our Earth, the technological civilization exists for 200-300 years, which is nothing when compared with fifteen billion years which may be the age of our galaxy.

In the course of fifteen billion years that the universe was evolving, billions of technical civilizations may have emerged, but since each of it may have lasted but a tiny fraction of the cosmic time, the probability of a simultaneous coexistence even of just two civilizations should be virtually nil. That is the reason why we may be alone in the entire universe.

Why do technical civilizations last for such a short time? The most plausible explanation is that the technical civilization is incapable to solve the problems which it has brought about and ends by self-destruction. It is enough to enumerate the complexity of problems of our present civilization to grasp the essence of this reasoning.

Such an insight poses a colossal challenge to the next few generations. It will depend on them whether humanity will be able to solve these problems and hence become the first civilization in the universe accomplishing a successful transition through the critical period, in which the probability of self-destruction equals almost to certainty, and continue in the evolution of intelligence. Let us see our situation in this perspective, let us conceive of the unique character of the period we live in, and let us understand the substance of this challenge: the vast knowledge on the nature of the world, accumulated by natural sciences and allowing the advent of the technological era, should be quickly and fully exploited by human and social sciences. The lagging behind of the human and social sciences is appalling and the ocean of ignorance and prejudices on the nature of man and of political and social reality represents the main endangerment of the survival of our species.

This is the basic tenet of our subsequent analyses.