

Philosophy, as I shall understand the word, is something intermediate between theology and science. Like theology, it consists of speculations on matters as to which definite knowledge has, so far, been unascertainable; but like science, it appeals to human reason rather than authority, whether that of tradition or that of revelation.

Bertrand Russell¹

Preface

We live in a golden age of the space, life and earth sciences. Never before did we have such detailed view of our cosmos, or understood in general terms its evolution, as well as the formation of our own planet. Never before have we been in a better position to approach the time-honored question:

Are we alone in the universe?

Yet, at the same time never before have we had such misrepresentation of the real frontiers of science. At a time when extreme specialization is necessary, due to the ever-increasing rate of discovery, it is necessary for scientists to explain the scope, limitations and successes of their research.

The general public has sometimes the mistaken impression that faith and reason are competing aspects of our culture, rather than complementary sectors of our humanity. To a large extent there is a dual aspect to keep in mind, firstly a vertiginous progress in science and technology, and secondly the complexity of human culture that goes beyond the frontiers of science.

The lack of appreciation of science by a large sector of our society may be due to the fact in science we do not always have a positive attitude to the question:

Does science need to be popularized?

The popularization of science assumes a central role in cultivating an appropriate relationship with the society that is funding our research. Valuable efforts to explain our work to a large sector of society have been made by scientists, journalists and even by gifted writers that, while not being practicing scientists, are nevertheless well informed of the main achievements of science. The

successes that have received adequate coverage include the exploration of the Solar System, the discovery of other solar systems, and the ever-increasing accuracy with which we are already measuring the most basic physical phenomena that makes nature more intelligible.

Alas, such efforts in the popularization of science have not been sufficient. This is amply demonstrated by the present unnecessary, but sadly growing controversies generated by ignoring the natural frontiers of science. Controversies have also arisen by searching within the domain of the humanities what lies beyond their own frontiers. The experimental method that we have inherited from Galileo and his contemporaries lies inside science's frontier and defines its range of influence.

In spite of its evident difficulty, we have attempted to introduce the reader to a well-balanced review, in which science is inserted appropriately inside the wider domain of contemporary culture; this term is to be understood as the grand total of civilization's achievements in the millennia that have elapsed since the ancient paintings began to decorate the caves of Altamira and elsewhere, deep into prehistoric times.

In the past, books on Mesopotamian archaeology had attributed the invention of writing to a Sumerian living in Uruk about 3000 BC, although today the picture has been suggested to be somewhat more complex². Even earlier, before 3100 BC, two important events took place. When a Giza race entered Egypt via the Delta, they brought new ideas with them including writing, thus introducing a second Middle-Eastern area into history³.

Another major component of our culture emerged after the invention of writing, namely religion. Pharaoh Akhenaton introduced monotheism for a brief period (cf., Sec. 2.2). The permanent establishment of Abrahamic religions (Judeo-Christian-Islamic) followed the singular Egyptian event. The non-Abrahamic world creeds: Hinduism, Buddhism and Confucianism eventually completed the group of the main world religions.

The flourishing of culture received another major impact with the emergence of philosophy. Miletus, like other Ionian cities became a prosperous economic centre in the 7th and 6th centuries BC. The legendary Thales is considered to be the founder of philosophy. He assumed that water was the original substance, out of which all others are formed. In spite of the impression this statement makes on contemporary readers, it had the merit of stimulating thought and observation amongst his successors.

Finally, science, the last major component of culture began to take its present form after the seminal contributions of Copernicus and Galileo in the 16th and 17th centuries AD. Unfortunately, in spite of the flourishing of science after the Renaissance, there has been an ever-growing negligence of accepting the internal boundaries of each cultural sector. Philosophers have attempted to understand problems requiring the experimental approach of science. One example is

consciousness. Science has also invaded domains beyond its well-defined experimental boundaries when, in spite of their academic training in science, rather than in the humanities, a restricted group of scientists in popularizing science have made statements (rather than theories supported by experiments) on questions for which training and familiarity with the humanities are essential. This attitude has conveyed the erroneous impression to the general public that believers should be exposed by what this restricted group of scientists regard as an interior misunderstanding on the part of the pious.

Sadly, overstepping the internal frontiers of culture has generated these controversies. At present ignoring these domains of culture has also taken place in a different context. The frontiers of science have been invaded with arguments that are foreign to the scientific tradition. The literal interpretation of the holy books of the monotheistic religions have led to argument, rather than to a constructive dialogue with science, especially with respect to the theory of evolution, which is not only one of the most remarkable scientific achievements, but it also represents the backbone of the life sciences. This is particularly relevant in the case of the Book of Genesis. Charles Darwin, by giving a theoretical foundation to natural history, improved considerably previous work in biology. Darwinism, like the whole of science, is clearly open to discussion, but this is an internal discussion that has to take place within the realm of science with publications in peer-reviewed journals.

We may find ways in the future of improving our rationalization of natural history. Fortunately, there are competent authors that have delineated clearly the internal frontiers of culture. The quotation at the beginning of this Preface by Bertrand Russell, the remarkable philosopher, mathematician and the 1950 Literature Nobel Laureate, is one such example. More recently, Professor John Cornwell has produced a timely, scholarly and clear presentation of these matters⁴.

We hope that the present book will make a modest step in the correct direction for the communication of science, in order to dispel all anxious fears that either the humanities, or science, carry within themselves a certain danger for our deepest convictions in the realms of either faith, or reason. But such an undertaking is difficult, since academic training encourages expertise in restricted sectors of the cultural repertoire. To help the reader in this task, in Sec. 1.5 we make recommendations that will add to the great enjoyment of the present book by sharing the author's excitement for understanding the implications of the discovery of a second Genesis within our own lifetime.

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