

WORKSHOP FISICA

Viña

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Not being a physicist, I should apologize for taking a few minutes of your valuable time to speak about things not directly pertaining to the highly specialized theme of this Workshop. But, on behalf of the Catholic University I would like to say that we feel very honored to be sponsoring this meeting and that we extend to you all the most cordial welcome, together with our wishes that the Workshop may be fully successful.

I would like to mention three of the reasons why this meeting should attract the friendly attention of people interested not only in astrophysics but also in other areas of knowledge, and of all those who feel a genuine concern about the philosophical and the social implications of scientific advance.

First, let me say that for the Chilean scientific community this meeting is interesting because it helps to strengthen and to multiply our international scientific links, especially in an expanding area of knowledge which shows a very dynamic growth.

I want you to know that this fact is very important for the whole of the Chilean scientific community. This meeting adds strength to our efforts to convince the national public opinion that basic science is of paramount importance, and that it is both necessary and possible that Chile remain actively connected to the international scientific community.

I am sure that most of you will have met at some time with the difficulty of convincing policy makers in your own countries of the fact that there can be no real advance in applied science, in technological research and development, without a parallel effort in the so-called pure sciences. And you will readily understand that success along these lines which may be occasionally difficult for you, is very often nearly impossible for us, in countries riddled with very urgent social and economic needs which compete for the scarce resources available. Here the history of scientific development resembles much a fight for survival. We are however convinced that unless a serious scientific endeavor is steadily maintained, our global development will certainly be hindered. Your presence has therefore a kind of pedagogical value for the national community, and we feel grateful for it.

The second point I would like to make is of a different kind. I must say that the question of the evolution of the organization of stellar matter has a peculiar sort of appeal for me. As a biologist, I have been active in a science where a central role is played by a theory such as organic evolution which assigns a predominant role to the **history** of the interplay through time of a number of variables.

The basic question by Darwin more than 150 years ago was derived from the artificial breeding of animals and plants carried out with the purpose of introducing new varieties. The question could be stated quite simply by saying : what is the agent which in Nature replaces or does the work of the breeder? **The fundamental assumption behind this question was certainly a breakthrough in the history of human thought.** It was assumed that the laws that were in play in remote ages of the history of life were the same which are valid today and that breeding as a process was essentially identical whether performed by man or present spontaneously in nature, both in the present time and in a very remote past.

It is interesting that the heuristic value of such an approach was so great that evolution penetrated all branches of biology long before a relatively rigorous theory could be developed to account for its mechanisms.

If my understanding is correct, recent advances in astrophysics suggest that the laws established in contemporary physics may be applied to give an account of a historical past, and that **history** refers **here** not only to organic structures, but to the whole of the universe.

It is indeed thought-provoking that what might be called the historical dimension should assume such importance in the study of the fundamental laws of nature. It might be reminded that **natural history** was a term coined to describe some complex physical and biological entities. These appeared to have a certain individual coherence, such as might be the case with plants, animals and even the earth as a whole. The question raised by biologists as to find a historical explanation for the present features of the biological systems, might perhaps have a parallel in the endeavour to find out what the reasons are for the physical universe to be such as it actually is.

And this brings me to the last of the three points I wished to make.

Astrophysics or its antecedent sciences have had considerable weight in the development of human culture. When one looks at the historical development of science, one feels more and more skeptical about the alleged radical differences between natural sciences and humanities. Science and, in this case, astronomy has always striven to give an account of reality. On the other side, men of all time have extracted teaching and guidance for their lives from the contemplation of the star-lit heaven. One remains always in doubt as to whether they were learning from the stars or rather projecting their own conceptions into the dome of firmament.

Chaldean cultures tried to read in the stars the secret signs that governed the destinies of man. In classical antiquity, and well into the Middle Ages, stars offered an awe inspiring demonstration of the regularity and beauty of a God-given order. The great sea-farers of the age of geographical discoveries, men endowed with a

more practical spirit, found in the stars the guidance they needed for their far-flung oceanic adventures. The advent of modern science looked upon the brilliant heavenly bodies as masses dispersed in an infinite and essentially unchanging space in which movement was determined by the fixed laws of mechanics. Each of these conceptions envisioned a different sort of sky and was connected with a different view of the basic laws ruling over man and nature.

Recent astrophysics yield a new and especially exciting outlook upon these age-old witnesses of man's existence. When man looks to-day at the galaxies, he is looking in a certain manner, at the future or at the past of his own constellation, of his own present world. In a way, the evolution of galaxies and stars shows us the evolution of the world we live in and opens up a new door for the understanding of man himself. Astronomy is once again at the helm of man's adventurous travel into the unknown. This is really and truly a renewal of the humanistic value of scientific endeavour.

May I say again that we are very pleased to have you here, and that I wish you all a pleasant stay and an interesting and fruitful meeting.