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SCIENCE AND THE FUTURE OF EUROPE

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Birth of Science

Whenever a scientist visits Greece he is reminded of the fact that here science was born. The signs in the streets are written with the same letters as he uses in his formulae, and the people speak a language grown from the same root as most of the terminology used for describing his new discoveries. It was a "Titan" which lifted the first men to land on the Moon and it was "Apollo" himself who carried them there and safely brought them back again.

Science was born as a part of the explosion of cultural creativity in Greece 2500 years ago. A new way of thinking was introduced, and resulted among other things in the rise of the sciences of mathematics, physics and astronomy. This was a unique achievement of the ancient Greeks. Certainly they also excelled in literature and theater, in sculpture, painting and music, but so did the Chinese, the Indians, the Sumerians and the Egyptians; some of them even earlier. But no other culture has developed science, unless inspired from Hellas.

There have been many attempts to explain why science was born just in Greece. A material standard high enough to give a group of people time to think, a political system which allowed them to think, and a military technology to defend their culture against attacks from barbarians - all these are of course necessary conditions. But such conditions have existed many times in many places, in many cultures. Then there was the inspiration from Egypt and Mesopotemia, and perhaps also from India. But is this enough to explain the birth of science? The most charming theory is no doubt that proposed by the Greeks themselves: when old Zeus once had a headache, Thea glaucops Athenae sprang out of his head, fullgrown and armed for battle. I am not sure that any other theory is definitely better.
Cultural stability

For all our admiration for the classical culture we must state that it had one serious weakness: it lacked stability. Both India and China built up cultures about 3000 years ago which have exhibited a high degree of stability and permanence. They have fluctuated, they have had many periods of decay, there have been several invasions by barbarians who have swept through their territory. In China these were the Mongolians and the Manchurians, the Europeans and the Japanese. In India, where religion is of decisive importance, we could speak of a Muslim invasion from the north and Christian invasion from the south. But these cultures have always recovered after about one hundred years, and the barbarian invasions have often rejuvenated and vitalized them.

In India it seems to be the caste of Brahmans which has been large enough and strong enough to preserve the cultural tradition. In China the Mandarin system has for centuries recruited the intelligent among the people into an organisation with at least the same stability. The Greek culture did not produce a cultural organisation of a similar strength and endurance. Perhaps the reason was that the group was numerically very small, perhaps it was because Confucius was wiser than Plato, perhaps it was the price to be paid for its unique dynamism and excellence. When the Romans learned the Greek art of warfare, and developed it further, Greece lost its political independence. Certainly this did not immediately mean the destruction of the Greek culture - on the contrary it spread to the whole Hellenistic world and penetrated the whole Roman empire, including a large part of Europe. But when a wave of religious fanaticism swept the whole classical world, its culture was too weak to resist. Europe became, and remained for 1000 years, one of the backward parts of the world.

The role of Science

As most people today associate science with its technological applications, it is necessary to stress that in the classical age science had almost no technological application. The science of that time is more adequately described as "natural philosophy" or "pure science" - in German: "Wissenschaft". It had a large
impact on the general way of thinking. The discovery that natural phenomena occurred according to certain fixed laws of nature, and were not staged arbitrarily by the gods, was of course implicitly an attack on religion, but the scientists avoided a dangerous confrontation by presenting the laws of nature as legislated by the gods. "Astra regunt hominen, sed regit astra Deus". This worked for some time but when the classical culture broke down and the centres of learning were closed and the libraries burnt in the name of religion, the scientific spirit was also destroyed. Philosophy was permitted only as an "ancilla fidei", a servant of religion.

Science in Europe

The Renaissance of the classical culture meant a revival of the Greek spirit of scientific thinking. In fact new scientific discoveries were essential for the destruction of medieval thinking. At the same time science itself changed character. Physics and astronomy were increasingly expressed in mathematical terms. This group of sciences had a decisive influence on philosophical thinking, and was indirectly a contributing factor to the Enlightenment. On the more technical level it facilitated navigation, thus contributing to the European colonisation and exploitation of the whole world. However, on the whole the technological development of Europe was not influenced very much by abstract science until the end of the nineteenth century, when a new epoch started.

The chemical and electrotechnical industry, especially in Germany, was a large-scale application of scientific discoveries and scientific methods for industrial purposes. This activity has avalanched and science today is essential to industry and especially to the military technology. In fact when people speak of science today they usually think of these applications and often forget the initial meaning of science.

Hellas and Europe

As pointed out in several of the very interesting lectures we have heard here, the European development since the Renaissance is in several respects a large-scale repetition of the old Greek development. In fact the title of our symposium draws
attention to our attempts to find parallelism between the ancient Greek and the modern European development. In both cases an assembly of politically independent states collaborate in the cultural, technological and economic development, they colonize large surrounding regions, and at the same time they compete, quarrel and fight with such fury that they ultimately weaken if not completely destroy their common culture. In both cases the result has been that other countries have taken over the political and increasingly also the technological and economic power.

In the case of Hellas, these countries were Macedonia and the Hellenistic countries, and later Rome, in the case of Europe they are the USSR and the USA. This part of the process we have experienced already. What will follow? In the case of Hellas the decay continued until the complete destruction of the country as a centre of culture. The "Delphic idea" of solving disputes by peaceful negotiations, did not save it. What is the prognosis for Europe? Has the Delphic idea when applied to Europe any chance of saving it?

In retrospect our historians have demonstrated what was the mechanism of the fall-down of Hellas. Its success was in part due to its sophisticated military technique, but we learn from history that a military superiority is always a transient advantage. Any military technique is sooner or later learned by your enemies who develop it further, with the result that sooner or later any military technique you develop in order to protect yourself is likely to be used for your own destruction.

Furthermore, in classical times Hellas was a very fertile region. The culture it nourished led to a population explosion nature was exploited with increasing ruthlessness, the soil was destroyed, resulting in an eroded barren region, which could no longer support a high culture. And the development of navigation and a large commercial empire did not last for long. It also backfired, when the trade was taken over by other countries.

**Future of Europe**

And what about Europe? If we substitute "Hellas" by "Europe"
- is it not the development of modern Europe we describe?
Similarly to Hellas which lost its political power, Europe
which earlier was the world's centre has now lost its
independence to the two superpowers, even if legal forms and
polite fiction may assert to the contrary. Will the future of
Europe be similar to that of Hellas? Are we rushing towards the
same complete annihilation? Or is our situation so different in
some important respect that Europe can hope to survive?

Our assets...

Obviously in one respect our situation is drastically diffe-
rent: we have a highly developed science, whereas in Hellas
science was just beginning. Since the Renaissance we have built
up in a systematic way our knowledge in mathematics, physics,
chemistry, biology, and their applications; in the historical
sciences, in sociology, the political sciences and economics.
Our knowledge in history, sociology, and the political and
economic sciences is so advanced, that we understand what
mistakes earlier civilizations have made. Isn't it obvious
that we Europeans, who possess such treasures of knowledge and
experience, should be able to predict all possible catastrophies
and avoid them? We should be able to plan our future in a sensible
way and approach a state when every human being, man and woman
with equal rights, has enough to satisfy their needs and are
glad to work together with all others for the perpetuation of a
peaceful life in harmony with nature, including all other living
beings. We should be able to collaborate with all parts of the
world. Certainly there are natural resources enough in the world
for a large and prosperous population, we have medical and psy-
chological and social knowledge enough to prevent it from being
too large, we know how to exploit our resources without destroying
nature, we can manufacture the most complicated chemical sub-
stances which are very useful and we know how to avoid the
poisonous substances. We can drive the complicated machinery
which does all this by the flow of energy which the sun provides
us with in the form of water power, wind power, biomass and direct
sunshine, we have fossil fuel and probably also hot rock energy
for a very long time to come. And with the beautiful earth as
our launching pad we can go out in space and see whether it is worth while to establish space colonies and spread the human race to other parts of the Universe.

... and how we use them

Such are our possibilities. But what is the reality? We find that Europe is still one of the most prosperous parts of the world, and after rapid social progress, especially during the last half-century, it is one of the most egalitarian societies in the world. Still there are many serious problems which seem to be increasingly menacing. Criminality and misuse of drugs, which serve as a social fever thermometer, indicate an increasing illness. Further a considerable group of intelligent people feel so alienated and frustrated that they are ready to sacrifice their lives in an all-out fight against the present society, and they have demonstrated that they have technical knowledge and organisational ability enough to cause serious disruption in the fragile social structure of our highly technological society. Again, our civilization does not have the stability of other cultures.

A third group, which is drastically different, consists of what is vaguely called the environmentalists. They criticise a misuse of technology which leads to a pollution of the environment and the destruction of nature, an urbanisation which has got out of control, and a centralisation of the economic power in the hands of a few who are misusing it to their own advantage at the expense of all others. Economic power is so overwhelmingly strong that it can press the politicians to run the world according to very shortsighted economic criteria, and it is able to manipulate public opinion by a psychologically sophisticated propaganda. This has been increasingly obvious when now the environmentalists are focussing their criticism on "peaceful" nuclear energy, which no doubt is a terrifying example of a high technology running amok.

Science as a threat to survival

All this is serious, but as we all know the most serious threat to us and to the whole of mankind comes from the arms race. A
very large part of our scientific-technological manpower and resources is used for increasing our power of destruction. This is especially a threat to Europe, because it is most likely that our region will be the first one to be destroyed, and possibly destroyed for ever. How have we brought ourselves into this situation? Why is man using his intelligence and his skill for his own destruction?

To a large extent this may be because science has changed its character. In the same way as during medieval times philosophy became an ancilla fidei, science has become an ancilla, a servant of political, economical and military establishments. Its aim is no more primarily the search for knowledge and truth, it is to help those who have power in their fight for still more power. The result is that science is back-firing. It was Europe that developed modern science. During the first few centuries after the Renaissance science clarified the structure of the world around us, it helped us to understand our place in a Universe and on Earth, it showed that we are the product of cosmical forces and of the biological evolution which has given us a very efficient brain. So far we used our brain mainly to our own benefit, to get control over our fellow-animals and monopolize the riches of nature to our own goals.

However, as mentioned already, a new phase in the evolution of science started less than a hundred years ago, when science was applied to speed up technological progress. This multiplied our resources in a very short time and science was hailed even more as a most beneficial factor in the progress of mankind. But half a century ago there was a new important change in the character of science: it began to show that it also had a destructive aspect. Already during the First World War it became obvious that science had a powerful military impact, and with the discovery of nuclear fission science became increasingly a threat to mankind. This is aggravated by the fact that at present about 40% of all scientists work in military research projects designing increasingly terrifying arms. Whether this will lead to complete destruction of our whole culture or not
depends upon whether our society can adequately reconstruct its social, technological and economic fabric.

**Can we stop the dangerous development?**

From the wars we know that a drastic reorientation of society can be made very rapidly if national survival is threatened. There is no doubt that a similar drastic reconstruction is possible if only the threat of the arms race is understood and its nature generally clarified. But most people prefer to ridicule the "doomsday prophets" and approach the Doomsday in a fatalistic mood.

The threat of destruction, especially by military use of nuclear energy, is the real challenge of science for the future of Europe. Fortunately the terror-balance rope-walking has not yet failed, but for purely technological reasons it becomes increasingly risky. It is intolerable that the politicians do not consider survival to be an important political issue. It is an omission that the computers of the economists, who make detailed scenarios of the economic future of Europe, never introduce the date of the "omnicide" after which there will be no Europe, no economy and no future. It is also most remarkable that the people of Europe - with the exception of some of the environmentalists - seem not to care about their own future.

Let us ask the oracle of Delphi: Is it possible to save Europe from the back-firing of the applied science it has fostered? And if so, could the Delphi Cultural Centre provide a badly needed leadership for Europe and for the whole world?
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The symposium of the European Cultural Centre of Delphi was devoted to a study of similarities between the developments in ancient Greece and in modern Europe. In this lecture differences and similarities are discussed. It is pointed out that Greek science had almost no technical application whereas in modern Europe it is decisive for the development. During the last decades the destructive application of science is increasingly serious in connection with the arms race. Nuclear energy, especially its military applications, is now a threat to the survival of Europe. The classical culture was destroyed because it was unstable, and the situation in modern Europe may be similar.

Key words: Arms race, European science, Greek science, nuclear energy