

## THE PRESENCE AND ABSENCE OF SCIENCE IN ITALY'S EDUCATIONAL TRADITION

GIUSEPPE TOGNON

Italy is a country that boasts a fine scientific tradition and vast technical experience, yet Italian society still has difficulty in recognising itself in this picture. The basic education offered by Italian schools is good, indeed among the best in the world. The level of university education is up with that of other major nations. Italy no doubt suffers more than most the shortcomings typical of Europe as a whole: few investments in Research and Development, a small number of researchers, fragmentation in terms of organisation, few patents. This state of affairs is however in line with the general 'European paradox': a continent where the scientific base is sound, where the network of universities and laboratories is excellent, where there is a high concentration of theoretical expertise, but also where scientific discoveries and technological applications are not at the same level as those of the US or, until a few years ago, Japan.

Why then in Italy do we find it particularly difficult to accord science its rightful place? Perhaps because Italy has been the 'Catholic' country most chastised by the Church? But we know that this has not been the case for the past two centuries. Perhaps because its economic and industrial development was delayed somewhat? This is true, but it was then exceptional, and Italy managed to catch up. The causes are more complex. They are concerned with the tricky relationship between knowledge and Italian society, and have been compounded by the schooling model, adopted in 1860 when the country was unified and confirmed by the reform of the schooling system inspired by the neo-idealist philosopher Giovanni Gentile in 1923. This model is based on supremacy of the culture of the written classics and on the clear-cut distinction between literary and durable education for the emerging bourgeoisie and practical, accelerated education

for the masses. The Gentile reform was important in many ways, and cannot be criticised just because it was effected during the period of fascism. The origins of this reform went back a long way, and were accepted by the majority of Italian intellectuals, including liberals and socialists. At the beginning of the 20th century in Italy, as in France and Germany, there was a revival in a philosophical movement whose aim was to establish unity around spiritual values that might overcome those of materialism and positivism. There was a violent confrontation between different schools. The neo-idealistic current came out victorious, partly because of its ability to represent the need for social emancipation of the lower middle classes that sought employment in the public sector and liberal professions. We know that a sound basic classical education, centring on the study of the arts and languages, actually helped rather than hindered the career of major scientists. The main limit of that cultural model was rather the intent to write off science categories as 'pseudo-concepts', as B. Croce said. Unfortunately such a purely instrumental conception was enormously successful, partly favoured by a certain naive Positivism. The stories of positivism-inspired science illustrated the slow but inexorable rise of scientific observation and experimental verification over religious prejudices and traditional abstract knowledge. Positivist literature stressed the benefits that the new rigorous scientific method would have on humanity, not only in cultural but also in civil, political and social terms. Such stories had dramatic contrasts: light against darkness; rationality opposed against credulousness; the truth clearly distinguished from error.

In light of these and other conditions that I cannot name here, contemporary Italian society has systematically distinguished between the 'two' cultures, theoretical and experimental, thus refuting the specific nature of its tradition. Above all, it has constructed the image of the cultured man around the model of the jurist and man of letters and the image of the influential man around the model of the politician. Notwithstanding the efforts of some pioneers, 20th century Italian society gave priority to ethical-political issues over scientific research. In Italian universities the chair of history of science or scientific techniques has existed only since 1980. The first national programme for the divulgation of a scientific culture got under way only in 1989. Hostility towards the sociology of science has meant that scientific research has been removed from national awareness.

This national weakness may also be explained by the absence of a policy defending and enhancing Italy's historical and scientific heritage. Everybody knows for instance that Italy is the nation of museums and collections *par*

*excellence*. But among the thousands of public and private museums and institutions, which are cited as proof of the absolute excellence of our country, scientific museums and technological and industrial collections are rarely mentioned. After the Unity of Italy little or nothing was done in this sector to catch up with Great Britain, France, Germany or the United States. A significant breakthrough in this direction only came in the 1920s and 1930s, a time of great modernisation for Italian society. Fascism embarked on a series of initiatives to valorise Italy's scientific heritage and to disseminate a technical-scientific culture, from which all the institutions still operating in our country originated. This interest was not selfless. The Regime aimed to finally give Italian culture as a whole 'virile' and powerful guidance. It saw Italian 'supremacy', in both civil and scientific terms, as being effective for the regime's propaganda and for the celebration of Italian science. Many of the best Italian scientists were forced to emigrate. It was in this climate and with these intentions that the scientific institutions and museums that still constitute the basic framework of Italy's research system, first and foremost the National Research Council, were founded. The issue that should be stressed here is that after World War Two the new Republic basically preserved the same system. It did change internal set-ups, create new laboratories and new faculties, but it was unable to change the collective mentality. For decades Italian scientists have had to 'struggle along', being forced to perform miracles, often to emigrate or spend a great amount of energy in search of resources, available almost only from public sources. Many researchers have become – or generously turned themselves into – 'politicians', with results that have not been spectacular either for science or for politics.

We can no longer carry on this way. The world's scientific and social scenario has changed, but the problem remains that of the educational roots of science. Psychological and social sciences have shown us the importance of the cognitive and emotive mechanisms that rule the life of individuals and communities. We all know too the way in which major technological and scientific challenges have been brought to the attention of the public at large by the media. Government and non-government committees dispensing ethical-scientific advice have sprung up in all countries. The majority of general discussions are now concerned with ethical controversy born out of scientific research. And with globalisation, moratoriums just do not work in 'sensitive' areas. We are unable to ascertain whether the moratorium is universal or only affects with some countries; whether it is possible to overcome the pressure of lobbies and industrial interests; whether researchers can be persuaded to prefer prudence to speed and private interests.

Rhetorical solutions can no longer be proffered. It is always possible of course to alter teaching methods, organise more training activities, create foundations or prepare major exhibitions. Positive transformation can clearly only result from a series of coordinated actions in schools and universities. One of the basic school functions that has almost totally lost its positive influence in recent decades is the scientific laboratory. A large number of schools were and still are endowed with such laboratories. But with current research trends, the lack of funds and competent technicians and limited equipment, there has been a gradual abandonment of laboratories, and they have been sidelined from teaching activity. I personally am aware of the attempts to reform educational systems in all industrial countries over the past twenty years: too often they have fallen victim to the 'engineering' of school curricula that has failed to yield good results. As Einstein said: 'I reject the idea that schools must directly teach the specialist knowledge that will have to be used in later life. Life's needs are too many and complex for such specialist teaching to be possible. The aim of schools should always be to ensure that youngsters leave school with a harmonious personality. The general ability to think and judge independently should also take first priority'. If this is not possible for the masses, then at least we have to try to invent the new figure of 'mediator' beside the figure of pure researcher: the mediator, an invaluable scientist whom the community of researchers entrusts with the job of seeking consensus, explaining and pre-empting objections. In university departments it is necessary to re-evaluate the role of those studying and teaching the history and didactics of science, a function often assigned to second-rate scientists.

The general problems is that of educating our societies to be able to choose while the machine is running, and to select the level and nature of knowledge that such choices require. If there is an alphabet of science, consisting of specific and specialist knowledge, then there is also a 'grammar' of knowledge, which extends beyond specific areas and is concerned with the overall behaviour of men in relation to knowledge and its history. There was a time when life's choices were few, and it was often other people that decided for us: what to study, who to live with, who to do business with, who to spend time with, who to vote for. Now we are called upon to make choices about everything, every day. These are almost always simple or false choices, regarding market-oriented consumption choices. When we come across real choices, we try to brush them to one side, because we have got out of the habit of considering knowledge as the basis for choices and of encouraging mutual trust. We are no longer living at a time when the

models of scientist are those of Einstein or Fermi, alone and faced by terrible alternatives, but still very cultured men alert to ethical problems. The problem with our system of specialist teaching is basically: it does not teach scientists about responsibility, it does not help the layman to appreciate scientific progress, it does not provide scientists with the tools to defend these breakthroughs when they are called into doubt.

To develop the educational roots of science, therefore, we must work on several fronts and 'from the bottom', namely at the level of individual scientists. The number of scientists should however rise well beyond the number of professionals, and scientific intelligence should become a mass phenomenon. We do not have to create a mass of researchers, but it is important to get whole populations to understand something about science, enough to be able to choose and to give or deny consensus to professionals, to involve them in the community rather than confining them to the laboratory. Without a popular scientific base, scientists too tend to intensify their individualism, and when they have to choose between cynicism and responsibility, they are torn by what are often futile internal conflicts. And without the understanding of public opinion, it is almost a waste of time calling upon scientists to reflect upon their responsibility with regard to the results of their action.

Human beings play a part in scientific research in three ways. Through the personality of the individual scientist, through the personality of scientists brought together in a community, and finally through the history of the society they are a part of. Science is not just a two-sided game, theory against nature, it is more complex, with the individual playing at least three roles: scholar, researcher, citizen. The more the person delves into science and acquires knowledge, the more responsibility and ethics circulate around the world through him.

Today science and technology are 'current money', but if the successful model of 'scientist' continues to be that of extreme competition between nations, between lobbies, we cannot hope to make of scientific research something more than other marketable occupations. If moreover public opinion continues to consider scientific research only as a means to an end, the scientist will continue to be viewed only as an economic entity, and it will attempt to unload the causes of evil onto society. There is the danger that what is happening against financial globalisation will be transferred to scientific and technological globalisation, which is the essence of the former. Then no one will be able to call himself simply 'a free scientist of a free science'.