

George Orwell

What is Science?

In last week's *Tribune*, there was an interesting letter from Mr. J. Stewart Cook, in which he suggested that the best way of avoiding the danger of a 'scientific hierarchy' would be to see to it that every member of the general public was, as far as possible, scientifically educated. At the same time, scientists should be brought out of their isolation and encouraged to take a greater part in politics and administration.

As a general statement, I think most of us would agree with this, but I notice that, as usual, Mr. Cook does not define science, and merely implies in passing that it means certain exact sciences whose experiments can be made under laboratory conditions. Thus, adult education tends 'to neglect scientific studies in favour of literary, economic and social subjects', economics and sociology not being regarded as branches of science. Apparently. This point is of great importance. For the word science is at present used in at least two meanings, and the whole question of scientific education is obscured by the current tendency to dodge from one meaning to the other.

Science is generally taken as meaning either (a) the exact sciences, such as chemistry, physics, etc., or (b) a method of thought which obtains verifiable results by reasoning logically from observed fact.

If you ask any scientist, or indeed almost any educated person, 'What is science?' you are likely to get an answer approximating to (b). In everyday life, however, both in speaking and in writing, when people say 'science' they mean (a). Science means something that happens in a laboratory: the very word calls up a picture of graphs, test-tubes, balances, Bunsen burners, microscopes. A biologist, and astronomer, perhaps a psychologist or a mathematician is described as a 'man of science': no one would think of applying this term to a statesman, a poet, a journalist or even a philosopher. And those who tell us that the young must be scientifically educated mean, almost invariably, that they should be taught more about radioactivity, or the stars, or the physiology of their own bodies, rather than that they should be taught to think more exactly.

This confusion of meaning, which is partly deliberate, has in it a great danger. Implied in the demand for more scientific education is the claim that if one has been scientifically trained one's approach to *all* subjects will be more intelligent than if one had had no such training. A scientist's political opinions, it is assumed, his opinions on sociological questions, on morals, on philosophy, perhaps even on the arts, will be more valuable than those of a layman. The world, in other words, would be a better place if the scientists were in control of it. But a 'scientist', as we have just seen, means in practice a specialist in one of the exact sciences. It follows that a chemist or a physicist, as such, is politically more intelligent than a poet or a lawyer, as such. And, in fact, there are already millions of people who do believe this.

But is it really true that a 'scientist', in this narrower sense, is any likelier than other people to approach non-scientific problems in an objective way? There is not much reason for thinking so. Take one simple test — the ability to withstand nationalism. It is often loosely said that 'Science is international', but in practice the scientific workers of all countries line up behind their own governments with fewer scruples than are felt by the writers and the artists. The German scientific community, as a whole, made no resistance to Hitler. Hitler may have ruined the long-term prospects of German science, but there were still plenty of gifted men to do the necessary research on such things as synthetic oil, jet planes, rocket projectiles and the atomic bomb. Without them the German war machine could never have been built up.

On the other hand, what happened to German literature when the Nazis came to power? I believe no exhaustive lists have been published, but I imagine that the number of German scientists — Jews apart — who voluntarily exiled themselves or were persecuted by the régime was much smaller than the number of writers and journalists. More sinister than this, a number of German scientists swallowed the monstrosity of 'racial science'. You can find some of the statements to which they set their names in Professor Brady's *The*

But, in slightly different forms, it is the same picture everywhere. In England, a large proportion of our leading scientists accept the structure of capitalist society, as can be seen from the comparative freedom with which they are given knighthoods, baronetcies and even peerages. Since Tennyson, no English writer worth reading — one might, perhaps, make an exception of Sir Max Beerbohm — has been given a title. And those English scientists who do not simply accept the *status quo* are frequently Communists, which means that, however intellectually scrupulous they may be in their own line of work, they are ready to be uncritical and even dishonest on certain subjects. The fact is that a mere training in one or more of the exact sciences, even combined with very high gifts, is no guarantee of a humane or sceptical outlook. The physicists of half a dozen great nations, all feverishly and secretly working away at the atomic bomb, are a demonstration of this.

But does all this mean that the general public should *not* be more scientifically educated? On the contrary! All it means is that scientific education for the masses will do little good, and probably a lot of harm, if it simply boils down to more physics, more chemistry, more biology, etc., to the detriment of literature and history. Its probable effect on the average human being would be to narrow the range of his thoughts and make him more than ever contemptuous of such knowledge as he did not possess: and his political reactions would probably be somewhat less intelligent than those of an illiterate peasant who retained a few historical memories and a fairly sound aesthetic sense.

Clearly, scientific education ought to mean the implanting of a rational, sceptical, experimental habit of mind. It ought to mean acquiring a *method* — a method that can be used on any problem that one meets — and not simply piling up a lot of facts. Put it in those words, and the apologist of scientific education will usually agree. Press him further, ask him to particularize, and somehow it always turns out that scientific education means more attention to the sciences, in other words — more *facts*. The idea that science means a way of looking at the world, and not simply a body of knowledge, is in practice strongly resisted. I think sheer professional jealousy is part of the reason for this. For if science is simply a method or an attitude, so that anyone whose thought-processes are sufficiently rational can in some sense be described as a scientist — what then becomes of the enormous prestige now enjoyed by the chemist, the physicist, etc. and his claim to be somehow wiser than the rest of us?

A hundred years ago, Charles Kingsley described science as ‘making nasty smell in a laboratory’. A year or two ago a young industrial chemist informed me, smugly, that he ‘could not see what was the use of poetry’. So the pendulum swings to and fro, but it does not seem to me that one attitude is any better than the other. At the moment, science is on the upgrade, and so we hear, quite rightly, the claim that the masses should be scientifically educated: we do not hear, as we ought, the counter-claim that the scientists themselves would benefit by a little education. Just before writing this, I saw in an American magazine the statement that a number of British and American physicists refused from the start to do research on the atomic bomb, well knowing what use would be made of it. Here you have a group of some men in the middle of a world of lunatics. And though no names were published, I think it would be a safe guess that all of them were people with some kind of general cultural background, some acquaintance with history or literature or the arts — in short, people whose interests were not, in the current sense of the word, purely scientific.

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