

Ryle's Last Testimony

Sir Martin Ryle died on 14 October 1984. Ryle was best known as a radio astronomer - one of the first astronomers to win the Noble Prize for Physics - but the main activity of the last decade of his life was his campaign against nuclear weapons and the nuclear power industry.

This letter was sent several months before Ryle died to Professor Carlos Chagas, president of the Pontifical Academy of Sciences. The letter expresses great despair at the way science is being misused, and can be read as the last testimony of a distinguished scientist. You will agree that Ryle's last thoughts deal with some of the most crucial and fundamental issues of our time.

24 February 1983

Dear Professor Chagas, You ask a very difficult question in seeking topics, which should be discussed in considering the contribution, which scientists, may (should) make towards peace.

I am afraid that I can only express my own views and hope that out of them some topics may emerge. I think one cannot separate science from the political/military/historical background, and perhaps, I should summarise my personal views here first. Inevitably I see through British eyes, but I think the view might have been similar if I had spent my life in any European country.

1. *Political*: The USSR exists, the US exists; they must either learn to live together, or die together.

The political system of the USSR is appalling, but those who suffer under it - and have little freedom to influence it - are those who will die. (In World War I some 5 percent of casualties were innocent civilians; in World War II about 50 percent; in a nuclear war it would be perhaps 95 percent.)

One cannot change the Russian system from outside - only annihilate it and the innocent with it. Change must come from within and will be slow. (Our Western system is not perfect - the ever-increasing gap between rich and poor; the increasing power of the multinational companies; inadequate contribution to the Third World; Vietnam and the destabilizing of Chile, Central America, and so on.)

There are great asymmetries; for European Russia, strategic and theatre weapons are the same. The effects on the two super-powers of World War II were very different. In the USSR seven million combatants and 12 million civilians were killed; in the United States 400000 combatants were killed (in all the theatres of war put together), and no civilians. Two million square kilometers of the Soviet Union were occupied and severely damaged, but not even a square meter of the United States.

The effects of these historical facts on the post-war attitudes cannot be ignored.

We, in Europe, whose experience (by being fought over, occupied or bombed) falls between (these extreme), have the responsibility of appreciating both attitudes.

2. *Military*: Present nuclear arsenals are so large that if even a few percent were launched, much of the Northern Hemisphere civilization would be destroyed. In these circumstances "Balance of power" and "Negotiation from strength" are meaningless. Either East or West could dismantle 10, 20 or 50 percent of its weapons with no military disadvantage.

Yet the Pentagon has urged the development of "Third-generation" weapons, and shortly before his death President Brezhnev stated that USSR would match every US weapon development.

3. *Proliferation*: The eagerness of the nuclear countries to export “research” and “power” reactors to non-nuclear nations - with the know-how, fuel etc. - constitutes the only politically respectable route for the acquisition of weapons-grade plutonium. It is the route which was used by practically every new nuclear weapons and near-nuclear weapons state.

The construction of even a few warheads to “settle” a long-standing situation may now be the most likely trigger for the Final world war. In much of the Third World nuclear power provides no solution to the low-density energy needs.

4. *What could science/scientists do?* Sadly, some 40 percent of professional engineers and probably a higher proportion of physicists in the UK are engaged in devising new ways of killing people; the US figures are I think much the same. Although there are plenty of jobs available in these areas, it is practically impossible for a young graduate or PhD to find a socially useful job. What do I say when young men and women come and ask my advice?

One can lay the blame on the government for distorting the distribution of expenditure and the powerful commercial pressures put upon them, but sadly that is not the whole story; the lure of challenging problems, high technology and unlimited funds seduces young physicists/engineers. This is not necessarily limited to *nuclear* weapons. With tanks, aircraft, rocket launchers and others which have kept going the 130 wars in the Middle East (West Asia), Africa and South America since 1945 - until the international arms trade is banned - this is where the money lies. The young seem able to work on, say, an anti-aircraft missile without regard for the consequences. They have never seen an aircraft shot down, nor felt the identity with its crew - whether hostile or friendly - which came from having flown in military aircraft. To so many it is simply an intriguing scientific problem; the morality and responsibility are pushed aside - the politicians make the decisions.

5. *The universities*: While most of these supremely unnecessary developments are made in the defense establishments and in the industries working for them, the reduction in state support for the universities has meant that science and engineering departments rely more and more on contracts - and this today means “defense” contracts.

It raises the whole question: should the universities try and retain the original status of an “association of independent scholars” - or should they become cheap research establishments for the state? In the UK we have had a long history of royal commissions, boards of inquiry in which the impartial voices of university members have been very important: the possibility of impartiality is fast disappearing.

6. *The individual scientist*: Besides his own narrow field of research, I believe that the scientist has a particular social responsibility in being aware of what is going on - and saying when he feels it to be wrong. Some, when challenged, would agree with what I was arguing, but would not commit themselves openly, for example, as signatories to a letter to the *Times*.

I do not think this responsibility is limited to Cambridge.

Most scientists simply do not want to think about these things - and like most of the public believe - or accept - that “the experts know the best.”

7. *Fundamental research*: Much of university research is, of course, still aimed at increasing our knowledge of the natural world. But can one ever foresee how such work might be misapplied? (Rutherford counting alpha particles.)

At the end of World War II I decided that never again would I use my scientific knowledge for military purposes; astronomy seemed about as far removed as possible.

But in succeeding years we developed new techniques for making very powerful radio telescopes; these techniques have been perverted for improving radar and sonar systems. A sadly large proportion of the PhD students we have trained have taken the skills they have learnt in these and other areas into the field of defense. I am left at the end of my scientific life with the feeling that it would have been better to become a farmer in 1946. One can, of course, argue that somebody else would have done it anyway, and so we must face the most fundamental of questions.

Should fundamental science (in some areas now, others will emerge later) be stopped?

It seems that in some areas, the resulting evil now outweighs the good. (We do not have to understand the evolution of galaxies, or the sub-atomic particles with those expensive machines at CERN.)

The benefits of medical research are real - but so are the potential horrors of genetic engineering and embryo manipulation. We devise heart transplants, but do little for the 15 million who die annually of malnutrition and related diseases.

Our cleverness has grown prodigiously - but not our wisdom.

Sir Martin Ryle