After the second World War, a cliché was repeated so often as to provoke, I fear, either yawns or giggles: "our moral sense was lagging behind our technical invention," i.e., science had, as it were, outstripped morality. In those days, of course, the bogey scientists thought to have left morality behind were physicists, especially those who had made possible the nuclear bomb. A wholly new kind of war weapon did indeed seem to have changed the world and to require a new dimension of moral thought and moral philosophy, if we were not all to be destroyed.

Today the same cliché is repeated just as often, but the bogey scientist now is not the physicist but the biologist, and especially the medical research worker. The mad scientist whom we all fear in our hearts wears a medical white coat. We should not be carried away too far by the force of this cliché.

The thought that science, whether physics or biology, has advanced too fast in comparison with the advance of morality suggests that morality is itself a science and that it advances as the other sciences advance, albeit more slowly. This conclusion is a mistake. Morality is in no sense a science—whether we are thinking of first-order morality, the way people think they ought to behave, or second-order morality, moral philosophy, which analyzes and investigates the principles on which people, in fact, base their behavior when they are thinking morally. Moral sensibility, how people in general think they ought to behave, changes gradually over time but is more like a shared taste, a shared appreciation of things, or a habit of mind than a science. Moral philosophy, on the other hand, although more systematic, is not, as science is, subject to proof or disproof. It is sometimes illuminating, but it does not progress in an orderly fashion, putting forward hypotheses that stand or fall according to whether or not they explain and make manageable the facts that are before us. Moral philosophy has no agreed solutions; nor are there agreed solutions in first-order moral behavior. We may wish to persuade others to accept our views, for if they are genuinely moral views, we think they have a certain general application beyond ourselves alone. Yet we know that the course of persuasion may be long and hard and may in the end not succeed. One feature of morality that must be accepted is a diversity of opinions as to what it is right to do, though not, I would argue, an infinite diversity.

I do not for a moment wish to deny that there is such a subject as bioethics. No one with eyes and ears open at the present time could possibly doubt this. There are bioethics courses springing up like mushrooms in all of the university world, to say nothing of advisory committees beyond number. Nevertheless, there is a sense in which bioethics is not a new subject. Bioethics is an attempt to apply an old subject, namely moral and political philosophy, to new material. Thus,
The most important aspect of this subject is to learn new facts, to learn more about what is and what is going to be possible, and then to think how to apply the principles of morality and the realities of politics to these new facts.

To what extent philosophy as an academic discipline is relevant to such discussions is a matter of dispute. Philosophy has in the last 30 years or so become much closer to the world than it was in the 1950s, which was the heyday of detachment for philosophers in universities. Philosophy is also closer to the world today than it was in the days before the first World War, then largely dominated by the grand structures of neo-Hegelianism. Nowadays, not only is an area specifically named Applied Philosophy, but everyone engaged in the subject, whether they think of themselves as applied or pure (with the possible exception of mathematical logicians), must be prepared to tangle with questions and examples derived from the real world and not the fanciful nor the wholly transcendental world.

It is not surprising then that philosophers should expect to be called in aid when questions of legislation or regulation are to be decided in the field of applied biology and medicine. Their professional expertise may well seem to be relevant to such decisions. Nevertheless, government or other public organizations must beware of expecting too much from philosophy. The most philosophers may be able to do is to expose with some professional clarity the issues involved and the possible different ways of approaching these issues. Philosophers and the people they advise would be misled if they thought there was any question of proof that one and only one way of looking at the matter was the “correct” way.

There is a difficulty here in the concept of an “expert adviser” and a related difficulty in the teaching and learning of bioethics as a separate subject in universities. Two different kinds of people may benefit from such courses: 1) Those who, having spent considerable time and acquired considerable knowledge in the field of philosophy, want to learn about the new issues being discussed with the advance of the biological sciences and 2) professionals in the field of biology or medicine who wish to have some instruction in philosophy. Teaching this second group is more difficult than teaching the first group or perhaps is difficult in a different way. Those of us who are not scientists may nevertheless grasp fairly quickly a notion of scientific method. Because we can understand how scientists proceed (even though we cannot understand exactly how they reach conclusions they reach or the techniques by which they conduct the empirical parts of their work), we may come to trust scientists to tell us as far as they are able what procedures are now possible, what may be possible within 5 years or so, and where they think research is heading. Scientists, however, have more difficulty in grasping the essential nonprogressiveness of the philosophical method. They have not the time to learn the details of philosophy slowly. Whereas a non-expert may be taught the broad outlines of a scientific theory or of scientific findings, philosophy has no such broad outlines. Philosophy is an essentially slowly growing subject, a matter of dialogue and discussion, both with the living and with the dead. To give people a quick update on philosophy is therefore a more dubious undertaking than to give them a quick update on the state of the biological sciences. Courses in bioethics, then, when directed to scientists and practitioners in the field of biology must be careful not to oversimplify and especially not to pretend that great new solutions to problems are forthcoming.

We must try at all costs not to be taken in by the thought that we are here to
study something wonderful and new; nor must we be caught up in the supposition that what we are engaged in is bringing, as the cliche has it, our moral expertise up to a point where it can match the expertise now available in the biological and medical sciences. There is no such thing as moral technology.

Nevertheless, one new factor in moral thought must be addressed in considering the kinds of problems we shall soon be engaged in. This is the factor of the future.

Let us consider possible germ-line genetic therapy. Gene therapy is at present itself in the future. But the prediction is confidently made that within 5 years it may be possible to replace the gene responsible for, for example, Duchenne muscular dystrophy so that a child born with the faulty gene will be healthy. But such therapy is generally envisaged as affecting only that particular child, but in principle genetic manipulation may become possible on the egg or sperm or very early embryo before cell differentiation so that all of the cells will be affected by the manipulation, including the germ-line cells. This would mean that any genetic effects brought about by the manipulation would affect not just one individual but all descendants and their descendants into an unending future. At present, a fairly general agreement suggests that even when germ-line manipulation becomes possible, it shall not be carried out on human beings. The first and most important basis of this agreement is the argument from ignorance. We simply do not know the long-term effects of eliminating certain genes from the gene pool. A secondary argument is that the only certainty is that human error is always possible, and mistakes made in germ-line gene manipulation would be irreversible. The generally received view is that it is better not to tangle with something so frighteningly long term and unpredictable. However, there are those who are prepared to argue for limited germ-line genetic intervention after such animal tests as are relevant and in cases where it seems of overwhelming importance to root out a disease forever. Here we have a manifest case for debate, where those who argue for a restriction of practice must be very clear about the grounds of their proposed regulation.

The present general embargo on proposals for possible germ-line gene intervention is based on our ignorance of the long-term future effects of such intervention. Ignorance of the future is also used in another way in arguments about the morality of various practices in gene manipulation. Questions are often raised about the morality of manipulation in fields where no such manipulation is so far possible and where it is unlikely to become possible within the foreseeable future because the actual concepts as well as the techniques are missing. For example, a number of people argue that gene manipulation in general is immoral on the grounds that if it were possible to manipulate genes so that people became more intelligent or stronger or less prone to violence, such manipulation would be immoral. So far such control over the expression of genes is impossible. We have not the faintest idea which genes or which sequences of numerous different genes are responsible for intelligence, nor do we know the effect of the environment on specific genetic patterns that might enhance or inhibit inherited intelligence. We are not even sure what we mean by intelligence or how we identify it. It is futile to ask about the morality or otherwise of attempting genetically engineered enhancement of intelligence. It is enough to say that it is impossible. In a discussion in 1990 of a paper titled "Limits to Genetic Intervention" by Bernard D. Davis, Bernard Williams made the following remarks:
Besides insisting on the point that most of the characteristics (such as intelligence) that people would be interested in from a positive eugenic point of view are highly polygenetic and therefore present great difficulties, you also have to do something to improve people’s understanding of moral argument. It is natural to say that what people need to grasp is the principle of the matter and that they won’t have done this unless they know what to say about a highly desirable characteristic that does not present the technical problems of polygenetic characteristics. You cannot simply leave the question at the level of saying that modifying polygenetic traits by genetic means is technically highly improbable. You have to take it a stage further. The sensitive issue is how much further. It is a requirement on moral argument that it shouldn’t simply stop at a mere technical fact, and say that the question doesn’t arise. But it is not a requirement on moral argument that it should be able to cope with any conceivable possibility.

This comment is important. Moral philosophers and other philosophers have been accustomed to hypothetical cases. Twenty-four centuries ago Plato posed the question “What would you do if you were possessed of the ring of Gyges which rendered you invisible? Would you have some inner power of restraint, some conscience, as we might say, that would prevent your committing outrages, even though you knew you could not be found out?” Such questions have never been rendered otiose by the observation that there is no such thing as Gyges’ ring. The question is one of principle, and the facts do not, for those purposes matter. When the question is plainly concerned with the real world, in the form of what we should or should not do in certain circumstances, then whether those circumstances could ever arise becomes important. It is not merely a case of setting up an imaginary example. Or is it? This question is of genuine philosophical interest and should be discussed.

Let us return to the question of unpredictability. Another related area in which the matter of how far we can predict the future and to what extent the future should be taken into account is of paramount importance: our accountability for the future environment. Long ago, in his book *The Foundations of Ethics*, David Ross argued that utilitarianism, or any other form of consequentialism (namely moral theories that hold that we judge things right or wrong according to the goodness or badness of their consequences), could not be correct. If they were, we would have to calculate the consequences of actions, or types of actions, into an unending future, and this is impossible. Therefore, there must be some other basis for our judgments of right and wrong.

When Ross wrote this in the 1930s, to answer him it seemed enough to say that we do make judgments about consequences, and we do, more or less, know when to stop counting something as the consequence of something else. It is partly a matter of the passage of time, partly what the lawyers call *novus actus interveniens*: if other things of sufficient moment come between our act and what comes after, we are entitled to believe that the causal chain has been broken, and, to change the metaphor, we are let off the hook. No one, it used to be said, can possibly feel responsible for what happens 50 or 100 years after they have acted in whatever way they did act. Therefore, consequentialism is saved. However, we feel the need to have another look at this highly pragmatic argument; both Ross and those who argued against him may have been wrong. We do have to take into account a far longer future effect of our actions than we once thought; we do
have to hold ourselves responsible for a future that we can barely envisage, let alone foresee in any detail. Our acts may affect unborn people and the environment itself in ways for which we cannot shuffle off responsibility by saying that we cannot see that far ahead.

A new dimension has entered the arguments of moral philosophy, from which we cannot turn away. It may well be the major task of bioethics, insofar as it is a new subject, to find ways of striking a balance between a kind of prophetic futurism like that of Teilhard de Chardin, who claimed that the future was of far more importance morally than the present, and an old-fashioned present-oriented position like that of Ross, who thought you could look at the nature of your choices in their strictly present context and somehow intuit whether or not what you chose to do was "fitting." New moral positions can be argued for only on the basis of an increased knowledge of future facts, and those facts are extremely complex, whether we are thinking of ecology in general or specifically of genetic engineering of living things.

The moral problems raised by our new biological knowledge arise in two characteristic ways. First are questions such as "Should we do everything we can in the way of therapy or enhancement of human life?" If not, and if some restrictions are to be imposed, what is the justification for these restrictions? Some of the justifications will be economic; and this in turn raises moral questions. What counts as "too expensive" if we are talking about therapy or saving or improving life for individuals? Second are questions such as "How do we weigh the value of a future environmental good against present economic or commercial need?" Both of these types of questions are relatively new. Little guidance to their answers will come from centuries earlier than this one. Both types of question are political as well as moral. As we struggle to find answers, we must bear in mind what is possible as well as what is in some more abstract sense good. For this reason, we should be on our guard against rhetoric. Solutions must be agreed upon, with perhaps painful compromises, in the full recognition that there are no perfect "correct" solutions or quick courses in bioethics that will offer us such solutions. Whatever solutions are agreed upon, however, are likely to have practical and relatively long-lasting effects, which is a further reason for caution.