Unravelling the meaning of life

***Denis Noble** argues that human nature cannot be reduced to a molecular level, as some geneticists claim.*

THE idea that the scientific study of life may undermine concepts of ourselves that are fundamental to humanity and civilised society is not new. Descartes, after all, had a mechanical philosophy of animal life, even though he tried to exclude man himself.

Each century has re-interpreted the mechanical thesis according to its science. But the idea has acquired immense power recently as molecular and genetic studies have revealed the detailed mechanics of living systems on the finest of scales. We know the molecular code of life, and within two decades we look set to unravel the complete sequence of the human genome.

With that knowledge, and the popular perception that it can be exploited both for immense good (such as cures for genetic diseases) and for horrific evil (people want to believe that Jurassic Park is possible), we seem set for the most intense debate on the nature and future of mankind. The recent reports on the 'gene for homosexuality' show clearly how deep public fears must run. The situation is exacerbated by claims and counterclaims as to what exactly has been discovered.

The problem is not just that aspects of human nature to which we may attach importance may be explained away in a flurry of molecular determinism, it is also that the reductionist programme appears to have no bounds. If there can be a gene for homosexuality, then why not one for creativity? If cystic fibrosis, then why not conscious intention?

The first thing to do when afraid is to ask whether the object of the fear really exists. Can biological science be as alarming as some popular opinion would suggest? Or are dealing with a modern myth based on a passing fashion? Could we have mistaken identifying the code for the mechanics of living cells for an understanding of the logic of life itself?

Francis Crick, whose Nobel Prize was for elucidating the double helix structure of DNA, wrote: 'In one way, you could say that all the genetic and molecular biological work of the last 60 years could be considered as a long interlude. Now that the programme has been completed, we have come full circle — back to the problems . . . left behind unsolved.'

Very significant words, coming as they do from a founder of the molecular approach. Sir James Black, also a Nobel laureate, put the point even more strongly when he commented that the future would see the 'progressive triumph of physiology over molecular biology'.

It is significant, therefore, that 5,000 physiologists from all over the world are meeting this week in Glasgow at a congress with these thoughts as its theme. The intellectual flagship of the congress is a book, *The Logic of Life*, which addresses the future of integrative physiological science and how it might live up to the challenges put by Crick and Black.

The result is an astonishing series of essays that should be compulsory reading for opinion-formers and politicians concerned with the ethical and sociological impact of medical science. For what people have been getting so excited about is comparable to mistaking the machine code of a computer for an understanding of the logic of the programs it runs.

In the case of living systems we have, as Crick says, to come back to unsolved problems. But it is clear that unravelling the logic of life will require a different approach from that which secured the successes of molecular biology. Most of all it will require much greater sensitivity to the concepts of organisation and hierarchical structure.

In doing this, it will use concepts of the nature of life that will appear to be far less threatening to our ideas of ourselves. Inevitably, such a study must respect the integrative aspects of our nature on which our humanity and so many other features of society depend.

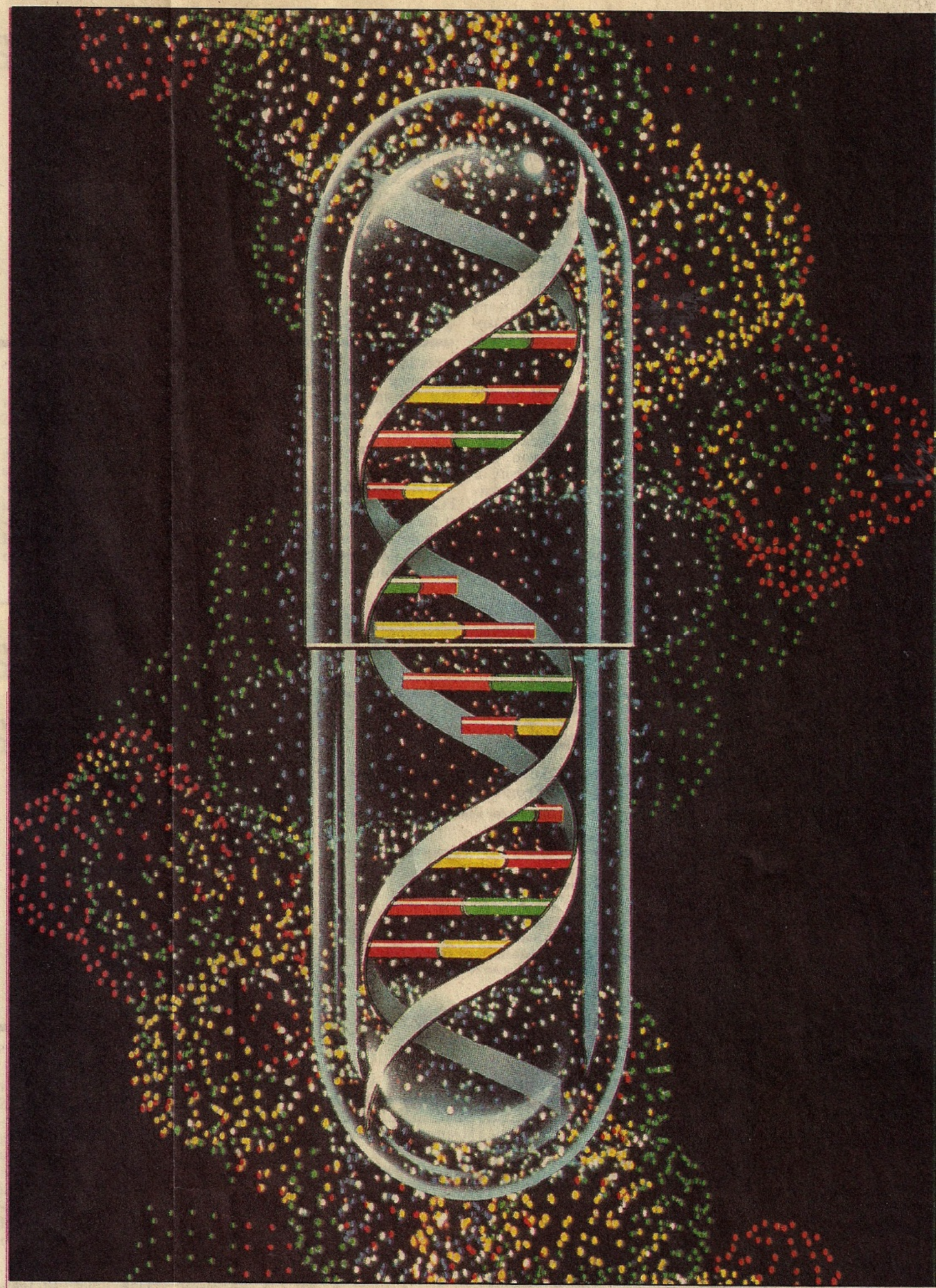
To portray genes, for example, as 'prisoners' of the successful physiological systems rather than as free-roving entities for which the body is a mere survival machine is to turn the recent debate about the sociological impact of medical science on its head. And that is the scale of the challenge posed by modern physiological science.

This does not mean that we can say which philosophical view of what it is to be human will emerge from the debate. On that there is much to be argued for, and there will be many surprises as science progresses. But it is to say that it cannot be the crudely mechanistic reductionism that has seemed so threatening.

As Rosen (in *Life Itself*) has written, 'there are many good reasons for *wanting* to be a reductionist, but unfortunately these have nothing to do with answering the question [what is life?]'. I have only one quarrel with that: it is not unfortunate at all! For on Rosen's 'but' hangs the whole agenda of a science that attempts to understand our nature. We would not be here to debate the issues if the extreme version of the reductionist thesis were valid. 'The proper study of mankind is man', indeed.

In East Asian countries that use Chinese characters in their writing, the word 'physiology' has three characters. They are 'Life-Logic-Study'. It is inherent in their culture that they should understand that physiology is the study of the logic of life. The title of the Glasgow congress book is a tribute to that culture. Not surprisingly, there will be many scientists from that part of the world in Scotland this week. It will be interesting to see whether they have a special contribution to make to the agenda of medical and biological science in the next century.

Denis Noble is professor of physiology at Oxford University and is chairman of the International Congress of Physiological Sciences being held this week in Glasgow. 'The Logic of Life' (edited by C. A. R. Boyd and D. Noble) was published by Oxford University Press on 30 July.



DNA revolution: 'We have come back to the problems left unsolved,' said Francis Crick./Photograph of computer image by John Bavosi.