DNA, RNA and protein formation
The information in DNA

Commentary:
Think again about the structure of DNA and how it might carry instructions. A single chain that simply repeats one symbol would carry no useful information, but a chain made up of different symbols can encode information. Information needs difference. In fact, life's genetic instructions are spelled out in combinations of the letters A, G, C and T, the four bases of the DNA molecule. In effect, one particular sequence of bases, containing one particular piece of information, is one gene.

Norman Cohen:
Genes come from proteins. Each specific gene comes from a specific polypeptide within a protein. Now proteins are extremely important in living organisms. Some proteins are structural. Others, for example, are enzymes. A typical gene is about a thousand base pairs or so. Now that may seem rather a lot but there's plenty to spare in DNA. You see this model actually represents a very, very small section of a real DNA molecule. A real DNA molecule's many, many times longer than this. They're the largest molecules known by far. In fact, a single human DNA molecule on this sort of scale will be thousands and thousands of miles long. And if you consider the 23 different molecules of DNA in a human haploid cell, and add all the base pairs together, you come out with a figure round about three billion, that's 3,000 million base pairs. Now frankly numbers like that don't mean very much to me, so how can we put numbers of that sort into some sort of perspective? Take a telephone directory and imagine the whole thing is composed with a very tiny print, and that each letter and each digit corresponds to a base pair. Well, to get three billion you need a couple of hundred or so different directories. Now in any particular type of cell not all the genes in the DNA are being used. Essentially some genes are switched on and some are switched off. Well what does that imply? Imagine you've got an instruction manual and you want to use just some instructions at a particular time in a particular place, without lugging the whole manual around. Now how could you do that? Well one way is to choose the instruction you need, tear it out, use them, discard. Well if this is DNA the cell can't do things that way, because the DNA would be damaged, and sooner or later all of the DNA has to be copied and the copies passed on to future generations of cells, so that can't be the way things happen. Okay, back to a manual. Another way of doing things is not to tear things out, is to make a photocopy of just the instructions you need at a particular time. And in a sense that's what happens in living cells. The genes that are switched on, those that are going to be used, are copied, that is the information in them is copied to make a copy called messenger RNA.