after and for many people will become a literal alternative to the university system. Will they then be able to remain a loose conglomeration of institutions, without procedures for admission and sources for financing research in common? Nobody should be surprised if, five or ten years from now, the polytechnics are organized and financed in much the same way as the universities. But how will they then differ from the universities? And how will they escape the slur of seeming second-class universities? Even if the polytechnics continue to take great numbers of part-time students, and even if they offer a greater variety of courses, many of them largely practical in character, they will be hard pressed to retain their distinctive identity for the universities may well be forced by social pressure to move in very similar directions. But will Britain really need a dual system of universities in the seventies and eighties? Ought there not to be a single system with a spectrum of institutions spanning all types, some bad and some good? Those who are now engaged with proper devotion and enthusiasm on constructing the polytechnic system will probably be asking themselves these questions sooner than they think. If they would ask them now they might even design a better system than is now in prospect.

HOW DNA FUNCTIONS

By now even schoolboys know that molecules of DNA are the embodiment of genetic inheritance. By his DNA shall a man be known has become the slogan. But DNA is not merely archival material. It also serves as an ever-present touchstone by which the biochemical integrity of an individual is sustained, and much of the excitement in molecular biology in the past fifteen years has been concerned with the detailed understanding of how genetically determined molecules of DNA put their stamp on the chemical structure of the protein molecules manufactured by living cells. With almost breakneck speed, the several parts of the complicated synthetic mechanism have been distinguished, characterized and understood, in part at least. Yet there has remained the problem of knowing how the synthetic activities of living cells are regulated. How is it, for example, that a bacterial cell may respond to changes in its environment by manufacturing kinds of proteins not previously in its repertoire? And why, for that matter, does a liver cell from an animal differ so markedly from a skin cell, or a bone cell? In 1961 Jacob and Monod put forward a remarkably perceptive explanation on the basis of some experiments with bacteria. Unwanted or irrelevant parts of DNA molecules, they said, are somehow switched off or rendered ineffectual by the intervention of smaller molecules manufactured under the aegis of other regions of the same DNA molecule. On this foundation there has grown up in the past five years an intricate vocabulary of ideas. People talk of regulator genes, and of the repressor molecules the production of which they control. Until the end of 1966, however, nobody had isolated a repressor molecule. Whether they were proteins of nucleic acids was even in doubt.

This state of affairs has now been quite transformed. By the end of 1966 Gilbert and Müller-Hill at Harvard (see *Nature*, **213**, 329; 1967) had been able to isolate repressor molecules—which turn out to be proteins—and molecular biologists were as relieved as the physicists must have been when they heard that Millikan in 1917 had at least been able to demonstrate the particulate character of electrons, already then a part of folklore. In the development of any conceptual framework, there comes a point when an ounce of direct measurement is worth a ton of speculation, if only because it serves to show what next to do. The first fruits of this are now apparent. The article by Dr. Mark Ptashne on page 232 is an elegant proof that repressor molecules do indeed attach themselves to molecules of DNA, and that the binding seems to be as specific as it must be if it is to be possible to switch off one gene without affecting others. Dr. Ptashne points out that the immediate importance of this experiment is the support it provides for the simplest interpretation of the theory of Jacob and Monod: repressor molecules function by sticking to DNA and not in some more complicated way, by intercepting RNA molecules on passage from nucleus to cytoplasm, for example. But this is obviously only a beginning. The way is open for a detailed study of the regulatory processes. The results will be something to look forward to.

MISTAKES WILL HAPPEN

The subcommittee of the House of Representatives, which this week began hearings on the Apollo spacecraft disaster, found NASA in an unusually subdued mood. Just published was a report highly critical of the conduct of the programme, and implying that the lives of the astronauts had been lost not by simple miscalculation—which might have been understandable—but by carelessness in design and construction—which apparently was not. The wiring in the spacecraft was vulnerable, but combustible materials abounded as well, and in the pressurized oxygen atmosphere represented an unreasonable fire hazard.

The replies from NASA to these criticisms have so far been composed of contrition, and a humble determination to do better if it is given the chance. In fact these sentiments, although obligatory for public consumption, have an element of hypocrisy. Nobody, least of all the astronauts, had any illusions about the risks which an enormously complicated programme like Apollo necessarily involves. Compared with some of them, the risk that the spacecraft would catch fire while still on the ground was probably small enough to be discounted. It would have been prohibitively expensive, and probably physically impossible, to eliminate all the risks which could have been imagined and still land an American on the Moon by 1970. But in that case haste, and not execution, may be the chief culprit.