

Editorial—Leaps and bounds, and small steps for Mankind

In the public mind, discoveries and progress in science are more likely to be sensational single events, rather than the edging forward of accumulating knowledge and understanding. Fame for an individual scientist is the result of that single event, and this attitude is reinforced in the popular history of science of such figures as Madame Curie, James Watt, Edward Jenner and Alexander Fleming, where their fame as scientists in popular culture is often summed up in a single legendary incident. Popular science has little room for descriptions of advances in science that take place over many years, involving thousands of research workers with vastly different motives and attitudes to their work. Yet if we look around at some of the modern miracles of science and the way they have evolved, it is often difficult to pin-point any particular event that has made the whole thing possible. Take telecommunications, for example; the launch of the first sputnik was undoubtedly a sensation at the time, although all it consisted of was a few pounds of crude electronics hurled into earth orbit. There was some talk in scientific circles that this was somehow the beginning of a new era in communications. Last month, the World Cup Football tournament took place in nine cities in the United States. Billions of the earth's population watched this sports tournament and, without any thought to the technology involved, or even whether the game was played in Boston or Dallas, were able to make judgments on incidents in the game every good as, and sometimes better than, the participants. The broadcasting of events around the world, in crystal-clear, full colour live pictures is taken for granted, and we can even summon up events of our own choice at the touch of a button. The launch of the sputnik would hardly seem to be the great single event that made all this possible, yet it would be difficult to identify any event or individual scientist that could be given the credit. Enormous progress is made in small, often imperceptible steps rather than great leaps forward.

The same measured progress is a feature of advances in pharmaceutical science. In fact, the recognition of this

gradual progress is often used as a justification for the development of new drugs with only marginal advantages over their predecessors. Of course cynics will say that the pharmaceutical industry will wheel out heavy batteries of statisticians to 'prove' that their particular me-too compound is superior to their competitors'. Nevertheless, it is the application of new knowledge and new ideas as applied by the pharmaceutical scientist that produces improved molecules, not the application of statistics or the ingenuity of the marketing effort. Such small improvements, while of debatable immediate benefit to patients, move the drug entity from a lead molecule, perhaps with undesired but tolerable side-effects or a narrow therapeutic window to a safer and more specific product. These improvements do not apply just to the drug structure but also to the mode of delivery, improvements in production methods and other aspects of formulation.

Other areas of biological sciences may also begin to impinge on the drug research effort. Three years ago, at the British Pharmaceutical Conference, a series of symposia was held on the impact of the new biologies on the medical and pharmaceutical sciences. These papers were published in a special supplement to the *Journal of Pharmacy and Pharmacology* and covered a considerable diversity of subjects ranging from the pathogenesis of AIDS to the human genome project and some of the ethical and legal aspects of the emerging technologies. One of these symposia described some of the early indications of using gene therapy, specifically as applied to cystic fibrosis. The science has moved on, not slowly, but not by leaps and bounds either, and pharmaceutical and medical scientists are now beginning to see real applications in this area. At this year's British Pharmaceutical Conference in London, once again there will be a symposium on gene therapy as well as a plenary lecture on the same theme.

We look forward to hearing of the very latest in applications of this new and important technique.

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