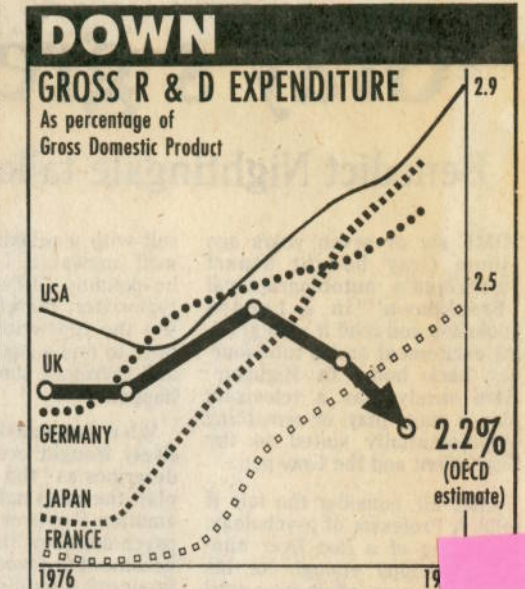
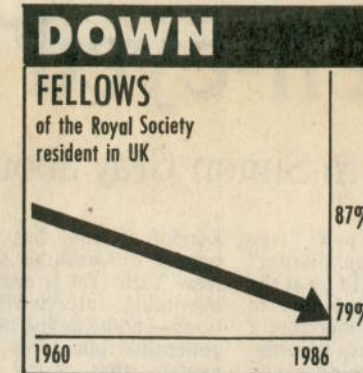
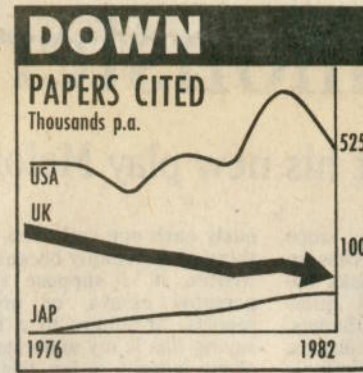
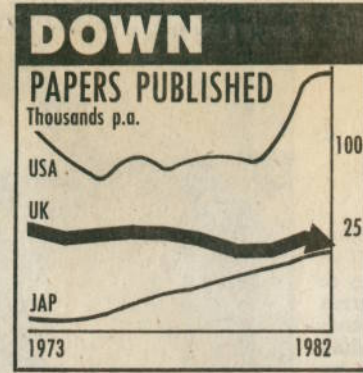
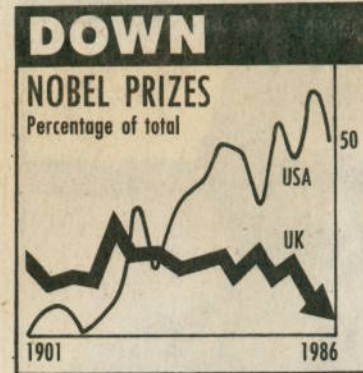


SPECIALISTS

This month the Royal Society issues a long-awaited report on Britain's accelerating brain drain. Technology correspondent ROGER HIGHFIELD finds that the future is far blacker than many had thought . . .



Swansong for British science

"THE BRITISH are coming" read the headline in a major American university newspaper earlier this year. And it reported: "Some US administrators foresee the greatest sustained academic immigration since Jewish scholars fled Europe before World War II".

Every year the crisis in British research drives thousands of our best scientists abroad. Every year Britain slips further into the second division of the science league. Our reputation is no longer for first-rate science but for training excellent scientists and then driving them abroad because of low funding, dwindling morale and lack of opportunity in university laboratories.

"The situation is critical and very near irreversible," said Professor Sir George Porter, the president of the Royal Society, which will report on the brain drain in two weeks' time.

Each year 1,000 of our scientists go to the United States alone. They may be only two per cent of our total annual output of 50,000 scientists, but they represent the cream of Britain's brains, including many young scientists and whole teams who have been working in commercially sensitive areas. According to Sir George, they will probably not return.

Britons excel in vital fields such as genetics, biochemistry, medicine and artificial intelligence yet they are driven abroad by the mood of despair in the British scientific community caused by low pay and dismal prospects, exacerbated above all by poor funding for their work and uncertainty over long the meagre funds that available will last.

The seriousness of this drain in talent reveals itself in the exodus by Fellows of the Royal Society, the nation's most distinguished scientists. In every field of endeavour, more of them choose to work abroad today.

A report by the Advisory Board for the Research Councils (ABRC) showed that in 1960, 13 per cent of the 603 fellows lived abroad. By 1986 this proportion had risen to 21 per cent of the current fellowship of 1022.

though it is, is not as serious as the internal brain drain according to Professor Denis Noble of Oxford University, a founder member of the pressure group Save British Science which represents leading societies and thousands of scientists including 100 Fellows of the Royal Society and 11 Nobel Prize winners.

Disaffection has two roots. First, scientists and engineers

A British scientist can hardly travel anywhere without being subjected to pity by others
Prof Sir David Phillips, FRS

have to spend so much time scratching around for funds that it is difficult to pursue the research itself. Second, young graduates perceive the prospects in science as so poor that they are moving into other careers, notably banking, accountancy and management.

Prof Noble said: "It is this form of the brain drain that is most worrying of all. If not corrected, it will have very serious implications for the quality of our science in 10 to 20 years' time."

Of the international brain drain, "We have not seen anything yet," said Professor Sir David Phillips FRS, chairman of the ABRC. In the long-term the

demand for scientists here and in America will increase dramatically both for demographic reasons (we are at the peak of a birthrate bulge and from now the number of young people will start to decline) and because large numbers of academics taken on during the expansion of the university system in the 1960s are coming up for retirement.

Just as the phenomenally wealthy Getty Museum has cornered the international art market, the US National Science Foundation has already made it clear it will make up the deficiency by importing more talent from countries such as Britain.

"They will be recruiting like mad in industry and universities in the States just at a time when the number of graduates will be at a minimum here and over there," Sir David said. "At the moment the Americans buy the best. In 10 years' time they will be buying our average scientists."

THE REASONS for the decline in British science are numerous. The most obvious is funding: this has been cut on two fronts. The University Grants Committee, which funds our basic science effort, has had its support for science cut by at least 11 per cent since 1981, according to an ABRC estimate. Even those departments classified as

outstanding in the UGC assessment of performance have suffered. One, the Oxford physics department, has suffered a 20 per cent cut in UGC funds, including the loss of seven posts.

Treasury forecasts also show that funding for the research councils will be cut further — in spite of "technological inflation" as ever more sophisticated equipment is needed to

We were able to respond to the Aids challenge only because of the excellent groundwork laid in the UK. But the erosion of our science base is so bad that the next virus along will beat us
Prof Robin Weiss, director of the Institute of Cancer research

keep Britain at the frontiers of science (estimated to be around 20 per cent by the Royal Society); fluctuations in the value of the pound (which can make a major difference in funding international "big" science); and the cost of redundancy payments and closure of research establishments.

Of Britain's £4.5 billion science budget, more than half goes on defence (compared with the Nato average of one quarter), and of this military expen-

diture, much goes on development, not research.

Between 1985-6 and 1989-90, it is estimated that the contribution to civil research and development will shrink by some three per cent, continuing a decline which started in 1972 (one year after Shirley Williams, the former Secretary of State for Education and Science wrote an article which warned, "For the scientists, the party is over").

The Science Policy Research Unit at Sussex University reports that, as a percentage of GDP, government spending on academic and academically related research is lower here than in Germany and France, our closest competitors.

A further problem begins with scientific education in our schools. Sir George stresses that not only is there a desperate shortage of science teachers, but our system also produces "a country of half-educated people. Britain is, on the whole, a non-scientific nation."

THE RESULTS of this growing inadequacy of science funding and education are clear. The ABRC reports that overall UK performances across all fields of research, declined significantly in the decade up to 1982, based on a survey of British publications and citations. Fewer Brit-

ish scientists are publishing papers today and fewer are being cited elsewhere — in other words they carry less influence within the international scientific community, notably in fields such as solid-state physics.

No wonder, then, that Nature, the British science magazine widely regarded as the most prestigious in the world, has

The morale of the scientific community has fallen to its lowest point this century
Sir George Porter, President of the Royal Society

rapidly increased the size of its Washington office, reflecting the dominance of American science and the slump in British output.

Its editor, John Maddox, admits that he has thought privately of moving the nerve centre of the magazine from London to Washington, though he says this has not been discussed formally with the journal's proprietors.

Britain's traditional excellence in basic science has been accompanied by an impressive record of throwing up valuable new ideas. Sadly we have an equally impressive record of failing to take these ideas from the laboratory into the market-

place. Most notorious among British breakthroughs that we have allowed rival nations to exploit are monoclonal antibodies, which are essential to medicine and biochemistry, liquid crystals, of digital watch fame, and amorphous silicon, the key to cheap solar panels.

Recent advances have suddenly created important and lucrative applications for superconductors in industry, into which Japan and America are pouring vast investment. Again, Britain was caught napping. When the Advisory Council for Applied Research and Development drew up its latest list on exploitable areas of science, it omitted superconduction.

On this very front, Dr Jan Evetts of Cambridge University told Save British Science last year: "I now have no research assistant, no students and no research funds in this area. For a while I can keep up the pretence. . . I can think and rework data. I can manage to give an invited plenary session paper at the 1986 Applied Superconductivity Conference, but what about 1988?"

"An area of basic and applied research where Britain has been pre-eminent and indeed where we are also very successful commercially is being allowed to collapse. . . I am seized by a great weariness."

No wonder that John Irvine, director of policy studies at the Technical Change Centre, commented: "Much more targeting of important areas of science should be done by the government. If it did, it would not be cutting basic research so much."

Britain appears devoted to destroying its science base to save the embarrassment caused by its inability to exploit ideas. Instead, industry must invest more in research. British companies have yet to be persuaded to declare their R & D spending but Organization for Economic Co-operation and Development (OECD) figures show that, as a proportion of turnover, it is well under half that of most European countries.

While our companies have pushed up spending by a

Four-point plan to arrest the exodus

WHAT CAN stop the rot? Sir George Porter told the Daily Telegraph last week: "More applied research, more engineers, more scientific entrepreneurs are urgently needed to provide the new industrial revolution which will put this country back into the first league."

Save British Science has put forward the following plan:

- Restore morale — a long-term commitment must be given to research funding so that contract staff (who do most of the research in Britain on non-tenured jobs) can plan ahead for up to five years.

- "One of the main reasons for low morale is uncertainty about the future," Sir George Porter said.

- Expand education — To bring our level of higher education up to that of the States, France, Germany and Japan we need to plan for an increase of at least 50 per cent by the end of the century, rather than abolishing posts and even entire departments. In addition, there must be an increase in the number of qualified physics, mathematics and science teachers in schools.

- Fund quality research — At present a large proportion of what are deemed "alpha" research projects go unfunded (25 per cent in the case of the Science and Engineering Research Council and as high as 70 per cent for the Natural Environment Research Council). Some £100 million a year would ensure they are funded — a sum equivalent to one-tenth of the money lost on Nimrod.

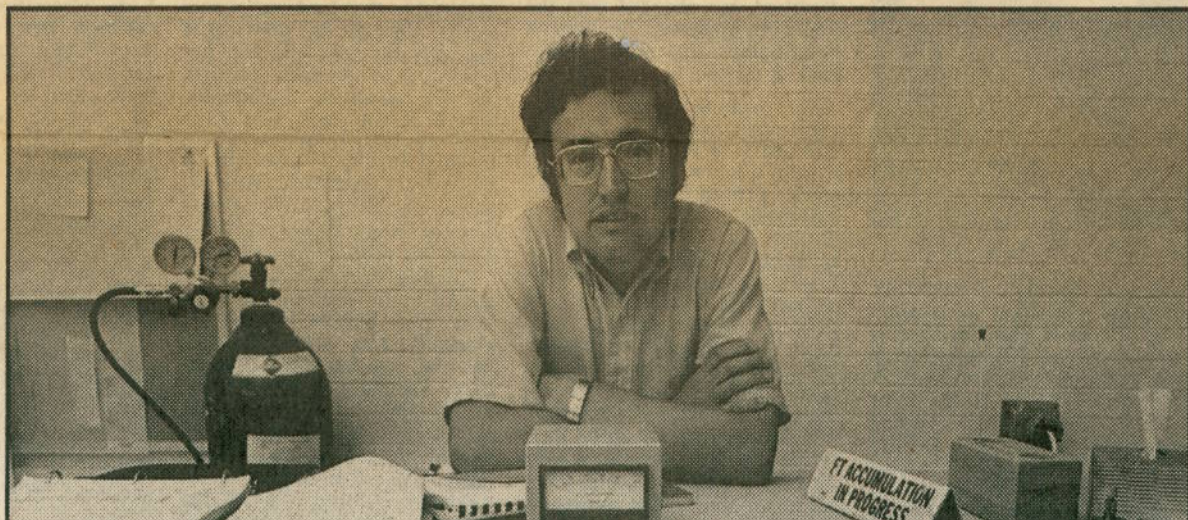
- Stimulate industrial R & D — With some exceptions, industrial investment in British

Land of the £100,000 professor

PROFESSOR Bob Crabtree's nuclear magnetic resonance spectrometer at Yale University in the States helped him discover a new catalyst, the first of its type with commercial applications.

Prof. Crabtree, 39, started out in research at the University of Sussex. "I looked around for the liveliest place for science in the world and it turned out to be the United States. Salaries are massive here—half as much again—before you add the extras such as consulting."

Indeed, whereas a British lecturer, senior lecturer and professor earn at most £18,000, £22,000



15/6/87