

of automobile bodies is an example. Now, with microprocessors that can be incorporated into virtually every machine, even skilled and previously immune occupations such as tool-and-die making may be affected.

The critical question is the validity of what has been a traditional assumption: that technological progress brings with it more jobs. Several witnesses scheduled to testify next week before a House subcommittee investigating the issue doubt that assumption still holds. "We can't count on expansions in the white-collar or service areas, which is what saved us in the fifties and sixties", says William Bittle of the International Association of Machinists and Aerospace Workers.

An annual employment forecast issued by the Bureau of Labor Statistics (BLS)* confirms that employment in at least some office and service occupations is being hit by electronic technology. "We do see some jobs disappearing", says Ronald Kutscher, assistant commissioner of BLS for economic growth and employment projections. Key-punch operators, telephone operators and virtually all the printing trades will be hard-hit, for example.

The other open question, though, is how many jobs will be created by the new technologies directly. Workers will be needed to build, install, adjust, and repair automated equipment. The GAO study found virtually no evidence that could answer this question, however.

The trade unions have apparently accepted that jobs will be displaced by automation. But the critical issue to them is whether enough time will be allowed for workers to find new positions. In Norway, unions have negotiated contracts that set a gradual rate for the introduction of new technologies. The possibilities of such contracts being agreed to in the United States seem much smaller. A common complaint by American trade unions is the tendency towards secrecy on the part of management and the absence of the sort of cooperation and consultation practised in Europe and Japan.

The House subcommittee hearings may be a small step towards some government action on the problem. Representative George Miller, who is holding the hearings, has introduced a bill (HR 5820) that would provide for vocational retraining of displaced workers in new occupations created by automation. The unions, however, tend to dismiss government-supported training as a subsidy for industry and an inefficient substitute for on-the-job training. More to the point may be another concern of Miller's: he points out that the government spends nearly \$2,000 million a year on labour-saving devices. **Stephen Budiansky**

GM cancer prizes

Rules to be bent

Although this year's General Motors Cancer Research Prizes have been duly awarded (see below), leaving Dr Howard Skipper, Dr Denis Burkitt and Dr Stanley Cohen each \$100,000 better off, the awards committees are clearly running into difficulties in selecting an annual trio of winners while sticking to the rules. Only four years after the awards started, the biggest worry is that of finding each year someone worthy of the prize "for the most outstanding recent contribution to the prevention of cancer, including environmental factors".

The rules of the prizes were set in 1978 when General Motors, disturbed by the number of its directors who had become victims of cancer, put \$2 million (just doubled) into a General Motors Cancer Research Foundation. The prizes are large enough to invite comparison with the Nobel awards; the rules, however, differ in interesting ways.

One rule, intended to eliminate fortuitousness, is that a prize winner should have made more than one major discovery. Their discoveries must have been made within the previous fifteen years unless their importance has been recognized only more recently.

One prize (Kettering) is for diagnosis and treatment of cancer, another (Mott) for prevention and the third (Sloan) for a contribution to basic science. Winners are chosen by a process that resembles that used for the Nobel prizes. From a list of 25,000 prominent scientists, about 6,000 each year are asked to nominate candidates. Three subcommittees, one for each prize, first pare the nominations to twelve. Last year, they had to sift through 114, 40 and 91 nominations respectively. By the second meeting, each committee member has to report on the merits of two of the twelve candidates, eight of whom are then eliminated. At a final meeting the committees rank two of the four remaining candidates in order of preference. Finally the awards assembly has to decide whether to follow the committee's advice.

This year the assembly argued whether it

should award the Mott prize for prevention. Nobody seems to have doubted the importance of Dr Burkitt's discovery of the childhood cancer that now bears his name (Burkitt's lymphoma) and his perceptive suggestion that it is transmissible (it later became clear that a virus is involved). Nor is it in doubt that he pioneered the chemotherapy of "his" lymphoma. But that was all more than fifteen years ago and in any case cannot strictly be considered a contribution to the prevention of cancer.

Turning a blind eye to those problems, the relevant committee and the assembly also had to grapple with the question whether Dr Burkitt's advocacy of the importance of dietary fibre in the prevention of cancer, the topic that has most occupied him in the past fifteen years, is more than a provocative hypothesis. In the end, it was not taken into account.

The choice of Dr Howard Skipper for the Kettering prize for diagnosis and treatment ran into much less opposition, although again the rules have obviously been stretched. Skipper is widely acknowledged as a pioneer of cancer chemotherapy. For 35 years he has influenced clinical chemotherapy by extensive studies on animal and cell models. His discoveries have influenced which drugs are used, in what combinations and their dosage and timing. It is, however, not easy to point to two major discoveries of Skipper's within the past fifteen years. His most recent work bears on the understanding of drug resistance in tumours.

Even for the least disputed of this year's prizes — that to Dr Stanley Cohen — an elastic interpretation of the rules is evident. There is no doubt that he put epidermal growth factor on the map and that it is relevant to cancer research. Cohen's earlier and very important work on nerve growth factor is not a contribution to cancer, and so the characterization and the biological effects of epidermal growth factor have had to be considered separate discoveries.

Perhaps prize rules are made to be stretched. Certainly as Robert Burton once said: "No rule is so general, which admits not some exception". But when the exception is the rule it may be time to change them. **Peter Newmark**



General Motors Cancer Research Prizes 1982: From left to right: Professor Stanley Cohen of the department of biochemistry at Vanderbilt University School of Medicine; Dr Howard E. Skipper, recently retired president of Southern Research Institute, Birmingham, Alabama; and Dr Denis Burkitt, honorary senior research fellow, St Thomas's Hospital, London.

**Advances in Automation Prompt Concern Over Increased U.S. Unemployment* (General Accounting Office, May 25, 1982). *Occupational Outlook Handbook* (U.S. Department of Labor Bureau of Labor Statistics, April 1982).