members of the staff, the true costs of moving have not been deducted from the savings and they doubt that the vacated site could be sold at market value during a recession.

Similarly, staff at the National Physical Laboratory claim that the proposal to close 200,000 square feet of buildings on the main site makes no economic sense. Some of the buildings recommended for closure are said to contain equipment such as standard force measurement machines and a vibration-free table whose removal would cost far more than the proposed savings. **Judy Redfearn**

Levich in New York

Down to work

New York

The fourth "Levich" conference held last month in New York was more like a routine scientific conference than a human rights protest. Organized by the New York Academy of Sciences and the City College of the City of New York, the Fourth International Conference on Physico-Chemical Hydrodynamics squeezed its concern for scientists' freedom in Eastern Europe into only a short tea-break. Professor Benjamin Levich, of the Weizmann Institute in Israel and simultaneously Einstein professor of physics at City College, participated as honorary chairman.

Five years ago at the first conference, Professor Levich was still in Moscow, a "refusnik" refused a visa to emigrate to Israel but also prevented from continuing his scientific work. Deprived of the sixtieth birthday conference normally accorded to Corresponding Members of the Soviet Academy of Science, Professor Levich was instead honoured with a conference organized by his colleagues in the West. The Soviet scientific establishment castigated this as an attempt to "set the scientific world in the West against the Soviet Union" — a charge strongly denied by Sir Derek Barton and Professor Brian Spalding, who stressed the "high importance" of physico-chemical hydrodynamics and of Levich's work in the field.

Nevertheless, the fact that the conference took place without the guest of honour inevitably publicized — and was intended to publicize — Levich's plight. When, the following year, a similar "Levich birthday" conference was convened in Washington DC, presumably n honour of his sixty-first birthday, the scientific purpose of the conference was again coupled with the desire of Levich's colleagues to win him the right to emigrate.

By the third conference (Madrid 1980), this aim had been achieved; Professor Levich had been in the West for more than two years and could preside in person. At the fourth conference human rights were referred to only in passing — in a review of the current situation presented by the Committee of Concerned Scientists and in an evening entertainment by a drama workshop from City College.

The conference, with its papers ranging from Czochralski crystal growth to three-phase coal slurries and from the haemodynamics of arterial flow with stenosis to two-dimensional flame propagation, honoured Levich rather by implication, indicating the wide ramifications of the discipline he helped to develop. Invited participants from the Soviet Union were unable to attend. **Vera Rich**

Acid rain

UK unrepentant

Stockholm

The Swedish government scored a modest success last week with its *ad hoc* meeting of the signatories to the 1979 Geneva Convention on long-range transboundary air pollution. The ministerial meeting accepted an expert report on the state of knowledge on acid rain, produced at a meeting the previous week, and it now seems likely that the convention will come into force by the end of the year.

Under the Geneva Convention, polluting countries must reduce sulphur emission, and the expert report effectively removed many of the objections that have been raised. There is no longer any doubt that sulphur dioxide and nitrogen oxides are responsible for the damage done to 20,000 Scandinavian lakes and a million hectares of central European forests.

Even so, Sweden's attempt to revive the "spirit of 72" when the UN Conference on the Environment was held in Stockholm was a flop. Some of the worst polluters, such as the United Kingdom, France and the United States, were complacent. Britain's Giles Shaw, Under-Secretary of State for the Environment, admitted the United Kingdom's burden of responsibility as Western Europe's biggest source of sulphur dioxide emission, but said that considerable strides had been made since 1972. Britain claims to have reduced sulphur dioxide emission by more than 20 per cent but mainly as a consequence of economic recession, the use of natural gas and low-sulphur North Sea oil and a greater use of coal.

The real surprise at the conference, however, was the change of heart by West Germany, where Chancellor Helmut Schmidt is anxious to win back the ecological vote after his party's near-defeat in the Hamburg elections. Another factor is the research carried out by Professor Bernhard Ulrich of the University of Göttingen which shows that 40 per cent of German forests have started to die, almost certainly as a result of air pollution. The expert report, however, considered as inconclusive the evidence that acid rain directly affects tree growth.

Scandinavian forests are not so far affected, principally because of the lower concentrations of sulphur dioxide and nitrogen oxides there. An ability to predict the speed at which acid rain will affect soils outside Scandinavia or the forests in that region, as well as the exact relationships between emissions and long-range precipitation, is crucial if the Scandinavians are to persuade other countries to spend money on pollution control. But the experts say that more research will be required before this can be done.

Some action at least is being taken. The Netherlands proposed reducing yearly per capita emissions of sulphur dioxide to 35 kilogrammes (the figure for the United Kingdom is about 88 kilogrammes) and nitrogen oxide emissions from 40 to 20 kilogrammes, which should halve the average wet deposition of sulphur in Europe. Although this proposal has not yet been accepted, the conference agreed that "even if deposition remains stable, deterioration of soil and water will continue and may increase unless additional control measures are implemented". **Jasper Becker**

US 1983 budget

Tighter still

Washington

The 30 per cent of US researchers who depend on federal funds are now a little closer to knowing how much money they will have when the new fiscal year begins on 1 October. The House of Representatives and the Senate have finally approved a budget resolution setting targets for government appropriations, that is, how much money may actually be spent in the 12 months starting in October. The Appropriations Committees of the House and Senate, each with 13 subcommittees, will now start working out individual spending figures.

A parallel but related process in Congress determines authorizations — the upper limits of what can be spent as well as approval for future years' programmes. Each process can modify the original budget request by the President but he has a veto. President Reagan has already vetoed a supplemental appropriation that contained, among other things, money for student loans, because it also included a housing measure he disliked. (Another supplemental appropriation, with the loans but without the housing, is expected to be passed soon.)

But last month's resolution may not put an end to the budget controversy that has dogged the Administration and Congress for most of the year, for the figures are somewhat higher than the President requested in domestic programmes, and somewhat lower for defence. If the appropriations committees agree these figures, the President could veto their measures. Even Washington has been bemused by the budget high jinks this year.

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This may have become a perennial problem. Two weeks ago, Michael L. Telson, an analyst with the House Budget Committee, warned the assembled administrators that the fight over the budget resolution was prophetic of what will happen in coming years.

He was speaking at an annual discussion of the federal research and development budget sponsored by the American Association for the Advancement of Science and based on a report* it issues each year. Telson said that so long as the Administration sticks to high defence spending and no major new tax revenue and does not lower the entitlements part of the budget (payments to individuals), the discretionary part of the civilian budget will become the scene of intense political competition. "Don't be surprised if you have trouble in the appropriations process that you never had before", Telson warned the group. "And don't take it personally."

Telson presented a chart from the President's budget request in which civilian research and development is included in the "all other" column. It shows how much less money there will be overall in the fiscal year 1983 than even in fiscal 1982.

David A. Shirley, director of the Lawrence Berkeley Laboratory (LBL) in California, gave the meeting an idea of what the recent budget shifts mean at the working level. LBL has no major weapons programmes or nuclear programmes and so has been particularly vulnerable to shifts in the civilian budget. When the President released the budget for the fiscal year 1982 in March 1981, the laboratory realized it would have to cut personnel by 10 per cent on 1 October. On 24 September, however, the Reagan Administration issued a revised budget for fiscal year 1982 which required a further cut of 300 employees, bringing the combined cut to 19 per cent. Seventy per cent of these cuts were made in basic research, Shirley said.

Now, Shirley said, there is a third cut coming for fiscal year 1983 in October, but he does not know its size because Congress and the Administration have not agreed on a budget. Legally, however, as director of the laboratory, he must give employees 90 days' notice of termination. He can make a guess now (something even soothsayers in Washington are not doing) or he can have the "full" complement of employees working on 1 October, and then make larger cuts later.

Meanwhile, Dr George A. Keyworth, the President's science adviser, complained of the hue and cry scientists had raised about changes that had been proposed — which he described as a quest for priorities — in the year since he took office. On the whole, however, Keyworth said the scientists, meeting with him privately in small groups of "20 or 30 a day", had been constructive, and anxious to help him set priorities. He boasted that the President's budget had done rather well by science — a conclusion the AAAS report supported — and took recent increases of 16 per cent in research and development spending by industry as evidence that US science is on the road to recovery (although others have attributed much of it to changed accounting due to new tax concessions). Having delivered his talk, and answered questions, he was out of the door before the moderator of the meeting had finished thanking him.

Deborah Shapley

*W.H. Shapley, A.H. Teich & J. Weinberg: *Research and Development, AAAS Report VII.* (American Association for the Advancement of Science, Washington, DC).

Universities outflanked by business lobby

Washington

Congress gave final approval last week to a plan that will set aside 1.25 per cent of federal research funds for small businesses. The legislation, almost certain to be signed into law by President Reagan, was strongly opposed by universities, fearing reduced spending on basic research.

The universities, however, were no match for small business, which has a powerful position in Washington. The House of Representatives passed the measure by an overwhelming vote of 353–57 and it was quickly approved by Senate (which last December had passed its own, similar version, by a 90–0 vote).

Any federal agency having a research budget of more than $100 million will be affected by the new measure. This includes the National Aeronauties and Space Administration, the National Institutes of Health, the Environmental Protection Agency, the Veterans' Administration, the Nuclear Regulatory Commission and the departments of defence, energy, agriculture, transportation, interior and commerce. After a three-year phase-in, the sums set aside will reach 1.25 per cent of each of these agencies' extramural research budgets (one-and-a-quarter per cent of the 1982 budgets would total $377 million).

The chief concern of the universities is that although the percentage cut appears small, its effect on basic research funds will be greatly magnified. A spokesman for the Association of American Universities called it "very unfortunate". A large proportion of spending on current research goes into fixed costs and previous commitments to multi-year projects, he said. What is left is the more vulnerable support for new, basic research projects.

A deeper worry is that since small businesses — defined as firms with fewer than 500 employees — will still be able to compete for funds under the regular programmes, the fund set aside will go to proposals that are unsuccessful in the general competition for funds. The bill's backers claim that peer-review of set-aside fund proposals will eliminate that problem.

Stephen Budiansky

Fancy technique

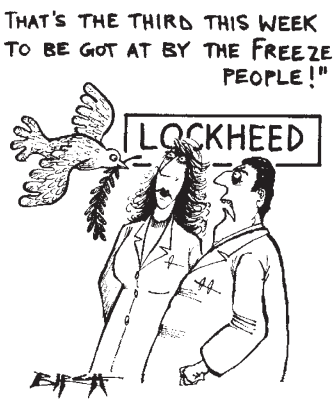
St Louis

From an industrial giant in the heart of California's "Silicon Valley" that specializes in conquering space in a minimum of time comes the latest in rapid communication — the homing pigeon.

At Lockheed Missiles and Space Company, a division of Lockheed Corporation, draughtsmen have gone beyond pencils and T-squares to perform their intricate design work on a computer's video screen.

A courier had to spend 1½ hours travelling over congested highways and winding mountain roads to carry print-outs from the Sunnyvale computer, 20 miles away, back to the designers, and designs done one day did not arrive until mid-afternoon on the following day.

That's where the homing pigeon stepped, or flew, in. The idea arose when someone heard about a hospital in England using the birds to transport blood samples. The company directed a



research chemist, Werner Deeg, to investigate. Deeg built a pigeon loft, and started with eight pigeons donated by local pigeon fanciers. He now thinks of pigeons as his hobby, and tends them in his lunch hour.

The pigeon courier service has been running since mid-December. A pigeon gets a lift down the mountain to Sunnyvale every afternoon with the regular courier. At the end of a day, a microfilm copy is made of the print-outs and the following morning the pigeon heads for home with the microfilm strapped to its leg. It's just a 20 minute flight as the pigeon flies.

The weather is the only problem said Deeg. "But, even so, we've been able to fly 85 per cent of the time." Why doesn't Lockheed have electronically-operated printers to transmit the data? It does — but at $10 a print, that system is used only as a back-up. The pigeon can carry a day's work, 30 or 40 blueprints, at a cost of about $1.50.

"They live 12–15 years unless they're eaten by a hawk or fly into electric wire", Deeg said. He's proud of their record so far: "We've yet to lose a pigeon or a microfilm."

Karen Freeman

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