not based solely on its experience with bubble technology. The company, which is the second largest producer of integrated circuits in the United States, is going through a difficult period as a result of a general slackening of world demand for semiconductors. It has already reduced its 2,800 workforce in the United States by three per cent, and is closing its operations for a few days in both September and December to save money. Part of this general retrenchment involves phasing out several products, including the bubble memory devices, which achieved sales of only one million dollars last year.

Bubble memories work by storing information in the form of small polarized regions created in magnetic film. These appear as "bubbles" of magnetism, and can be forced along tracks by a pulsating magnetic field.

They have several advantages over more conventional memory systems, one being a potentially large capacity to store information. Intel announced in 1979, for example, a bubble memory capable of storing one million bits of information, while semiconductor manufacturers are still struggling to produce reliable chips capable of storing 64,000 bits.

Bubble memories are considerably faster than floppy disk storage. They are more reliable than magnetic tapes and disk storage since they have no moving parts. And unlike silicon chips, they do not lose stored data during power failures.

Against these advantages, however, several factors have handicapped bubble memories in the market. For a start they tend to be considerably slower than silicon chips. And while research and development into bubble memories has been aimed at improving their performance, the price of competing systems has been falling at such a dramatic rate that the advantages of bubbles have been insufficient to achieve the volume sales necessary to reduce prices.

While the price of floppy disk storage fell from about 0.04 to 0.01 of a cent for storing a single bit of information between 1977 and 1981, and random access memories from 0.08 to 0.02 over the same period, the cost of bubble memories remains an order of magnitude higher.

Compounding the price disadvantage have been apparent marketing failures by several of the companies. Both Rockwell and Texas Instruments are said to have concentrated excessively on refining the technology of bubble memories while neglecting the ancillary equipment necessary to make them as easy to use as conventional memory systems.

Supporters of bubble memory technology now admit that they are unlikely to overtake the market position of either disks or silicon chips. Where they are more likely to find a niche is in specialized applications where they can capitalize on their particular advantages, for example in defence or factory equipment operating in particularly harsh conditions.

Another potential application is in telecommunications. However, even Bell Laboratories, which pioneered bubble memories in this field admits to frustration in persuading its parent body, American Telephone and Telegraph, to replace disks with bubbles in telephone switching systems. Initial projections that this would take place in the early 1980s have now been put back "two or three years".

David Dickson

New antibiotics

Combined attack

If the hopes of the British pharmaceuticals company Beecham are realized, a quiet revolution in antibiotic treatment began yesterday (Wednesday 16 September) with the launch of Augmentin on the UK market.

Although in no sense approaching dangerous levels, there is a steady increase in the proportion of pathogenic bacteria possessing resistance to the widely used beta-lactam (penicillin and cephalosporin) antibiotics. Already several drug companies have responded by introducing so-called "third generation" cephalosporin derivatives (such as cefotaxime (Claforan) from Roussel and moxalactam (Moxam) from Shionogi and Eli Lilly) which are less susceptible to inactivation by the beta-lactamase enzyme present in resistant bacteria. These new cephalosporins, which have a much wider spectrum of activity than the "older" beta-lactam drugs, are being touted as an alternative to combinations of "old" penicillins or cephalosporins with aminoglycosides or some other antibacterials such as chloramphenicol or metronidazole for treating or preventing surgical infections.

Where the new cephalosporins fall down, however, is in the route of administration — they must be given by injection and not orally. In general practice, and for patients not hospitalized, oral administration is much preferred. Because Augmentin is claimed to have at least as broad a spectrum as the new cephalosporins, and can be taken orally, there is already great interest in the drug.

Augmentin is a novel combination; it contains a well established semisynthetic penicillin (amoxicillin) together with clavulanic acid which has no antibacterial activity of its own, but blocks the activity of the beta-lactamase enzyme in bacteria resistant to conventional penicillin therapy. Now this combination has been cleared for sale in the United Kingdom, and the Committee on the Safety of Medicines has now permitted Beecham to recommend its use in most of the infections for which the company had requested clearance.

The attraction of a broad-spectrum antibiotic is that it stands a good chance of being effective when used as an initial treatment, before there has been time to go through the process of identifying the infecting organisms. And this, of course, is usually the case in general practice. Augmentin is indicated for virtually any bacterial infection provided the bacteria are sensitive, and that means in about 95 per cent of cases. Comparable figures for resistance to cotrimoxazole and ampicillin or amoxicillin are around 84 per cent and 72 per cent respectively.

Applications for Augmentin to be allowed onto other markets, including Europe and the United States, are in the pipeline. The next step after that is to make a grade of Augmentin suitable for use in children (the present one is not), and then perhaps injectable forms will be introduced to compete with the third generation cephalosporins for treating surgical infections.

Charles Wenz

California's Medflies

Who to blame?

Washington

Now that the State of California seems to have brought its recent outbreak of Mediterranean fruit fly under control through intense spraying with the pesticide malathion, a sharp dispute has broken out over what — and more importantly, who — was responsible for an outbreak that at one time seemed to threaten not only California's multi-billion dollar fruit industry, but also the political career of Governor Edmund G. (Jerry) Brown.

Last week, officials of the state's Department of Food and Agriculture issued a report laying the blame squarely at the feet of the federal government. According to department head Richard E. Rominger, the outbreak would have been contained much earlier and without the need for aerial spraying had it not been for the accidental release of over 50,000 supposedly sterile flies by the US Department of Agriculture (USDA), some of which were later shown to be fertile.

However, USDA is refusing to be identified as a principal culprit. A representative of the agency said in Washington last week that although some non-sterile flies were "probably" released by mistake, it was impossible to tell whether this was the main cause of the outbreak since only two fertile flies were discovered among 1,300 dissected, the rest having been found to be sterile.

USDA is also pointing to an apparent laxity in quality controls supposed to check on the sterility of the 8,000 million irradiated flies imported from Peru in an attempt to apply biological pest control methods, for which the state was jointly responsible. USDA protocols suggest that several dozen flies from each batch should be checked for sterility. But in the rush to control the outbreak "the program personnel from both the federal and state agencies decided that only one insect should be checked (from each bag) so the state is really equally to blame".

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California's fight against the so-called Medfly, a battle which has been fought several times over the past few years, since the fly is endemic to Central America and is thought to be brought over the border in fruit and vegetables, found itself in the national headlines in July when traditional ground-based control methods, including selective spraying, biological pest control and stripping trees of fruit, appeared to be failing to stop the latest infestation.

Initially Governor Brown refused to allow aerial spraying by malathion because of the general environmental damage he thought this would cause. However, he changed his mind when the federal government threatened to place all Californian produce in quarantine unless the spraying was carried out. After some technical hitches, this began on 20 July.

So far, the massive spraying seems to have been successful in containing the infestation. Although Medfly larvae are still being found at the edges of the sprayed areas — as well as occasionally in other locations to which they are thought to have been transported by humans — none has been found in places where the spraying has been concentrated.

But if the biological battle has been won, at least temporarily, the legal and political battle may be only just beginning. Governor Brown, who draws much of his support from the environmentalist community which opposed the aerial spraying, has been widely criticized by local farmers for not acting sooner. Brown hopes to run for the US Senate when his term as governor expires, a factor said to be playing a large part in his aides' insistence that the federal government should be blamed for the Medfly outbreak, and should therefore help to cover the costs of controlling it.

However, it may prove extremely difficult to determine who is to blame. In addition to the problems with the initial quality control, there is evidence that laboratory technicians who have examined over 100,000 flies have had difficulty in distinguishing the irradiated ones — marked with a yellow dye — from local flies onto which some of the dye has brushed off.

David Dickson

The Medfly is not an aphid, as described in a recent leading article (see *Nature* 27 August, p.786), but *ceratitis capitata*, a dipteran — Editor, *Nature*.

Research in Romania

Time for rethink

Scientific research and development work in Romania is being hampered by professional "discoverers" — people who put forward artificial suggestions and "pad" each other's research — according to a recent round-table discussion organized by *Era Socialista*, the theoretical journal of the Romanian Communist Party. At the same time, technologists and engineers genuinely contributing to industrial research are overburdened with routine paperwork, and some industrial managers try to keep scientists out of their plants on the grounds that they interfere with production. Pay for research staff is too low, and the bonuses payable to those who have put forward a practical new idea often arrive three or four years late. Moreover, no bonuses are paid out on a negative result — and due recognition for negative results is of particular significance in Romania which now has a policy of "reattestation", the conferring of academic degrees not for life but on a renewable basis, depending on recent professional performance.

The round table was part of the new Romanian drive for research and development. During the past 10 years, the research workforce has expanded from 37,000 to 200,000. Since 1976, all research has had to be directly linked with specific needs of the national economy, virtually eliminating the concept of fundamental and academic research. Yet press reviews of the 1976–80 five-year plan indicate that the 12,106 new patents granted during that period earned the national economy some 8,700 million lei, barely enough to offset the state's research and development expenditure during that period.

During the current five years, research expenditure is scheduled to increase sharply. For example, the Minister of Mines, Oil and Geology, Virgil Trofim, told the *Era Socialista* round table that he had been allotted an extra 13,000 million lei for geological research alone — a figure approximately double the total allocation for all scientific research under the previous plan. Last week a decree of the State Council "released" Mr Trofim to take up "other assignments", and divided his former Ministry into three, in terms which suggested that the research funding will be increased even further.

At the end of last year, summing up the research and development shortfall under the 1976–80 plan, President Nicolae Ceausescu criticized in particular the failure to achieve set targets for "technical progress" and failures, or long delays, in introducing many of the results obtained into industry. (Such criticisms, incidentally, must cause the president some conflict between his public and domestic personae. In 1979, when the National Council of Science and Technology was reorganized to strengthen central party and government control, his wife, Dr Elena Ceaușescu, was made its head, while in April 1980, two of their children, Valentin and Zoe, became council members.)

In June this year, Dr Ion Ursu, First Vice-Chairman of the National Council of Science and Technology announced a crash research and development programme to achieve over 3,000 main "targets" of national importance, 2,600 of which are to be introduced in industry before the end of the present five year plan.

Vera Rich

Pearls before swine

Bangalore

India and China are showing renewed interest in biogas production as the answer to the energy crisis "down on the farm".

The concept is simple — animal and vegetable waste are converted into methane gas and thence to workable energy. The practical problems of constructing and maintaining suitable digesters and the costs of steel and concrete fittings have, however, proved beyond the capabilities of many third-world farmers. In the Chinese province of Sichuan, for example, more than half of the 7 million digesters have fallen into disuse.

The situation may be eased with the development by the Union Industrial Research laboratory near the Taiwan capital Taipei of an almost indestructible, non-corrosive biogas digester working on pig excreta. The plant is made up of a tough pliant plastic sheet derived from blending red mud with polyvinyl chloride. It is resistant to all types of acids and alkalis, can withstand deflation and inflation 6,000 times per year and is half the cost of conventional digesters used in China. In Taiwan a unit big enough to process the manure of 30 pigs costs around $225. An adult pig weighing 90 kg excretes about 8 litres of body waste per day; this converts to a third of a cubic metre of gas with a quarter of the heating value of petroleum-derived bottled gas.

Cow dung is the major ingredient for biogas plants in India. Here the most widely used plant, based on a design evolved by the Khadi and Village Commission, consists of an underground cement pit covered by a metal gas holder which had to come from an urban workshop. However, a drumless plant has been designed by a governmental research agency in Uttar Pradesh, which has many similarities with the Chinese biogas plants. It is also half the cost of the conventional plant and can be easily handled and maintained.

It has been estimated that India's cow dung potential could run 18.75 million family-size and 5.6 million community-size biogas plants with a daily capacity of 1.7 million and 142 million cubic metres of gas respectively. The target of 1 million family-size biogas plants, under India's sixth five-year plan, for which $55 million has been set aside, can only utilize 5 per cent of the potential capacity.

Various new feedstocks are being tested in experimental plants: the Punjab Agricultural University is using leafy material such as tree leaves, crop residues, fruit peel, chopped paddy and wheat straw; and the Indian Agricultural Research Institute in New Delhi is experimenting with both animal and plant wastes.

Radhakrishna Rao

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