employment, associated with the station; leaving the area where a new reactor is built—an option that objectors to other environmental changes, such as an increase in noise, frequently chose; joining a local action group and seeking local support—for example, general practitioners could be an important source of support as could friends and relations; and cognitive restructuring—that is, if it was impossible to change circumstances it might be possible to change perceptions of them. (An example of such positive induction was the BMA's tour.)

Radiation in medicine

Medical ionising radiation is the major source of exposure to non-natural radiation in this country today, and it forms 11% of the population's total radiation dose. Reporting this in his talk on the benefits and risks of radiation in medicine, Professor L E J Roberts of the environmental risk assessment unit at the University of East Anglia, discussed the benefits and risks of radiation in medicine. Natural background radiation might cause 1% of all cancers (1400 cases a year)—the nuclear industry added only 0.1% to this natural background radiation. Residents of granite buildings in parts of Cornwall and Devon received almost 10 times the background radiation yet there was no evidence that the incidence of any cancer was higher there than elsewhere.

Studies by the United Kingdom Atomic Energy Authority and British Nuclear Fuels of the incidence of all cancers among those employed in the nuclear industry showed that their standardised mortality ratios were slightly higher for some cancers and lower for others. Although it was accepted that the increases might be attributable to ionising radiation in some cases, the numbers seemed to be small and hard to determine with certainty. The depression and morbidity associated with fear and uncertainty about the nuclear industry were, said Professor Roberts, a much greater burden to the population living near reactors than the physical risks of living in such an environment.

Turning to the disaster at Chernobyl in April 1986 Professor

Roberts assured his audience that British safety systems were based on the belief that any piece of equipment and any human being could fail. The type of reactor used at Chernobyl was likely to become unstable if operated at less than 20% of full power. On the day of the disaster the reactor had been operating at only 6% of full power for more than two hours and the operators had managed to circumvent four separate safety systems. Subsequently, acute radiation sickness had been diagnosed in 200 people and 31 had died. Professor Roberts urged his audience to see the accident at Chernobyl in context, serious though it undoubtedly was, and he believed it to be "probably the worst possible accident which could happen to a nuclear reactor." It had been the result of a combination of ignorance, lack of discipline, and poor management. It should not lead people to fear a similar accident at a British reactor, which was of a totally different design and subject to far stricter safety controls.

Where fact mingles with science fiction

In the subsequent discussion it emerged that alternative energy sources could meet only 5% of the United Kingdom's energy requirements. Even a barrier across the River Severn would only double that figure. To produce the same power output as Oldbury 1000 wind turbines with 100 m long blades would be needed and this system could not meet actual power requirements because the coldest days when these were greatest were invariably devoid of wind. So whatever people's personal opinion of nuclear power it was needed to meet our energy requirements.

Concluding the visit, Mr Keith Baddley, the station manager, observed that despite his belief that some very eminent doctors were present he had to boast of an earlier visit by another doctor whose personal fame was even greater. Doctor Who had fought a famous battle against the forces of evil in the chamber where we were sitting. That this scientific achievement of the twentieth century should form the background to a futuristic fantasy seemed entirely appropriate: we were, after all, looking at our future.

Two centuries of immunology and a touch of mediaeval history

DEBORAH NEWTON

To encompass two centuries of immunology in 30 minutes is no mean feat, but that was the target for the scientific session at the Jenner Centre in Berkeley, Gloucestershire. The Sasakawa Conference Centre, set in the beautiful grounds of The Chantry—Edward Jenner's home from 1785 to 1823—is named after the internationally renowned Japanese philanthropist, whose generous gifts helped the Jenner Trust to purchase and endow The Chantry, home of the Jenner Museum.

Professor J P Mitchell, chairman of the BMA local organising committee, introduced the first speaker, Professor Bruce Perry, emeritus professor of medicine at the University of Bristol, who has made a particular study of Jenner's life. Offering \$1000 on behalf of the World Health Organisation to anyone in the audience who could find a natural case of smallpox anywhere in the world, the professor attributed the eradication of this horrific disease to the birth of Edward Jenner, the ninth child of the vicar of Berkeley, on

17 May 1749. Jenner's early life as an apprentice surgeon had been in Sodbury, where he first heard of the popular belief that cowpox protected against smallpox. Jenner subsequently travelled to London to study at Hunter's anatomy school and on the wards at St George's Hospital, returning to Berkeley after only two years to become "a simple country doctor." Nevertheless, he corresponded with Hunter and in one letter Hunter advised his friend, "Why think? Why not try and experiment?"

Jenner married in 1788 and bought The Chantry which became his headquarters for the rest of his life. He studied patients who had had cowpox but had escaped smallpox when exposed to it; some of them he challenged by inoculating them with smallpox. On 14 May 1796 he saw Sarah Nelmes, a milkmaid with a cowpox lesion on her hand. From this he inoculated the boy James Phipps. Three months later he challenged the lad with smallpox, with no ill effect. In 1798 after collecting more cases Jenner published privately his book on the causes and effects of the variolae vaccinae. It is from Jenner's latinisation of "the smallpox of cows" that the word vaccination is derived. His book was more popular abroad than at home, but despite criticism he persisted and in 1801 predicted the eradication of smallpox. Ironically, from a twentieth century viewpoint, Jenner was elected to the Royal Society in 1789 not for his work on smallpox

BMA gold medallist

Dame Cicely Saunders, who received the BMA's gold medal for distinguished merit at the ARM in Bristol for her outstanding services to medicine in the form of the hospice movement.

Costing university research

Universities have been subsidising their commissioned research for industrial and government customers at the expense of their basic research and teaching budgets. As the volume of university research for such customers has grown—by 45% in real terms between 1981-2 and 1985-6—these subsidies have increasingly drained resources.

A consultation paper from the Committee of Vice Chancellors and Principals (CVCP) says that universities should be aware of the full cost of undertaking such work and asks universities to consider a system for costing research and other activities, which should be simple and be acceptable and understandable to university staff and to commissioning bodies.

Although this would raise the price, universities would still be less expensive than most major research laboratories, according to the report. *Costing Research and Projects in Universities: a New Approach* recommends the phasing out of subsidies and suggests that the government should set a good example to industry by agreeing to pay the full economic cost of work commissioned from universities.

A second consultation document, *Guidance on Structure and Practice of Financial Management in Universities*, follows a recommendation of the Jarratt committee report of 1985 that the CVCP should "encourage and assist universities in

adopting best practices." The recommendations include more detailed and closely defined responsibility for lay members of university councils in the financial management of universities; five year forward planning as part of a clearly defined system for planning and allocating resources; up to date, computerised information systems so that income and spending can be adjusted rapidly as circumstances require; and internal and external auditing of all spending as part of a clearly defined system of accountability and control.

Council meeting in Bristol

The first council meeting of the 1987-8 session was held in Bristol at the conclusion of the ARM. Dr John Marks, who was re-elected chairman for the session, welcomed new members and thanked those members who were no longer on the council.

The following were elected to the finance and general purposes committee: Dr D J Brodie, Dr W M Dixon, Dr J M Dunlop, Mr A H Grabham, Dr P F Kieley, Dr Caroline Marriott, Mr A P J Ross, and Dr M A Wilson. The president, the chairman of the representative body, the chairman of council, and the deputy chairman of the representative body are members ex-officio.

Appointments were made to several other committees of council.

Two centuries of immunology—continued from p 225

but for his discovery that cuckoos laid their eggs in the nests of other birds. In 1823 he had a stroke, died the next day, and was buried in Berkeley church.

Professor Perry concluded by touching on two mysteries connected with smallpox vaccination: firstly, the virus used for inoculation was propagated on cows' bellies after 1880 and electron microscopy had since shown that it was neither cowpox nor smallpox virus, nor, apparently, derived from either. The professor wondered if it had come originally from the disease "horse grease," an assumption that would support Jenner's theory that horse grease and cowpox were the same disease. Whatever the virus, it seemed to protect against smallpox, even when given after initial exposure to the disease. This was the second peculiarity and a property that enabled smallpox to be annihilated world wide.

Immunology from Jenner's time

Leaping forward a century Professor J R Clamp, professor of experimental medicine at the University of Bristol, described the development of immunology in France and Germany. Paul Ehrlich believed that the basis of the immune reaction was to be found in humoral factors. Professor Clamp described the functions and sites of action of each antibody class using a simple diagram. Metchnikov had been working in Paris and supported the opposing view that cells were the basis of the immune response. Professor Clamp illustrated modern theories of cellular immunity. Yet cellular mechanisms had been ignored for a long while, a neglect that was due principally to Ehrlich's dominating personality, suggested Professor Clamp. Metchnikov, although a brilliant research worker in many ways, had some strange ideas that affected his influence. At the end of the nineteenth century he had written a book, *The Prolongation of Life*, which though decried by scientists was influential among lay people and also doctors. His idea was that all degenerative disease, including old age, was due to bacterial toxins. The colon was the most important source of these toxins, a theory that had resulted in a vogue for colonic lavage—and even colectomies to prevent or cure such degenerative diseases as

rheumatoid arthritis—as well as the great search for septic foci in the 1930s and 1940s. Metchnikov was described by Professor Clamp as the first food faddist, whose book, which described yoghurt as a "staple food," started the yoghurt craze.

Jenner Museum and Berkeley Castle

After tea in the Sasakawa Centre the representatives visited the Jenner Museum. The Chantry's drawing room is devoted to Jenner, his life and work, and contains such enlightening exhibits as a lock of his hair and his will. Excellent displays portray different aspects of his life: his personality, his relationship with Hunter, the country doctor, the naturalist, and his family. The dining room contains photographs and cartoons illustrating the history of vaccination, as well as housing an exhibition about Rodney Porter, a more contemporary immunologist (1917-85), who elicited the basic structure of antibodies and for this won, with Gerald Eldman, the Nobel Prize for Medicine in 1972.

Perhaps the loveliest room in the house is Jenner's study, equipped according to an inventory produced shortly after his death. Among the anatomical specimens, papers, and globe, is a wooden flute, for Jenner was a keen musician as well as something of a poet.

The garden contains the "Temple of Vaccinia," an extraordinary thatched garden shed built by Jenner's eccentric clerical friend, Robert Ferryman where Jenner did free vaccination of the local poor. The party then left scientific history for social history, walking through Berkeley churchyard past Jenner's grave to Berkeley Castle, notorious as the site of Edward II's incarceration and brutal murder. Home of the famous Berkeley family since the eleventh century, the castle boasts numerous original paintings including a portrait of Harvey and one of a rather corpulent Jenner.

A whistlestop mixture of science and history, the afternoon's session was nevertheless much enjoyed. Few single discoveries in medicine have had such a pronounced impact as that of vaccination. It led ultimately not only to the eradication of one scourge but also to the birth of immunology, a science whose skills are vital in medicine's efforts to combat the latest frightening scourge, the acquired immune deficiency syndrome (AIDS).