

invitations have been accepted, and the proposal for presentation of 'poster highlights' has been favourably received. Contributors from the following countries, in addition to the United States and Canada, have accepted the Committee's invitations: Australia, Belgium, Brazil, China, Czechoslovakia, Denmark, France, Germany, Hungary, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Norway,

Sweden, Switzerland, United Kingdom, U.S.S.R.

Finally, the Programme Committee decided that a small series of public lectures, ideally to be held in the City's Media Centre with full television and other coverage and dealing with subjects of interest and concern to the population at large, would be an important means of giving publicity to the contributions which physiological research has made

to the common weal throughout the world. This plan too will be implemented during the 1986 Congress.

HUGH McLENNAN is in the Department of Physiology, The University of British Columbia, Vancouver, B.C., Canada, and is Chairman of the Programme Committee, XXXth International Congress of Physiological Sciences, 1986.

EDUCATION

The Challenge of the GPEP Report

F. Vella

There are 127 medical schools in the USA and 16 in Canada. Their preclinical curricula (which include Anatomy, Biochemistry, Microbiology, Pathology, Pharmacology, and Physiology and frequently also Behavioral Sciences, Genetics, Neurosciences, and Preventive Medicine – Epidemiology) have been categorized¹ into four patterns: (i) disciplinary (namely, the responsibility for teaching a course in a discipline is vested in a basic science department); (ii) disciplinary with a correlative course (as in (i), but includes an interdisciplinary course which involves basic and clinical disciplines, in the second year); (iii) systems (namely, organized partially or totally around body systems); and (iv) problem-based (that is, one which requires students, under the guidance of a tutor, to seek out information and to formulate solutions for clinically based problems presented to them). Some 91% of schools are in categories (i) and (ii), and only four schools are in (iv). The lecture is the predominant mode of instruction.¹

The influence of the recommendations of the GPEP Report² – which took three years to produce and was released in September 1984 – will be felt within this context. Five conclusions are contained in the report. They concern: purposes of a general professional education, baccalaureate (i.e. pre-medical) education, acquisition of learning skills, clinical education, and enhancement of faculty involvement. Each conclusion is followed by four to six recommendations. The fundamental general recommendation is that 'medical faculties should emphasize the acquisition and development of skills, values,

and attitudes by students at least to the same extent that they do their acquisition of knowledge. To do this, medical faculties must limit the amount of factual information that students are expected to memorize.' It is not surprising therefore that a recurring theme is the need for the development of active, independent, self-directed learning by which students develop abilities to seek out information and to analyze and apply it to the solution of problems, as opposed to an almost total reliance on rote learning of lecture material and handouts.

To bring about this remarkable shift in emphasis from the acquisition of factual knowledge (mostly by rote learning) to the development of learning abilities and processes, six specific recommendations are provided: (i) identification of those students who have the ability to learn independently with provision of opportunities for their further development of this skill, and of those who have not yet developed this ability who should be challenged to develop it; (ii) reduction of scheduled time; (iii) reduction of lecture hours; (iv) the offering of educational experiences that require students to be active independent learners and problem solvers, rather than passive recipients of information; (v) use of appropriate evaluation methods; (vi) application of information sciences and computer technology in education.

The report does not describe or propose methods for the enhancement or acquisition of these learning skills. However, the Subgroup on Learning

Skills³ lists the following as examples of methods which foster them: problem-based learning, experience-based learning; contract learning; mastery learning; computers as resource and method of learning, and patient-oriented problem-solving systems for groups. One characteristic of these educational strategies is that they promote the development of process skills, rather than the acquisition of enormous numbers of poorly integrated facts.

This is an important report. What it says about the professional education of the physician is, in large measure, also valid for the education of other professionals. The ideas it embodies have been held and proposed by many educators from a variety of disciplines over the years. It is the presentation of these ideas as the collective wisdom of a prestigious group of medical educators under the aegis of the AAMC, which brought the group together in the first place, that is new and highly significant. Medical schools in many foreign lands are likely to be affected to varying degrees by them.

A very dramatic shift in the didactic methods beloved of the great majority of university teachers is being recommended, one that requires a departure from the deeply ingrained and comfortable model of student as passive recipient of knowledge, and of teacher as the active transmitter of this knowledge. Teaching is to be accorded a status in academic medicine which it now has only in a minority of institutions. Will the challenge be taken up by the great majority? Inertia (personal, departmental, institutional) is

EDUCATION

the strongest enemy of educational change. Will the challenge prove to be powerful enough to reduce this inertia significantly? Will the report produce a blossoming of creative and ingenious attempts to explore, and to develop, ways which bring about the learning skills it advocates? Will we see a resurgence of interest in laboratory exercises or projects (e.g. in Biochemistry), in library projects, and in term papers? Will those students who may have become hardened in their ways before they reach medical school take kindly to unfamiliar educational methods, especially if these are perceived as being at odds with the evaluation methods used by professional bodies? Will concerned educators be able first to teach students how to learn for themselves

and pass on to them the findings of educational psychology and the collective experience of reputable teachers? Is the present economic environment conducive to the changes proposed? Only time will tell.

There are many educators in the pre-clinical sciences who have been contemplating change in their didactic approaches. They are the ones who could extend and spread the use of a different approach to medical education, one which has been tried, which incorporates the results of extensive experience and research, and which is intellectually more reasonable and pleasing. Will they find the courage, energy, and commitment to take the next, the logical step? If and when they do, the report will have produced

meaningful change in the education of those who will bear the burden of medical practice and research in the twenty-first century.

REFERENCES

- 1 SWANSON, A. G. (1984). Medical Education in the United States and Canada. *J. Med. Educ.* **54**, 35–56.
- 2 THE GPEP REPORT: Physicians for the Twenty-First Century. *AAMC*. September 1984. 64 pages.
- 3 KNOX, A. B., SUTER, E. & CARMICHAEL, J. W. (1984). Subgroup Report on Learning Skills. *J. Med. Educ.* **54**, 149–154.

F. VELLA is in the Department of Biochemistry, Faculty of Medicine, University of Saskatchewan, Saskatoon, Canada.

CORRESPONDENCE

A BLUDGEON FOR THE CURMUDGEON

Sir –

Like the cable cars of San Francisco or small bottles of Coca-cola, Erwin Chargaff has long been a lovable anachronism. After the era of his significant contributions to nucleic acid chemistry, he became an observer and critic of society and science, bemoaning, often wryly and brilliantly, the evolution of Biochemistry (with Microbiology and Cell Biology) into the 'new' discipline of Molecular Biology. His classic play *Voices in the Labyrinth*, which describes allegorically the philosophical and verbal conflict between the Young Biologist and Old Chemist, employs the rhetorical technique of hyperbole for emphasis. In a recent contribution to *BioEssays* entitled 'Frozen Delight' (*BioEssays*, vol. 2, 84), however, some of Chargaff's wonderful outrageousness is excessive and should not go unchallenged. Chargaff's essay, which begins with an excerpt from a *New York Times* article describing the birth of the first baby produced from a frozen embryo, is a diatribe against the medical scientists who, 'splitting and splicing, messing and fussing', have allegedly even attempted to replace Nature. It must also be considered an indictment of our presumed lack of appreciation of the mystery and uniqueness of human life and of the process of procreation.

The story as reported by the *New York Times* (April 11, 1984) and *Life*

Magazine (January 1985) seems anything but extraordinary. An Australian woman underwent treatment at an *in vitro* fertilization clinic in Melbourne, Australia, where ten of her freshly extracted ova were fertilized *in vitro* by her husband's sperm. Several of the resulting embryos were immediately implanted in her uterus, but the woman failed to become pregnant. However, doctors had preserved the other embryos by suspending them in liquid nitrogen, and when they were thawed two months later, two were implanted and one developed normally. It appears from Chargaff's essay that this tepid account precipitated his passionate lament for times 'when people did not think that God created the world as a tax shelter', when we were not 'allured by the shrill advertising claims of science and technology...[and] willing to assume that nearly everything is fixable'. Does this account warrant such a response? Does it really imply that we 'have completely lost the sense of that aura of irrepeatability surrounding each human life'? And what of Chargaff's throwing his net of vituperation even wider: 'The ever growing persuasion on the part of many scientists that they are called upon to replace nature has found its clearest and most brutal expression in the designation of "genetic engineering"'?

Little of Chargaff's harangue is defensible. It denigrates unfairly the motives and *Welanschauung* of the professionals involved in *in vitro* fertilization and in human gene therapy, and

ignores the long and distinguished history of medical therapeutics. The goal of science is never to replace Nature, but to comprehend her, to gain hard-won insights into her complex mysteries and, at most, on rare and sublime occasions to complement her in small ways. It is naïve to suggest that we have not routinely 'tampered' with the will of Nature; vaccination, blood transfusions, antibiotics, insulin replacement, and open-heart surgery all refute such an implication. Recall that Chargaff was set off by a good-faith attempt to bring parenthood to an infertile couple. Infertility, *per se*, is only disease in the evolutionary sense, although there it is mortal. But for the persons with this disease there may be turmoil, even agony in the deprivation of the telos of all organisms. Do those who seek to treat infertility, or those who suffer from it, deserve Chargaff's ex-coriation? Arguably, it is precisely the antithesis of Chargaff's assertions – that is, the appreciation of the uniqueness and value surrounding each human life – that impels the afflicted and their physicians to circumvent the lesion.

Some of Chargaff's rhetoric is not execrable, but merely inaccurate. His assertion that 'experiments on human beings have hitherto been shunned, if not proscribed...' ignores the realities of life in these United States. We are commonly experimented upon for an almost incredible spectrum of reasons, for everything from determining our preference for a certain diet cola drink