What's New in Education, Research, and Community Service

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New Lead on Diabetes

A team of Monash University medical scientists has made a discovery that could lead to a new approach to the clinical treatment of diabetes. Preliminary tests on volunteers from among patients at the Alfred Hospital, Melbourne, have given dramatic results and the biochemists are now urgently seeking ways of producing the new drugs in quantity for large-scale clinical trials.

Although insulin and certain oral drugs play an important role in ameliorating diabetes, the disease continues to take a heavy toll. Medical researchers believe that better control is most likely to result from an understanding of basic body processes involved in the condition.

These clinical tests of a new treatment were the culmination of more than 20 years' research by Professor Joseph Bornstein, head of the Department of Biochemistry in the Monash Medical School. He began the research in 1947 at the Baker Institute in Melbourne. Following further work in the same field at Kings College Hospital in London, Washington University in St. Louis, Melbourne University, and the Alfred Hospital, Professor Bornstein came to Monash, where he continued his investigations with Drs. J. McD. Armstrong, F. M. Ng, and H. P. Taft.

An important early discovery was that the majority of diabetics do in fact secrete insulin. It was found that the blood of such people contains a substance that interferes with the function of the hormone, so that additional insulin must be given to promote normal use of sugar in the body. A possible clue to the nature of the unknown substance was provided when medical scientists elsewhere found that injection of growth hormone normally present in small amounts in the body produced a rise in blood sugar level analogous to that of diabetes. Even more intriguing was the fact that a temporary fall in blood sugar preceded the rise.

Following years of patient investigation, Professor Bornstein and his colleagues at Monash last year announced the isolation of two breakdown products of growth hormone that could account for the fall-and-rise effect. By interfering with critical biochemical stages in the use of blood sugar and its conversion to fat in the body, one of them (polypeptide “ACG”) could account for the lowering of blood sugar immediately after injection of growth hormone, and the other (polypeptide “ING”) for its later sustained rise to diabetic levels. Further, these two substances could be responsible for all the effects of growth hormone on the use of carbohydrates and fats in the body.

These products of the breakdown of growth hormone are apparently in balance in the healthy individual and imbalance could possibly lead to diabetes. Treatment with ACG might overcome the imbalance and restore the normal rate of breakdown and use of sugar in the body.

The treatment of experimental animals with ACG confirmed this suggestion. The results were so impressive that clinical tests of the purified and sterilized material were carried out on five volunteer diabetes patients at the Alfred Hospital.

In all five cases the administration of ACG resulted in a sustained fall in blood sugar, and so confirmed the potential value of the new drug in the treatment of important diabetic conditions, including insulin resistance. It is possible that large groups of diabetics capable of secreting insulin in response to variations in blood sugar levels might tolerate a normal diet if insulin antagonism could be suppressed by ACG.
Research Aids
New Guinea Education

Basic difficulties in educating the indigenous people of Papua and New Guinea for life in a technologically oriented twentieth-century society have emerged from studies completed recently by the University's Faculty of Education. Research has shown how children from native societies with vastly different cultural backgrounds from ours face the difficult task of coping with ideas and methods of thought evolved in a Western-style culture.

The Territory Department of Education is very much aware of the general situation and of the need for firm facts and figures about the many problems facing local education. In 1966 the Department provided grants to a number of researchers at Australian Universities to look more closely at particular aspects of education in the Territory. Three of these projects were carried out by Monash University staff in cooperation with officers of the Papua and New Guinea Department.

New Look at Social Studies

Social studies obviously assume great importance in an educational system aimed at developing an indigenous population, still widely scattered in village and tribal units, to the stage of social maturity required for self-government and nationhood. Papuans and New Guineans of diverse sub-cultures must learn to live and work together. Social studies can make a special contribution to this sphere by developing an awareness of the relation of other cultures and of other political structures to those prevailing in a particular village or tribe.

Dr. J. F. Cleverley and Mr. G. L. Johnston investigated the teaching of social studies in the Territory and, as a result, developed and tested in schools there two curriculum units based on principles differing from those currently in use. The results were very encouraging and the Department of Education is now taking a look at its social studies courses in the light of the findings.

The new approach replaces ad hoc teaching of facts and figures of history, geography, and current administrative and political structures with a more analytical approach. This develops an appreciation of basic concepts of social material by building upon ideas and experiences already familiar to the child in his own family or village life. Such ideas can be used in the description of a wide range of social phenomena and are not limited in application to particular circumstances of time or place. With this approach, the pupil's understanding of his environment can be raised step by step until he comprehends the relationship of his own environment to other cultures and other social systems.

The same general principle was applied to another aspect of the subject—the nature of government in the Territory. Past practice has been merely to present a factual picture of the existing government structure. The new programme first teaches the general concept of government, and then shows how the local scheme operates within that concept.

Again, the subject was developed step by step from a situation that the village children could appreciate. The problems of conflict, organization, and authority encountered within an isolated group of survivors of an aircraft disaster were used to demonstrate the need for acceptable systems of government to resolve conflicts between individuals and groups in a society.

Although language and other cultural barriers detracted somewhat from the effectiveness of both of the new courses, the results as assessed indicated that the new approach was likely to lead to a better understanding of social problems than is achieved through existing curricula.

Thinking Processes

Mental processes influenced by different cultural backgrounds can alter the effect of educational systems based on Western-style culture. For education in the Territory to be as efficient as possible, it is important to achieve a better understanding of the thinking or cognitive processes developed in indigenous cultures. Dr. Mary Nixon, a psychologist in the Monash University Faculty of Education, has investigated an aspect of this very involved problem.

Children learn to group objects and events in an orderly manner according to logical rules accepted in the culture in which they live, and the skills related to this are modified through further experience. Dr. Nixon has developed a test for measuring the capacity of children to classify objects of different kinds. She used the test, first in Victoria and later in New Guinea, to discover how well children can consistently build mutually exclusive classes when they have

Sixth form students at the Baruni school participate in a Social Studies project that culminates in a mock court hearing.
to work out the nature of the classes, and how well they can describe these. This cross-classification test presents the child with the task of regrouping coloured rods of various heights and widths into new combinations.

Since the New Guinea children were given the test in English, which is not their mother tongue, their verbal performance was expected to be less facile than that of Victorian children of similar educational level. This proved to be the case, but in grouping the rods the New Guinea children showed that their grasp of the task was very similar to that of their Victorian counterparts. There is evidence that the indigenous children are capable of high-level complex thinking, and are well on the way to developing such skills.

Science Concepts Difficult

In many respects school science courses in the Territory have resembled those at the same grade level in Australian schools. However, doubts have arisen about the appropriateness of these courses for the Territory environment and about the readiness of many pupils passing the final (10th Form) examination to proceed to more advanced tertiary courses in science.

Mr. Lindsay D. Mackay, of the Faculty of Education at Monash, has evaluated some aspects of science teaching in Territory secondary schools. As part of this evaluation, he compared the performances of the indigenous children with those of typical Victorians of the same age.

The groundwork for this project had been laid by the development of a series of tests for assessing the achievement of children in Victorian schools at the commencement of their Grade 11 physics studies. These tests were planned at Monash in 1967 by a working party of education specialists (including an officer from the Territory Department of Education), which devised tests covering about 80 different concepts and generalizations relevant to the physics curriculum.

The use of these tests on children in a sample of Victorian schools showed a fairly regular growth in understanding of physical concepts from Form 1 to Form 4. At one school, for instance, average scores for a test were 13.4, 16.3, 19.8 and 23.6 for Forms 1 to 4 respectively.

Form 4 students in the Territory averaged 16.9 for the same test. This information, and that obtained from other tests and in other schools, led Mr. Mackay to conclude that the native children in Form 4 performed at about the level of Victorian students midway through Form 3. In other words, they were about 18 months to 2 years behind Victorians at the same grade level in their understanding of basic physics. Inferior performances of Territory children could often be traced to differences in the cultural backgrounds of the two groups.

For example, for Territory students, time measurement in the classroom appeared to be divorced from time as measured in the student's village and family life.

Science courses in Territory secondary schools are currently being modified in the light of the findings of this study, which also have serious implications for teaching it in the preliminary years at the recently established University of Papua and New Guinea and the Institute of Higher Technical Education. They explain, in part at least, some of the difficulties experienced by students in the tertiary courses in certain science subjects.

Design for Winds

The wind is assuming increasing importance in the design of modern buildings and structures. Not only must they be strong enough to resist the greatest wind force likely to occur, but structures must be placed and shaped so as to avoid severe secondary wind effects. These could be hazardous or, at the very least, unpleasant to people entering or leaving a building or on nearby footpaths. For instance, high-rise blocks, particularly in enclosed city areas, may scoop high-velocity winds from above to produce strong gusts in the forecourt or street below. Pedestrians sometimes find difficulty in keeping on their feet when caught unexpectedly by such high winds.

A group at Monash University's Department of Mechanical Engineering, led by Dr. W. H. Melbourne, is actively investigating wind effects on buildings and structures, both at full scale and on a model complex in a specially designed tunnel. In one project, wind-tunnel tests on a model of a 21-storey building in Melbourne were used to develop a canopy system which will reduce the unpleasantly high winds occurring across the entrance and the adjacent footpath.

Construction techniques making greater use of welding have sharply increased the allowable wind pressures on the 11-story Sir Robert Menzies School of Humanities Building with those on an instrumented scale-model in the special wind tunnel (below) will determine how accurately real wind forces can be simulated and wind loadings predicted from a model environment.
importance of wind loading in designing structures, because they lower the internal absorption of energy damping and hence external loadings such as wind forces become more significant. Older building methods, using stone, bricks, riveted steel, etc., provided relatively high damping and were rarely troubled by excessive oscillation or other effects. Today we have many examples throughout the world of towers, chimney stacks, bridges, and buildings either failing completely or oscillating to dangerous amplitudes.

In most cases, the reaction of structures to wind forces can only be predicted from model tests in a wind tunnel. Until recently, facilities for such tests were limited to tunnels of aeronautical type, with short working sections that made it impossible to satisfactorily simulate the turbulence and velocity-gradient characteristics of the natural wind. Special long wind tunnels are required in which an artificial wind can be created over roughness models in the same way as the natural wind develops.

Very few such units have yet been built and, as yet, tunnels at Monash and at the University of Western Ontario are probably the only ones in regular operation. Incidentally, many United States designers are now making use of the Canadian facility.

In addition to providing training and operational experience for students, and serving as a testing facility to help advise architects and structural engineering consultants, the pilot-scale (40in. square by 20ft. long working section) Monash wind tunnel has paved the way for the design of a very much larger unit. This has a working section 11ft. 6in. x 7ft. x 60ft., and is currently being built into the Department's main wind tunnel.

As knowledge of this relatively new phase of engineering science develops, it should be possible to use basic aerodynamic principles established through research to assist designers and reduce their dependence on extensive testing of models in wind tunnels.

What's New at Monash

We hope that you will welcome the opportunity presented by this bi-monthly publication to keep abreast of progress in research and education at Monash University. It is modest in size and can hope to describe only a small proportion of the discoveries, educational achievements, and contributions that the staff and students make to the industrial and professional life of the community. Its circulation is restricted initially to some 7000 people, including Members of Parliament, business executives, administrators, professional men and women, and other interested members of the Victorian community.

The State-supported university in the modern world has a wider and more responsible role than its forerunners in the Middle Ages. Its primary responsibility is to produce successive generations of educated people ready to take their place in and to contribute effectively to our fast-changing society. Students of today will be the community leaders of the early decades of the twenty-first century. Thus they must be capable of adapting to technological and social conditions that are as yet unknown.

But the University also serves the community in other ways. The 700-odd academic staff at Monash, whether individually or in teams, constantly work to extend the frontiers of knowledge and, by scholarship and research, contribute to solving problems ranging through engineering and medicine to social structures and political systems. This work is not only valuable in itself, but also provides the background for sound undergraduate and graduate education.

At the immediate practical level, research associated with the graduate schools brings discoveries that contribute to the health and material welfare of the community. As an off-shoot of the "expertise" created by such activities, some faculty are in a position to offer specialist advice to sections of industry.

If the University is to fulfill its function in the modern state properly its activities must be closely connected with those of the community—the medieval concept of academic isolation is no longer tenable. We hope that this publication will play a part in forging the necessary links between Monash and the community which it exists to serve and of which it is an essential part.

J. A. L. Matheson
Vice-Chancellor

The designer's impression of the interior of the Blackwood Hall now under construction at Monash. The Hall will provide a fitting environment for academic ceremonies, conventions and conferences, university examinations and musical performances.

(Architects: Roy Grounds and Co.)