Growth and Fertility

After treatment with appropriate pituitary hormones, dwarfed children have resumed normal growth and a number of previously sterile women have borne children.

Medical researchers at Prince Henry's Hospital, Melbourne, have used modern techniques of protein chemistry and hormone assay to investigate the functions of the pituitary gland and to diagnose and treat some of its disorders, particularly those involving growth and fertility. The work was carried out by a research team from the Monash Department of Medicine led by Dr. K. Catt and another from the Hospital's own Medical Research Centre under the leadership of Dr. H. G. Burger.

Scientists at other Melbourne hospitals and in the Melbourne University Medical School also made important contributions to the advances that have led to the successful use of the hormones.

The pituitary, a small gland situated at the base of the brain, secretes a number of chemical messengers (hormones) that affect important body functions either directly or indirectly. Human pituitary growth hormone has a direct effect on growth of the body, and others act indirectly on the reproductive and other target glands.

The glands stimulated by these hormones "report back" to the pituitary by adjusting the level of their own secretions in the blood, so influencing the output of the primary gland. They interact with each other and with the pituitary in an intricate system of checks and counter checks. Disturbances in the secretion and regulation of the pituitary hormones cause abnormalities, including certain types of sterility and failure to grow.

About one in 20 cases of retarded growth in children is caused by a deficiency of human growth hormone. This hormone normally occurs in the blood in extremely small concentrations (2 parts per million), and diagnosis was greatly facilitated when Dr. Catt and his colleagues developed a simple and inexpensive means of accurately estimating its concentration.

Antibody to the hormone is adsorbed onto plastic-coated tubes; after contact with blood serum containing growth hormone with a radioactive tracer, the tubes are washed and examined for residual radioactivity, which gives a measure of the amount of hormone in the sample.

In a joint project, Monash and Melbourne University medical researchers developed an improved method of extracting the growth and reproductive hormones from human pituitary glands. This was another major step forward and provided material for more extensive trials. The Commonwealth Serum Laboratories are now preparing these hormones for distribution to appropriate clinical centres throughout Australia.

Five of the eight dwarfed patients in an initial clinical trial of growth hormone responded to the treatment and maintained increased growth for several years. One boy of 13, who had been growing at the slow rate of less than half an inch in a year, grew nearly 6 inches over a 3-year period.

The other important pituitary hormones under investigation at Prince Henry's are those affecting the reproductive glands. The female gonadotrophins play a critical role in the reproductive cycle and one of them—the luteinizing hormone—triggers ovulation. The recent collaborative investigations suggest that the release of luteinizing hormone is
stimulated by a secretion from the ovary itself. In other words, the ovary rather than the pituitary takes the initiative.

Gonadotrophins extracted from the pituitary were used successfully at the Royal Women’s Hospital to induce ovulation in 50 women who had not reacted to other forms of treatment. All but 3 responded, and 42 of them conceived.

Unlike other Australian medical faculties, the Monash School provides a 5-week period in the fifth year during which students may work in a field of experimental medicine of their own choosing. Several of those who joined “the pituitary group” have made useful and significant contributions to the programme.

Wastes into Westernport

The effects of discharging sewage, industrial wastes, and eroded sediments into waters such as Westernport and Port Phillip Bays can be predicted with reasonable accuracy from relatively simple measurements by applying modern knowledge of fluid mechanics. Fourth-year engineering students are assisting members of the Monash University Geophysical Fluid Dynamics Laboratory in a study of the probable effects of the discharge of such effluents into Westernport from the projected industrial complex near Hastings. The exercise has brought students face to face with the practical realities of turbulence and also with the side effects that some types of industrial engineering development have on the natural environment.

The Laboratory, an inter-faculty unit, brings appropriate staff from Mathematics, Mechanical Engineering, and other Departments together to study problems of fluid mechanics encountered in meteorology and oceanography. Typical theoretical investigations currently under way include those on the atmospheric turbulence associated with hot air currents rising from bush-fires, and on the structure of the vast ocean current that sweeps down the east coast of Australia. Professor B. R. Morton is in charge of the Laboratory.

The Westernport study is the joint concern of Dr. J. B. Hinwood and Dr. Deane R. Blackman, of the Department of Mechanical Engineering. It began in 1967, when Dr. Hinwood’s class of 12 final-year civil engineering students opted to undertake the field investigation as an alternative to a course of 18 lectures and practical classes. The group met each week for informal discussions, collected information on the area, studied theories of turbulence and waste disposal, and then planned and executed a full-scale experiment on diffusion in the Bay.

They planned the experiment to discover how waste discharged into the north channel would spread and whether it would reach the shores. The green dye fluorescein which they used to simulate the effluent discharge was visible at dilutions of one part in 20 million of seawater. Its horizontal spread was followed by colour shots from an aircraft at 15-minute intervals. At the same time a boat party took water samples and measured wave heights, wind speed and direction, and the turbulence of the tidal currents.

The general conclusion the student group arrived at was that the high turbulence found in the area will lead to rapid mixing and dilution of pollutants. However, the material will be quickly carried to the shores of the Bay. The 1969 fourth-year class recently completed a somewhat similar study of a much larger area of Westernport Bay and reached roughly the same conclusions.

These student projects have led to the planning of more precise investigations and stimulated the development of new instruments and techniques. Studies of this kind should provide scientifically founded facts to replace argument and speculation about the fate of pollutants.

Dr. Blackman has developed an instrument that will not only operate beneath the water surface and measure a variety of physical quantities relevant to the diffusion of pollutants in depth but do so more conveniently than the dye technique. It will also be useful in measuring other features of coastal waters, such as the distribution of fresh and salt water, which have important consequences for fish and other marine life.

Below right: The routes taken by marker dye placed at three different points in Westernport Bay. The dye moved with the tidal currents, but spread sideways towards the shores. Left: The “torpedo” under construction in the Mechanical Engineering laboratory. It is powered by compressed air and carries instruments that will record automatically a number of measurements relevant to pollution of coastal waters.
The instrument outwardly resembles a small torpedo and weighs about a quarter of a ton. It can be instructed to change its activity while underwater and, with the exception of an air link to the surface, is entirely self-contained. Initial calibration tests were completed recently and Dr. Blackman expects to make the first underwater measurements shortly.

### Tracing Demand in Business

Tables prepared in the University’s Department of Economics can help determine where business comes from. Firms certainly know their own customers, but very few can identify their “customer’s customers” and follow output through the complex pathways of manufacture and distribution. Most industries and individual firms have a fairly accurate knowledge of the direct relations of their products to personal consumption, exports, secondary manufactures, and other final demand sectors of the economy, but the task of tracing the interrelations of products that go indirectly to the final user is beyond them. Yet without that information an industry or firm that sells to others can have little understanding of the factors affecting demand and this lack hampers future planning.

The information can only be obtained by modern techniques of input-output analysis. But statistics upon which these analyses can be based were not available for the Australian economy until 1964, when the Commonwealth Bureau of Census and Statistics published its first input-output tables (for 1958/59). A second, improved, and more recent version (for 1962/63) is expected to be published shortly. The figures generally require further specialized analysis and fairly complex computational facilities for their translation into forms appropriate to specific uses by industrial accountants and economists.

Mrs. Esme Preston of the Monash Department of Economics has performed one such analysis and tabulated some of the most vital input-output relations within the Australian economy in a manner that is easy to interpret and apply to a variety of practical problems. The table she prepared shows the direct and indirect relations of 35 sources of goods and services — such as textiles, wood products, business services, gas, and imports — to the final demand or consumption sectors of the economy. It reveals the impact of each final demand sector upon the total demand for products, both locally produced and imported. The figures thus indicate the potential market to which local business can aspire.

The entry for wood products illustrates the type of information that the table provides. Roughly a third of the output of the industry plus competing imports went, either directly or indirectly, to personal use. Another third went towards increasing the country’s stock of fixed capital equipment such as buildings. Most of the remainder went to public authorities. Whereas the greater part destined for personal consumption reached that sector directly, most of the contribution to private capital formation went indirectly, through other industries that used wood products as inputs for house-building, making office equipment, and so forth.

Mrs. Preston points out that, although input-output relations are a fairly stable feature of most economies, the Australian industrial structure has developed considerably since the first input-output tables were compiled. Such tables are brought up-to-date regularly in many advanced countries; and it is expected that similar tables will soon become a regular extension of our national accounts.

### Migrant Language Problems

The material progress of the migrant commonly depends upon his capacity to master English. However, as he adjusts to the new life and its language, his native tongue is modified and may ultimately fall into disuse.

Both intellectual and emotional factors are involved in the conflicts between the two languages. The nature and extent of changes, particularly in his native tongue, can provide important clues to the migrant’s general adjustment. Scientific an-
The recorded interviews were based on structure, vocabulary, and other language components of recent readings and of their daily activities, and so on. Sentence structure, vocabulary, and other language components were later studied in detail from the tape recordings and the results related to educational level, family structure, and other background information that might influence language.

The bilinguals interviewed ranged from those who could be described as German-speaking persons domiciled in an English-speaking community, to Germans who have become completely absorbed and dissociated from their native language. Most of those interviewed had reached a stage where German could no longer adequately describe their daily life, their thoughts, or their habits. It has been found that a migrant who has reached the stage of assimilation where he must use English to express many of his ideas and feelings is a "changed person"; his personality has altered to cope with the needs of the new society.

The important role of children in the language situation was evident from the interview information. In families with more than one child over 3 years of age, either the children spoke English among themselves and German to their parents or, more commonly, the parents spoke mainly German and the children answered in English. Where the English of the parents is poor a breakdown in communication between the two generations can lead to rifts and disruption of family life.

Dr. Clyne found that the two languages interacted through the transfer of words, phrases, and syntax. He analysed the form and nature of such transfers and showed how such English "borrowings" confuse bilinguals and often trigger a switch from one language to the other in the middle of a sentence. The results throw light on the relations between thought and speech and between word and concept, not only in the migrant situation but also in the general field of linguistics.

The findings were subsequently checked in the reverse situation, that is from German to English spoken by British, Australian, and American residents of Germany. A technique similar to that used with the German migrants in Australia was employed in interviews with 20 adults in several West German cities. Although similar types of interactions and transfers were observed, the nature of the changes differed substantially. But in both situations the subjects tended to graft the more "economical" features of one language onto the other. For example, English-speakers tended to replace phrases with single compound German words in their English sentences, whereas German-speakers in Australia replaced German nouns requiring elaboration with prepositions or dative attributes with simple English words.

The information obtained in these studies of bilingual migrants is being put to practical use at the university teaching level. It has been found that children reared to the age of 5 or 6 in Germany present a special problem. Their German is often poor because they have never been taught the language at school, and their English is inadequate. Quite a few of these people are now entering the university, and a special course, based on the research findings, has been instituted at Monash to help them cope with advanced reading and writing of German.

Some of the findings have sociological implications relevant to migrant assimilation. The present policy of "weaning" first-generation migrant children from their native tongue in the normal Australian school curriculum can alienate them from their parents and cause social stress. Dr. Clyne suggests that they should be taught German in addition to English, at primary and secondary school, in order to facilitate normal family life and assist in their overall assimilation.

A first year biology practical class. This course is taken by students from several faculties including Medicine, Science, and Arts. The large numbers involved—more than five hundred are taking the course this year—presents major organizational and administrative problems, particularly in relation to practical work.