Transfer Cells in Wheat

Cells specially adapted to the fast transfer of nutrients through structural bottlenecks in plants have been found in abundance at the junction of the glumes (the green sheaths that enclose cereal flowers) and the stalk at the base of the developing wheat grain.

The discovery of “transfer” cells at this site by Dr. T. P. O’Brien of the Monash Department of Botany helps to explain the rapid movement of nutrients into the wheat grain during the few weeks following fertilization of the ovule. Their presence at this critical junction, through which the bulk of man’s energy food passes into wheat and rice, refocuses attention on the glumes as a source of nutrients for the developing grain. It may explain why cereal yields are so sensitive to any practice that damages the glumes or even the awns they sometimes bear.

The recognition of the nature of these specialized cells at the base of the developing wheat grain was facilitated by the use of new methods of preparing very thin sections of plant tissue devised by Dr. O’Brien and others at Harvard University’s Biological Laboratories two or three years ago.

In the new techniques, non-coagulant fixatives, such as acrolein and glutaraldehyde, and a plastic embedding material (a mixture of monomers containing glycol methacrylate) replace the coagulant fixatives and paraffin wax embedding procedures used by plant histologists for more than a century.

Hovercraft or Beef Roads?

An intriguing analysis by a Monash economics student suggests that in some situations hovercraft might bring cattle to market from the outback more cheaply than trucks travelling on specially constructed roads.

The results of this relatively simple study illustrate the need to take a wide, long-term look at such major projects in the light of possibly less expensive alternatives presented by advancing technology.

Much of the true cost of hauling cattle by truck lies in the “hidden cost” of the
road itself. In other words, the transport is subsidized through construction and maintenance of roads from the public purse. If a similar subsidy were given to hovercraft operations, the cost per beast per mile might in some circumstances be less than that of trucking. Furthermore, the investment would be more flexible and allow transport routes to be modified at minor cost as the pattern of cattle production in Northern Australia changed in response to advancing technology and marketing needs in the years ahead.

Until recently, high cost and limitations on speed and payload prohibited the use of hovercraft for other than passenger traffic. However, the advent of large-scale units such as the British Hovercraft Company’s “N4” has materially altered the situation. The makers claim that, given suitable terrain, the N4 can move payloads of up to 90 tons at speeds of 45-75 miles per hour. But although the N4 has performed well over water its behaviour on land has not yet been fully tested. Furthermore, operation in northern cattle country could present special problems, such as soil erosion along the hovercraft pathway, damage to livestock and fences, and so on.

One of the strongest arguments in favour of hovercraft is route flexibility. A manager of one northern pastoral company stated that the length of the route to market could be cut by two-thirds if hovercraft were used.

Many Problems

Among the technical problems to be solved are manoeuvrability, the effect of dust on the turbine blades, and selection of suitable terrain. Indeed, the report acknowledges that many problems would have to be faced, but presents persuasive views that they are not insurmountable.

For example, an assessment of terrain made from aerial photographs suggests that 90 per cent. of the Darwin and Gulf of Carpentaria regions, up to two-thirds of the Victorian River and Barkly Tableland regions, and all of the flat Queensland channel country would be suitable for hovercraft operation.

The most important section of the study involved a comparison of costs of the two methods of moving cattle. Direct cost of trucking has been estimated by government economists and commercial firms at from 3.36 to 3.65 cents per beast per mile. The cost for hovercraft transport is estimated at 20 cents per beast per mile. This includes a charge of 3 cents a mile to cover clearing and maintaining a pathway through scrub, and light sealing of sections liable to erosion.

The costs of the two systems come into line when account is taken of a cost of $2,350 per mile per year for “typical” beef roads. But clearly costs per mile travelled will depend upon the number of cattle handled and the mileage comparison between arterial plus feeder roads and the practicability of hovercraft routes.

Comparative costs were estimated for a district about 125 miles north of the Mt. Isa railhead, turning off about 7,500 head of cattle annually. In this instance the use of hovercraft was cheaper than building beef roads and using trucks. For every situation there is a “break even” range for cattle traffic densities and route-distance savings, with hovercraft superior at low traffic densities and high route-distance savings.

The student, Mr. G. M. Feiger, reported the results of the study in the March, 1970, issue of the “Economic Record”.

Surgeon in Vietnam

"Among the desolation one catches glimpses of the handful of warm, decent men and women, some American, some Australian, regrettably few Vietnamese, who give without stint of their skill, their strength, their courage to show that western civilization has a meaning other than hideous destruction, that the heart is more than an instrument for pumping blood, that minds still dream of a kingdom of kindness, that there is an ethic in which the saving of life is prized more highly than its taking away."—Foreword to "Bleeding Earth", A. Brass. (William Heinemann Ltd., Melbourne, 1968.)

In August, 1969, Professor H. A. F. Dudley, head of the University’s Department of Surgery, went to South Vietnam to work for six weeks at the First Australian Field Hospital. But it was not his first visit.

In 1966 he had spent three months with a surgical team treating civilians at the 350-bed Provincial Hospital at Bien Hoa, followed by a period at the army hospital. His team formed one of a series of five from the Alfred Hospital, Melbourne, which staffed the surgical service at Bien Hoa for the 15 months from January, 1966, to March, 1967. Other members of this Monash team were Dr. D. J. Knight, Research Fellow in Anaesthetics, and Mr. J. C. McNeur and Mr. D. S. Rosengarten, part-time Senior Lecturers in Surgery at the University.

The early surgical teams at Bien Hoa had to contend with appalling conditions by Australian standards. For example, 500 patients were served by half-a-dozen latrines emptying into the nearby river along an open drain.

Although civilian battle casualties or road accidents associated with military traffic dominated the surgical work at
Bien Hoa, about one third of the operations were performed on patients with civilian-type conditions such as broken bones and so on.

Neither the weapons used nor the type of injuries suffered in Vietnam are unique. Nevertheless, they combine with the nature of the environment and the type of warfare to produce many problems not encountered by surgeons in World War II.

Professor Dudley and his colleagues have documented the variety and causes of non-military battle casualties treated during their stay at Bien Hoa, with particular reference to the nature of the weapons causing them and to the interaction of surgical treatment with parasitic and other diseases endemic among civilians in the tropical environment.

During his more recent visit, Professor Tolley lived at the First Field Hospital under conditions just a little better than those being suffered by the Australian infantry fighting less than 10 miles away. Real water closets and showers, he says, heightened the contrast and reminded the hard-working medical staff that they had a “relatively soft option”.

His graphic description of the arrival at the hospital of an evacuation helicopter sums up the medical scene. “Figures sprint to the cabin; the stretchers of the living and the bundle of the dead are eased out. Less than 10 seconds elapse before each survivor is on a trolley in the triage area and at least six men are at work on him. One feels a little helpless at this point, for the resuscitation men have first go, establishing the conditions under which survival and surgery are possible, ripping off clothes, documenting injuries, checking on next of kin. But soon it will be our turn to assess priorities, arrange for X-rays, and, if necessary, plunge rapidly into some vital operation to arrest bleeding or to remove damaged tissue.

“The next few hours are concentrated in the small circle of light of the operating lamp. Private ________ was bleeding to death in his abdomen and we have opened him to stay the haemorrhage and carry out the necessary repairs. Time stands still and it is only as the last stitch is inserted that one realizes that two hours have elapsed and that one has aching feet and swollen ankles.”

New Techniques for Lecturers

Twenty routine course lectures have been recorded on videotape and will be projected through television outlets for first-year engineering students in 1970. The project is another important experiment in the use of modern teaching aids at Monash University.

Preparation and presentation of the lectures involved close co-operation between the Civil Engineering Department, the Audio-visual Aids Unit, and the University’s Higher Education Research Unit. Immediate videotape replays of individual sections allowed the lecturer to check clarity and improve presentation as the material was built up. Experience while taping has already shown the benefits of the team approach.

The section of the first-year course that was videotaped has been given for several
years by Mr. K. J. Atkins. He will be present in the lecture theatre after the recorded material is run; personal contact between teacher and students will also be achieved by means of tutorials and practical classes based on the lecture.

Many of the advantages of using recorded lectures result from the better quality of presentation and the more extensive and imaginative use of illustrative material woven into the lecture fabric by modern television or film techniques. Repeated use of all or part of the tapes over several years compensates for the longer time involved in lecture preparation. But Monash educational researchers point out that the recording method is only suitable for particular types of material and courses.

"Editing an engineering lecture recorded on videotape.

The variety of modern teaching techniques and audio-visual aids now available can each be used to advantage in particular circumstances. In some situations, the traditional personally presented lecture is still preferred; in others supplementary aids can clarify and emphasize, while in yet other situations the teaching workload can be lightened for both teacher and student through impersonal presentation by videotape, film, teaching machine, books based on programmed learning, or other teaching aids.

The Audio-visual Aids Unit, headed by Mr. E. C. J. Snell, helps all University Departments and undertakes occasional educational assignments for outside bodies: a two-part programme entitled "How to succeed in examinations", made last year in association with a commercial television station, was an outstanding success and the station replayed it twice at the request of student viewers.

The Medical and Education Faculties were the first to make extensive use of videotape and television. For example, one early project condensed the highlights of a demonstration of neuromuscular responses, which occupied a 16-hour day in the physiology laboratory, into a 40-minute videotape programme for medical students.

Videotape is proving particularly useful in teacher training. The mobile T.V. unit tapes selected lessons at schools and these serve as material for example and criticism in practical teaching tutorials at the university; the traditional system of trainee students sitting in at school classes is far more time-consuming and is often less efficient.

Novel Examination

The technique was used last year in a project designed by Miss Jill Maling of the Australian Council for Education Research to examine students studying methods of teaching English. Mr. H. P. Schoenheimer arranged to give a lesson to 15-year-olds at a Victorian high school, in the course of which he made deliberate errors in teaching and presentation. The lesson was videotaped, analysed by a panel of Monash education tutors, and run on television screens as a "visual stimulus" and background to correlated questions set on the examination paper.

An interesting outcome of this project was that a number of students subsequently telephoned the Monash Education Department to express appreciation of the innovation in examination methods.

In another co-operative videotape project with the Higher Educational Research Unit, recordings of lectures and seminar talks are played back to the staff members concerned. This enables them to check and discuss their presentation with education specialists. The project has been very effective in helping staff to improve their teaching and the demand for this service is expected to increase.

The Higher Education Research Unit comprises Professor S. S. Dunn (Director) and Senior Fellows Mr. J. C. Clift and Dr. N. J. Ryan. The services of the unit are available to all Departments to assist in preparing lectures and to advise on educational methods appropriate to the solution of course problems.

The Unit is a source of advanced educational skills for the academic staff. In the long term, its activities, including research, should be reflected in greater efficiency and a general improvement in the level of teaching at the University.