THE STRUCTURE AND FUNCTION OF A UNIVERSITY DEPARTMENT OF SURGERY

FRY, WILLIAM BURNETT

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THE STRUCTURE AND FUNCTION OF A UNIVERSITY DEPARTMENT OF SURGERY

Professor of Surgery, University of Queensland

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A UNIVERSITY DEPARTMENT of surgery is concerned basically with undergraduate and postgraduate teaching, functions as a service unit in the teaching hospitals, and in addition has a special task in the advancement of surgical knowledge. It is a member department of the university, with all consequent duties, as well as the privileges, of such membership. I propose to examine the structure and function of the Department of Surgery in the University of Queensland to see how these various objectives mentioned above may be realized and reconciled.

Structure of the Department

The Department consists of people, their work area, their equipment, and their ideas. The full-time academic staff is complemented by a laboratory and research staff together with a secretariat, which is so vital to any active organization. The academic staff are assisted in their task of instructing about 450 clinical students by a large part-time staff. This includes the various specialty lecturers and a large number of senior and junior clinical teachers (Fig. 1).

The parent Departmental area is presently located in rather restricted accommodation in the Brisbane Hospital, but handsome new quarters are in process of construction on the fourth floor of
the adjacent Clinical Sciences building (Fig. 2). It is hoped that this teaching, research, and administrative area will be linked up directly with a new professorial surgical ward when redistribution of ward areas takes place in the near future. The wards currently in use by the professorial unit are sited conveniently near the present Department.

### FIGURE 1

**STAFF OF DEPARTMENT OF SURGERY, UNIVERSITY OF QUEENSLAND**

**FEBRUARY, 1965**

#### Full-time Staff

<table>
<thead>
<tr>
<th>Role</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>1</td>
</tr>
<tr>
<td>Reader</td>
<td></td>
</tr>
<tr>
<td>General surgery</td>
<td>2</td>
</tr>
<tr>
<td>Cardio-vascular surgery</td>
<td>1</td>
</tr>
<tr>
<td>Radiology</td>
<td>1</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>2</td>
</tr>
<tr>
<td>Teaching Registrar</td>
<td>5</td>
</tr>
<tr>
<td>Rotating resident</td>
<td>3</td>
</tr>
<tr>
<td>Secretariat</td>
<td>5</td>
</tr>
<tr>
<td>Research laboratory</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Part-time Staff

<table>
<thead>
<tr>
<th>Role</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialty lecturers</td>
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</tr>
<tr>
<td>Clinical lecturers</td>
<td>19</td>
</tr>
<tr>
<td>Assistant clinical lecturers</td>
<td>61</td>
</tr>
<tr>
<td>Chief tutor</td>
<td>1</td>
</tr>
<tr>
<td>Tutors</td>
<td>55</td>
</tr>
<tr>
<td>Demonstrators</td>
<td>6</td>
</tr>
</tbody>
</table>

The full-time staff are distributed between the two constituent parts of the Department at the Brisbane and Princess Alexandra Hospitals. The residents are in their pre-registration year and are drawn from the rotating groups attached to each hospital. The research laboratory staff include both science graduates and technical staff.
A major difficulty at the Brisbane Hospital has been the lack of suitable seminar and teaching rooms, as the hospital was not constructed as a teaching institution but as a base hospital. However, a submission has been made for the early construction of two seminar blocks to remedy this situation (Fig. 3).

In addition, a new ward with teaching and research areas nearby has been opened at the Princess Alexandra Hospital within the last six months, and this has greatly improved the undergraduate teaching facilities of the professorial surgical unit which now has an academic staff of Reader, Senior Lecturer, and Teaching Registrar. A very considerable advantage of this unit is the sharing of clinical, teaching, and research facilities with the University Department of Medicine, enabling very close contacts to be maintained between the two Departments.

If proposals presently under discussion are accepted, the Department of Surgery will also shortly open a similar branch at the Mater Misericordiae Hospital, i.e. with clinical teaching facilities, research laboratories, academic staff, etc.
Functions of the Department

Professorial Service Unit

The Department functions in parallel with other surgical units in two teaching hospitals, the Brisbane and Princess Alexandra. It conducts out-patient clinics, takes care of in-patients, and under-
takes emergency surgery (approximately one-quarter of the total) together with regular operating sessions for elective surgery. In this way, we work in collaboration with our surgical colleagues and the two hospital authorities. In addition, one Senior Lecturer has been given an Honorary position at the Mater Hospital where he works in association with the three general surgical teams there. Also, one Reader is a member of the cardiac surgery team at Chermside Hospital. I believe that this arrangement, whereby a full-time University staff member functions as a member of a hospital team, offers a happy prototype of what might be developed in other fields in hospitals with university connections. Here, a pattern of association has been established between a University clinical department, a hospital board, and the government department concerned, which is of the highest professional importance and reflects the valuable and developing relationship between University and teaching hospital. I am certain that in this way, University and hospital, working in close harmony, can realize the objective common to both — the best possible treatment of patients. This has been shown effectively by the very creditable results in the first year of open-heart surgery at Chermside Hospital.

Function of the Professor

This is rather a mystery — especially to me. In order to clarify my mind, I have kept records of my major activities during the last two complete working weeks and have summarized them in Figure 4. The extent of time spent in administration and at meetings of various sorts clearly impedes both clinical work and teaching, and quite destroys any personal research time. There is an obvious case for delegation of administrative duties which I intend to put in practice as far as is possible. An additional and important advantage of such devolution is the opportunity to train senior Departmental personnel in executive administration activities — one aspect of academic training which is all too often totally neglected by heads of clinical departments, to the frustration of their deputies who would be delighted to obtain this type of experience even though it involved considerable extra work. Such experience would be invaluable to an academic surgeon when he became the administrative head of his own department. In some instances, unfortunately, university protocol and tradition impede this devolution to senior staff. However, the increasing weight of administrative
duties required of heads of departments unduly restricts their academic professional contribution. Time for policy-making or executive duties is obviously essential, but so also is a proper balance between this and professional activities.

FIGURE 4

ANALYSIS OF PROFESSOR’S WORKING WEEK (HOURS)

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Teaching</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Administration</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Meetings</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Lecture and publication preparation</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Research</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Travel</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>64</td>
<td>55</td>
</tr>
</tbody>
</table>

In this fairly typical fortnight more than 50 per cent of the working week from Monday to Friday was taken up with Departmental administration and attendance at meetings of various types. Meetings recorded here vary from working sub-committees of the University or hospital to attendance at faculty and Professorial Board meetings.

THE UNDERGRADUATE CURRICULUM

I think that in the Faculty of Medicine we consistently treat our undergraduates badly because we over-estimate their capacity to absorb the immense amount of factual material we put into the curriculum. At the same time, we also tend to under-estimate their intelligence by using teaching methods more suited to a school audience than to a group of intelligent adults, and are apt to omit reference to recent advances of real or potential importance. One major problem is the rate of growth of new medical knowledge. As it appears, this is usually just added on to the curriculum by a process of accretion; saturation finally occurs and something precipitates. This “something” is, unfortunately but understandably
enough, the initial student enthusiasm, which wilts under a surfeit of data in which essential facts are often indiscriminately mixed with obsolescent ideas and the shining new beacons to the future.

Another major difficulty arises from the sustained demand for medical graduates, which has increased greatly the problems facing those who design curricula. It has been generally supposed that 90 per cent of our graduates are destined to become general practitioners, although recent evidence shows a swing to specialization in Queensland of a quite significant degree. However, the fact that the majority of our graduates become general practitioners should not lead to a teaching policy pitched at a low or even moderate level. I do not think that I would myself be a good general practitioner; the field to be covered by practitioners is so enormous that their specialty should really be omniscience. Furthermore, in Queensland, isolation is still a problem for some in spite of the splendid flying services available. But in planning our courses, in addition to giving basic training to future general practitioners we have also to consider the training of those who will become specialists, administrators, academics, or research workers.

Difficulties arising from over-stuffing of the curriculum have been particularly evident in older universities, but there has been a good deal of contagious spill-over into the newer schools. Fortunately, in Queensland we are not afflicted with many generations of teaching prejudice to overcome when putting forward new ideas on curriculum and teaching reform. This happy situation was made most obvious by the tremendous interest in medical education shown at a recent Saturday conference on medical education at St. Lucia.

However, I believe we have to alter many of the approaches to teaching to which we ourselves were exposed. This does not imply criticism of our surgical mentors. Many of the ideas advanced by them were appropriate to their time, but are rather pointless now. For example, many teachers used to spend hours or even days of teaching time showing how to differentiate between a direct and an indirect hernia. The plain fact is that, in most cases, the diagnosis is an intelligent guess at the best, and even experienced clinicians regularly make diagnostic mistakes. However, this is unimportant, as the treatment in each case is by operation at which the surgeon concerned can deal with whatever type of hernia he finds. This type of mechanistic approach to teaching has either gone or should now be on the way out.
Objectives of Undergraduate Education

We are still trying to produce doctors familiar with all aspects of medicine and therefore capable of coping with any situation. However, in reality, we have only to produce a man fit to undertake his compulsory internship. He should therefore be given a basic body of knowledge, but this by no means implies that we should function as a technical college. In addition to teaching the basic medical facts of life, we have to instil a scientific flavour into what has been described as the art of medicine. I believe that this art adds up to an experienced, scientific, yet almost subconscious, assessment of the clues of varying importance — helpful, accurate, or misleading — given by a patient’s history, by his relatives, and by physical examination. The art of assessment of these many variables cannot be acquired from a textbook but can be promoted by a good teacher. We have also to encourage our students to develop complete honesty of observation and recording and, most important of all, total integrity in dealing with patients, colleagues, and the public. These objectives are essential, but difficult to sustain through a complicated medical curriculum over six years. They are the characteristics of a university.

Undergraduate Teaching Programme in Surgery

The Department is a large teaching unit with responsibilities extending into many areas beyond the field of general surgery. However, it is possible to organize a basic unity into this complicated course. It is planned to integrate the introductory course in surgery, surgical anatomy, and the lecture course into one coherent whole and a start has been made in this. The needs of surgical anatomy have changed; films, discussions, and other modern teaching methods are now replacing the tedious and unproductive dissection of preparations, which is merely repetition of the anatomy already fully dealt with in the pre-clinical years, and as such understandably wearisome to both student and teacher.

The traditional lecture has been much condemned and with good reason. However, correctly used, it remains a most effective means of instilling principles into large audiences and of directing the student towards recent knowledge which might not reach his textbook until some years after he has graduated, and we will continue to use this method of instruction. Furthermore, as part of the
over-all plan, my part-time colleagues will be invited to give lectures in those subjects in which they are especially experienced and interested.

The particular teaching responsibility of the Surgical Professorial Unit is the fifth year students. With increased staff, it has now become possible to try out many new teaching ideas. I believe that attendance of the student at the Out-patient Department is important, but facilities at the parent hospital are at the moment quite restricted and we look forward to a fully adequate teaching area in a new Out-patient Department.

It has been my impression that, in the Final Examination, candidates show themselves weak in knowledge of both acute surgical cases and of Casualty work, both of which are fundamental to good practice. We are attempting to remedy this by evening teaching on emergency cases, and students have now been rostered to serve in the Casualty Department during peak periods of activity when they will learn much in a short space of time from close liaison with the Casualty officers. Other teaching methods introduced are the seminar, where students in turn play an active part in case and topic presentations, the clinico-pathological conference and the tutorial. Teaching is also given in such specialties as facio-maxillary surgery and urology, and students visit Chermside Hospital where they are instructed in recent developments in cardio-respiratory investigation.

The teaching of specialty subjects has now been moved from the sixth year to the fifth year curriculum; this has caused considerable confusion in 1964, when old and new curricula overlapped, a hazard familiar to curriculum changers. However, a better distribution will be arranged in 1965. In some subjects, e.g. radiology, emphasis has been placed on near-individual teaching by the specialist, and this is appreciated by both student and teacher.

One of the principal difficulties facing this school has been the large and increasing number of students who enter the clinical years. This has placed an intolerable strain on the teachers, both in general surgery and in the specialties. The Senate of the University has now found it necessary to limit the intake of students into the second year of the course; we were the last university in the British Commonwealth with an unrestricted entry into Medicine, but this distinction has unfortunately had to go, as standards would inevitably have fallen because of the lack of sufficient teachers and patients.
FIGURE 5
THREE EXAMPLES OF THE TYPES OF MULTIPLE-CHOICE QUESTIONS
USED BY THE DEPARTMENT OF SURGERY

To illustrate clinical knowledge

Select the cranial nerve from the right-hand column most likely to be associated with each of the conditions listed in the left-hand column

1 Absent corneal reflex  A 7th nerve
2 Loss of abduction of the eye B 3rd nerve
3 Facial asymmetry C 9th nerve
4 Dysphagia D 10th nerve
5 Hoarseness of the voice E 5th nerve
   F 6th nerve
   G 4th nerve

To examine for knowledge of therapeutics

Select from the list on the right the most appropriate treatment for the thyroid disease listed on the left

6 Early carcinoma of the thyroid H Total thyroidectomy
7 Thyrotoxicosis in a young woman I Sub-total thyroidectomy
8 Non-toxic nodular goitre J I131 ablation
   K Partial thyroidectomy
   L External irradiation

To demonstrate knowledge of details of surgical pathology of any one condition

Select from the right-hand column the phrase which accurately describes each of the components of a hydatid cyst listed on the left

9 Adventitia M Host response to parasite
10 Laminated membrane N External secretion of germinal layer
11 Germinal layer O Produce brood capsules
12 Daughter cysts P Arise when laminated membrane ruptures

Examinations

It is unfortunately still necessary to assess the progress of students by examination; in surgery we have begun to replace the present
essay-style questions with a series of multiple-choice or objective questions. Examples of these are given in Figure 5. Examiner-error is eliminated and a further advantage is that the student can be examined over a wide area of knowledge. We, as examiners, have found this a satisfactory method of written examination, although suitable unambiguous questions are extremely difficult to set. The students have already begun to prefer it — their natural early suspicions have disappeared as they have come to realize that this system of examination is much fairer than the traditional one.

![Objective Surgery Paper](image)

Figure 6.—Increase in knowledge gained in sixth year Medicine as shown by multiple-choice type of examination. A series of questions was randomized into two equal groups — one given to the fifth year and one to sixth year students of the University of Queensland as part of their annual professional examination.

Recently, I compared the performances of Queensland students and Glasgow students in the same questions, and was not very surprised to find that students tend to be the same the world over. I was most interested to see that students do in fact learn a considerable amount in their sixth year (Fig. 6). A large number of questions were divided into two equal groups and given to the
fifth and sixth year students in the University of Queensland whose examinations coincided in time. The sixth have nearly twenty-five of their students ahead of the top student in fifth year — the sixth mean is higher, and the long fifth year tail is now shortened to a small stump, which must be regarded as rather liable to amputation at the Final Examination. At the Final (Fig. 7) the objective paper reflects quite accurately the performance over the whole examination in surgery.

The three original subjects for examination at the Final—medicine, surgery, and obstetrics and gynaecology — have now had added to them child health and psychiatry. No doubt others are on the way. The examination load has become intolerable and each new University department cannot expect to control an examination divided into its own written, clinical, and oral components. Nor can the three original clinical departments expect that they can continue their traditional influence at the Final Examination, each with absolute power of veto.
At the end of a six years' course, including a number of major examination hazards, most surviving students should be expected to pass the Final Examination, which should cease to be a long drawn-out process of attrition, exhausting to examiner and candidate alike, over a period of a month or more.

I suggest that all departments come together in planning a reasonable examination, consisting of the following:

a) Written paper of multiple-choice type — sections set by all departments.
b) Written paper of short-answer or essay type — set by all departments.
c) Clinical examination — one long case to assess together with a group of short cases designed to test clinical competence. The function of this examination would be to demonstrate whether a candidate possessed the basic clinical experience and ability to examine a patient and come to a reasonable conclusion as to the probable cause of the illness and the methods of investigation required. The examination could therefore be inter-departmental and would not be intended as a type of junior specialist examination in each of the clinical subjects.
d) A viva voce examination — to be conducted by members of departments which the individual candidate had not met in the clinical examination.

I believe that an adequate assessment of the candidate's ability to enter his internship year could be made in this way, the pass rate would be higher, and the examination completed in one week or little more.

Electives and Integration

A recent proposal which I greatly favour is to use two months of the three month holiday between fifth and sixth years so that a course of a student's own election may be undertaken. He may elect to study, with the approval of the Dean, in clinical medicine or surgery, in a specialty, or to undertake a research project, or to travel interstate or abroad for a particular project. He may well attach himself to a general practitioner. The elective allows of considerable initiative on the part of the student, but it will be some little time before this potentially valuable scheme can be initiated.
I believe that much more can be done towards integration in the undergraduate curriculum. There is still a tendency for university departments, whether pre-clinical, para-clinical, or clinical, to remain isolated from each other. Much of the course could be better taught if taught inter-departmentally. There is a case for vertical integration between pre-clinical and clinical departments, as well as horizontal integration between the various clinical departments. This may not be the proper time for a further drastic overhauling of the curriculum as the latest alterations are not yet in full swing. It seems to me, however, that a suitable area of experimentation might be in the fourth or fifth years, after a basic course in pathology, bacteriology, and the introductory clinical course. Combined teaching could then be undertaken with physician, surgeon, pathologist, radiologist, and appropriate pre-clinical teachers teaching subjects in rotation such as gastroenterology, diseases of the cardio-vascular system, neurology, urology, etc. Certain symposia are now being arranged using this principle and may point the way to the future.

**Postgraduate Training in Surgery**

Apart from playing a leading part in such regular activities as Grand Rounds, Journal Club, postgraduate lecture courses and so on, the Department of Surgery should play a major and central role in postgraduate surgical training. This ought to be carried out in full collaboration with the surgeons of the teaching hospitals and the hospital authorities, and should be designed to fit in with the pattern of development of surgery in Queensland. A period of general internship for one year after graduation is now firmly established here. I am rather unhappy about ward-unit attachments of only eight weeks, although these were designed for the purpose of giving every graduate some experience in a variety of disciplines. An eight week term is too short for any real benefit to the intern. One possibility worth exploring is the use of sixth year students as some form of junior interne under adequate supervision; trust breeds responsibility, and that subtle change, by which a student who is only an observer becomes in a rapid metamorphosis a responsible doctor, may be put forward in time with advantages to both himself and his hospital.

The critical defect in the present postgraduate picture in Queensland is the absence of a clear way ahead to the top in surgery. During a two years' Registrarship, the young aspirant may acquire a
Primary F.R.A.C.S. or may subsequently “flit” to the Anatomy Department for this particular purpose. I doubt whether the intense concentration required to pass this examination is of any permanent value to the trainee, but I agree that there must be some definite hurdle at this stage of training. I would like to see more concentration on applied physiology and biochemistry, but a fundamental knowledge of anatomy is essential in a surgeon’s training.

After Registrarship and with or without acquisition of a Fellowship, comes the end of any obvious road for the surgical trainee. Odd jobs here and there sooner or later form the basis of continuation of training at home or overseas with the ultimate goal of a Fellowship of a Royal College of Surgeons, obtained either in Australia or the United Kingdom. On the other hand, we must be candid and admit that some Registrars fail to attend Fellowship courses and postgraduate lectures arranged for them in their hospitals at times when they could attend. While advocating a much fuller training policy for Surgical Registrars we must ensure that only those who demonstrate both ability and an interest in learning should be accepted for further official training leading to responsible posts.

There is as yet no definite post-Fellowship ladder. The missing post is that of Senior Registrar — as understood in the National Health Service in Britain — during tenure of which ultimate professional skill is acquired over a period of three years or more. Without this post, a Registrar is too inexperienced to take on the mantle of competence expected of the holder of a Surgical Supervisor’s post in one of the Brisbane teaching hospitals. Furthermore, there are only two of these appointments available in general surgery, and the appointments are for an initial period of seven years with the possibility of renewal. Conditions have changed since these posts were first created and their function might well be reviewed. The only alternative higher training posts available are by way of appointment to smaller non-metropolitan hospitals where full facilities for postgraduate teaching cannot be expected. If a number of Senior Registrarships were made available, the most suitable men could then be groomed for later consultant posts in surgery by passage through an established pattern of training.

Can the academic Department of Surgery play any part in improving this training and promotion pathway? I believe that somewhere along the surgical training line of six years or so, which
we ought to organize here, a young surgeon should be fully exposed to academic disciplines and have some training in research methods. He may never do any worthwhile research himself, but an occasional man may well find his métier in such work. In any case it is important that he should acquire an understanding of research methods, and thus be in a position in his maturer years to form a better judgment of current surgical literature. Furthermore, I think that full appreciation of recent developments in surgical science, such as the use of "immediate" or "bedside" biochemistry, would be of great value in dealing with the complicated problems he is bound to meet in his practice in years to come.

The time for academic attachment is open to some argument. A young man, post-Primary Fellowship, is at the right stage of his career, but is over-fearful about passing the Final Fellowship. The older graduate, on the other hand, feels that he is past the laboratory stage and wants only to have as much operating experience as possible. Fortunately, the Department of Surgery in Queensland is of such a size that it can carry Registrars of both junior and senior experience, and so achieve the research pattern desired and take advantage of the clinical duties available. Work initiated at this stage by a Registrar might be continued later, and so form the basis for a Doctorate of Surgery for anyone planning an academic career or one who might wish to acquire this academic accolade.

The post of Senior Lecturer is a key one. It may be held by a career academic but should also be available to a man on his way up to the surgical staff of either his teaching hospital or a peripheral hospital. The surgical staff of one of the teaching hospitals in Brisbane believe that the post of Senior Lecturer might well be held on a half-time basis by a young man starting a private practice. He would thus establish his early practice during several years of academic attachment. The academic Department would benefit from an outside point of view being expressed in the Department. This part-time Senior Lectureship would be a bridging position and the holder would become the obvious candidate for the next vacancy on the part-time hospital staff. I am in full sympathy with such a view and believe that if the Department of Surgery could be thus integrated with the staffing structure of the teaching hospital, the present friendly links between the full- and part-time staff of the teaching hospitals of Brisbane and the Department would be extended, and the Department would be able to play its full part
in the training of surgeons who will staff the Queensland hospitals.

General Surgery and the Development of the Specialties

In the nineteenth century, it was possible for one man to be completely proficient over the whole field of surgery. These were indeed the golden years of the general surgeon, but the process of erosion of general surgery had already started many years before. While the general surgeons were still associated with their original partners, the barbers, itinerant cataract kings were pursuing their occupation with considerable skill in India and elsewhere. There were also the peripatetic urologists of Europe who cut perineally and optimistically for stone and fled before sepsis overtook their patients. Nowadays, our colleagues the ophthalmologists and urologists are much more static because of the development of the complicated instruments they use in their specialties! Advances in endoscopic instruments also led to the early separation of ear, nose, and throat surgery from general surgery, and a few creative and independent spirits expanded orthopaedic surgery from a relatively small specialized study of foot deformities in children into the present enormous subject with ever-enlarging pseudopodia. Within the last two decades, the highly specialized knowledge required of the dynamics of cardio-respiratory function, of extra-corporeal circulation, etc., has led to the virtual separation of cardiac and vascular surgery from general surgery.

After these multiple and major excisions, what remains of general surgery? Only the surgery of the breast and endocrine glands — already invaded by specialists of all persuasions — and the surgery of the alimentary canal, which is currently under attack from below by the proctologists. The general surgeon in desperation has therefore had to turn himself into a gastroenterologist and is prepared to repel all invaders while he clings to the islands of surgical survival created for him by the peptic ulcer, the gall stone, the appendix, and gastro-intestinal malignancy, with their various potentials for excision and anastomosis.

How then can we define general surgery? Is it merely gastroenterology? Or is it, as I believe, also concerned with a knowledge of fundamental principles such as shock, haemorrhage, blood transfusion, fluid and electrolyte balance, acid-base equilibrium, cardiac, pulmonary and renal function, the proper preparation of patients for surgery, post-operative care, etc.?
It has recently been suggested that general surgery is the whole of surgery other than that particular specialty in which a young man proposed to train. However, I do not agree with this definition. The fundamental aspects of surgery mentioned above have to be acquired by every surgeon whatever may be his own specialty, but I doubt whether they can be taught effectively from some specialties where a very few conditions are very commonly seen, where routine tends to be the order of the day and few problems present outwith those referable to the specialty, so that the outlook is inevitably restricted.

I believe that there are no absolute lines of demarcation between the various specialties and the rump of general surgery. Any dividing lines set up tend to vary from place to place and depend partly on the clinical practice available but more on the personalities and experience of the surgeons concerned. Recent examples of this can be seen in the approach to advanced breast cancer by endocrine ablation. Again, ovarian ablation can be achieved by radiotherapist, general surgeon, or gynaecologist; the adrenals can be removed by general surgeon or, it appears, by urologist because they are located near the kidneys; and finally, the pituitary can be attacked by general surgeon, ear, nose, and throat specialist, oncologist, radiotherapist, or neurosurgeon, as the gland is situated in the head. Advances are made by the keen, and a new procedure may thus be developed within quite different specialties in different cities because new areas of experience open up for those who have ideas and work to develop them. This is as it should be, and the process ought not to be resisted by those who merely paddle their way through their careers.

*University Departments of Surgery and the Specialists*

How have university departments of surgery met the challenge of specialism? In the first place, most of the excisions from general surgery had been carried out prior to the setting up of full scale academic departments. In many of the older universities, departments of surgery were formerly headed by professors who were not paid any significant salary by the university, who were given practically no staff, and who consequently could not develop any academic activities. These posts were often awarded to the surgeon in the community who had most distinguished himself in his professional practice. In some universities, the title of professor rotated among
the senior surgeons who carried out what little organization of teaching was required. This often amounted only to deciding on whose wards a student should walk; and teaching in some schools was rather perfunctory.

When departments of surgery were formed with whole-time staff, they were often led by men who had become prominent in setting up some particular branch of surgery. In the post-war years for example, departments proliferated at a time when major advances were being made in peripheral vascular surgery. In Britain, a number of chairs of surgery were filled by men experienced in the new techniques of arteriography and vascular anastomosis. This led to valuable advances in knowledge and techniques by university departments of surgery. However, such specialization may be criticized as being rather narrow for departments whose real purpose is undergraduate and postgraduate education, both of which require broadly-based programmes. Such defects are more noticeable in a school where both medical faculty and department of surgery are so small that overmuch teaching and the greater part of the research interests are concentrated in one tightly limited area. In this regard, there are undoubted advantages in belonging to a large school where the particular interest of the head of a clinical department is not so very important. What is important is that he should act as a focal point for developments in aspects of surgery other than his own particular interest. I believe that general surgery should be the basis of a department of surgery, and nowadays, as we have shown, general surgery has become essentially gastroenterology. The head of the department of surgery may well be a gastroenterologist, as I suppose I am, but only some part of the clinical and research activities of his department should be in this area, and the academic staff should not be a team of gastroenterologists.

In the Department of Surgery in a large school such as the University of Queensland it is possible to appoint an academic team whose interests extend out into the territories lost to specialization. This should not be done with the intention of bringing these areas back within the fold of general surgery. This objective would be quite impossible to attain if only because of the large technical advances in those specialties. Rather it should be the purpose to create a central area of integration. Surgery is far too big a subject nowadays for any one man, but a group of men in an academic unit can cover a large area: an area where those who are going to be “specialists”
and those who are going to be "generalists" will spend some part of their career working together, holding regular discussions and conferences — where for example, a cardiac surgeon may explain the dynamics of cardiac bypass to a man whose heart is in the bones; where a budding urologist may explain the latest technique of prostatectomy to his colleagues who in turn introduce him to new ideas in fluid and electrolyte balance, or the latest antibiotic on trial; an area where there is free discussion and exchange of ideas so that the young can gain experience by listening to the experienced and, as often as not, have an opportunity to pass on their enthusiasm to seniors who may have become a little tired; in short, a place where the whole ethos of surgery can be developed in its modern idiom.

Here in Queensland, I am exceptionally fortunate to have an opportunity of developing such a situation. There is an academic staff of twelve in the Department of Surgery, and their interests range through gastroenterology, peripheral vascular disease, cardiac surgery, orthopaedic surgery, transplantation surgery, and the surgery of cancer. A department of surgery can, and should be, a training ground for both academic and general surgeons, for men who are looking forward to appointment to the general surgical staff of a hospital, either teaching or non-teaching, and for those who will become specialists. It should also act as a centre for the development of a university interest in the specialty departments of surgery and closely related subjects where a university has not yet had a definitive role. In Queensland, orthopaedics, anaesthetics, and radiology are examples of this. I think that in the future a strengthening of the University link with the orthopaedists is desirable as there are nearly 2,000 teacher/student hours now annually devoted to this subject. The present link is through the attachment of a University Teaching Registrar in surgery to the Orthopaedic Department at the Brisbane Hospital.

In anaesthesia there is nearly the same amount of teaching time, and this fact is a powerful argument for the creation of an area in an extended Clinical Sciences Block suitable for teaching and research in anaesthesia; provision is also required for suitable links between any proposed University appointment and the service interests of the hospital departments of anaesthesia. This might be best carried out in a manner similar to the relationship which has been established in regard to cardiac surgery.
In radiology, however, conditions for a University interest are very obviously opportune at the moment. A sub-department of radiology could flourish within the Department of Surgery until such experience and development had occurred that total independence became feasible under an independent chair. This might then lead to an academic centre within the specialty of radiology. The University and the Australasian College of Radiologists have both supported this development, and a Reader in radiology has just been appointed. It will now be possible to bring into full use the magnificent x-ray equipment in the Department of Surgery generously provided through the Mayne Trust, and so establish a centre for radiological research on a broad basis.

**Research**

Research may be either fundamental or applied. It is vital that some work should be done on basic biological problems, but, bearing in mind the staffing and duties of university clinical departments, it is surely practical to act on the assumption that some, and perhaps the majority, of research projects in a department of surgery ought to originate in the unit's clinical practice. Departmental research should have as its objectives the development and application of new knowledge, but it is also important to use research techniques for the training of Registrars and other postgraduate staff. I believe departments of surgery should provide opportunities for part-time surgical colleagues who may wish to undertake some particular project. Facilities in this Department are already in use for this purpose and I hope that more of my colleagues will wish to take advantage of the research laboratories which will become available in the new Department to be opened later this year in the Clinical Sciences building.

**Financing of Research**

Modern surgical research requires considerable funds—for salaries, capital expenditure on such items as electronic monitoring equipment, and recurrent expenditure for glassware, chemicals, etc. Part of the cost is met through University research grants, and from research endowments associated with the University such as the Mayne and Tooth Bequests. In addition, support can be requested from the National Heart Foundation, the Queensland Anti-Cancer
Council, the National Health and Medical Research Council, and other foundations in Australia and abroad. Recently, the Australian Universities Commission has made available special research grants to enable universities to press forward with certain research projects that could not otherwise be carried out owing to lack of finance.

The preparation of research submissions is thus one of the most important activities in the Department. Certain foundations can only support research projects within certain areas of interest, but there is often overlap and no certainty of success in any submission, so that multiple submissions are often required to ensure that adequate support is available for Departmental research in the following year. As the University and the various trusts and foundations meet and make recommendations at various times in the year (during which Departmental staff and needs may change, rendering some submissions obsolete), there are periods of anxiety before the financial picture is clear to the head of a department or the supervisor of a research project. Often this means great uncertainty by research staff as to whether funds will be available for their next year’s salaries; naturally this personal worry militates against good research. Another problem is that some grants tend to be too specific in the use of monies granted. As a research project proceeds, a promising new avenue may open up, and the researcher should be free to follow the line of greatest promise. Sometimes it is not possible to obtain suitable staff at the salary provided under a grant at the start of the period of operation of the grant. Any money thus saved should be able to be used to pay a much higher salary to attract the right person for the remaining duration of the project. Elasticity in accounting should also permit any unspent remainder of a grant to be used in the following year for the most appropriate purpose relevant to the research. It is unrealistic to believe that a precise sum of money can be completely spent by 31 December in any year, and I believe that any funds granted for a research project should be available to be fully used as required over the duration of that project.

Inter-Departmental Collaboration

Few major investigations can be carried out by the intellectual resources of any one department. It is most likely that major problems tackled by a department of surgery would entail close collaboration with such departments as medicine, pathology, biochemistry, bacteri-
ology, or the basic sciences of anatomy and physiology. This applies to personnel, ideas, and the sharing of expensive research equipment.

Registrar Training

If Teaching Registrars are to get experience in research work they must be given time to do so. An occasional afternoon off when things are slack will not do. Ideally something from 25 per cent to 30 per cent of their time should be allotted to research, and the teaching and clinical work of staff should be so arranged that any one Registrar should have the possibility of having one or more months off in a year to concentrate on his research problem. Normally, a Registrar inexperienced in research techniques is attached to a senior member of the Department and takes part in this man’s project. However, it is often possible to devise some relatively simple clinical research as a personal project for the Registrar: items such as minor clinical trials come readily to mind. Results of these, and the presentation of case reports, may be used to pilot a Registrar through his first written communication. In this regard, any impatient senior might do well to remember the circumstances of his own first appearance in the medical literature.

FIGURE 8

CURRENT INVESTIGATIVE WORK, DEPARTMENT OF SURGERY, UNIVERSITY OF QUEENSLAND

A summary to illustrate type and variety of work in progress

a) General and Metabolic Surgery
   Evaluation of semi-automatic blood volume estimator
   Biochemistry of seriously ill surgical patients
   Metabolic changes in the aged

b) Gastroenterology
   Pathogenesis of gall stones
   Myenteric plexus in duodenal ulcer
   Pancreatic function tests
   Smooth muscle abnormalities in diverticulosis

c) Renal and Transplantation Surgery
   Renal transplantation
   Studies in unilateral renal hypertension
Current Investigative Work in the Department of Surgery

This has been summarized in Figure 8 which illustrates the pattern which has developed in Departmental research projects and has led to interests over a broad base in the various sections of surgery.

(a) General Surgery

Members of the Department are engaged in evaluating a semi-automatic blood volume estimator. The machine estimates dilution of a radio-isotope in a patient’s circulating blood and computes his blood volume. Our early studies suggest that this method may have an acceptable level of accuracy. We are investigating new methods of rapid estimation of alterations caused by major illness in a patient's metabolic indices and in pulmonary and renal function, to enable fast correction of metabolic imbalance and thus by this modern development of clinical chemistry to increase the chances of survival of the desperately ill.

(b) Gastroenterology

Here, research has been concentrated on the causation of certain diseases — peptic ulcer, gall stones, and diverticulosis. Gall stones are particularly prevalent in Australia and the aetiology is unknown.
Attention is being paid to the epidemiology of stones and to the dietary intake of stone-formers, and a study of their lipid metabolism and other related factors has also been undertaken. This study is an example of a multi-discipline investigation, and the team includes surgeon, physician, biochemist, dietitian, and bacteriologist.

(c) Renal and Transplantation Surgery

A major section of the Department's research work is concerned with the development of renal transplantation. The technical problems have been dealt with, and considerable effort has been put into finding a means of overcoming homograft rejection which has so far made human homograft success very rare, except in identical twins. New methods of suppressing the host's immune reaction are now being tried and we await with great interest the results of these studies in immunology.

An investigation is also being carried out into the diagnosis of renal hypertension by individual kidney function studies. This project is an example of how Departmental facilities can be offered to a part-time colleague interested in working on a specific problem in clinical research.

(d) Cardio-vascular Surgery

Many of the recent advances in surgery have been in this area. Members of the Department have collaborated in the development in Brisbane of a heart-lung machine. With it, studies have been carried out into the homotransplantation of the aortic valve and other problems. Other work in progress relates to the diagnosis and treatment of disturbances in acid-base balance and in renal function in patients undergoing open-heart surgery.

(e) Cancer

A fascinating study of the immune mechanisms in cancer in man has commenced in the Department. Some patients react immunologically to the presence of their cancer, while others do not. Preliminary work on the mechanism of antibody formation is under way, and it is hoped that this may lead to the possibility of immunotherapy in man.

(f) Orthopaedic Surgery

A study of osteoporosis is being made to see whether this condition is really one aspect of a generalized collagen disorder. Methods of diagnosis are being appraised against the dietary background of patients, and detailed biochemical observations are being made on skin and bone collagen.
Another investigation is relating the strength of individual bones in man to their structure. A detailed study is being made of the effects of varying types of stress on bones of different strength. This work is opening up some interesting fields in bioengineering, where engineering, biology, and medicine are very closely related.

(g) Radiology

Research projects have just begun in the new radiology section. Preliminary studies are concerned with new developments in lymphangiography and the causation of excess gas in the intestine.

An optical step printer for cineradiography has been designed and manufactured. This permits animation and other special effects and so increases the teaching value of a film. The first film using this new system has been prepared for undergraduate teaching and illustrates the radiological anatomy of the heart. Further films are being made to deal with cardiac pathology.

THE DEPARTMENT OF SURGERY AS PART OF THE UNIVERSITY

One of the largely unrecognized problems in a clinical department is its relation with the rest of the university, particularly the large faculties unconnected with medicine. There is a separatism here which is both mental and physical. Often the physical separation is important, as clinical departments are necessarily sited at a teaching hospital which is, as here in Brisbane, nearly always located at some distance from the university. Physical embedding in a hospital has led to severance from the University. There is also a mental separatism which arises partly from the physical separation and partly because of the very professionalism required by clinical departments. This is especially the case in surgery where there is much necessary concentration on the detail of surgical procedures and much consequential training in operative technique. I am sure that this separatism is damaging both to us and our University colleagues, but I suspect more so to us. We are part of the structure of the University and should not forget it. Unless a department of surgery makes an effort to overcome this separatism, it is then exposed to the temptation of becoming only a professional training college. There is a great necessity for us to be in contact with the University at all levels, taking part in all University cultural and social activities, even in the multiple and sometimes tedious facets of administration and committee work. We must play our part in the conversion of the spirit of a university from an ideal which has come down to us
from mediaeval times into a modern one based more closely on the life of the community. Universities have always tried to have this association, but the tremendous alterations arising from recent scientific progress demand parallel changes in the traditional pattern of university life in order to defeat a tendency for the university to retire within walls of its own making.

Conclusions

I would like to think that I have made the theme of this inaugural lecture one of integration: integration between the Department of Surgery and its sister clinical, para-clinical, and pre-clinical departments in relation to curriculum, examinations, and research; integration of the Department into the life of the University; the maintenance of a close relationship between the Department staff and teaching hospital surgical colleagues; integrated postgraduate surgical training in Queensland, with the Department of Surgery playing its role as a focal point; close association with the Postgraduate Committee, the Australian Medical Association, and the Royal Australasian College of Surgeons; finally, through its research activities, the promotion of the advancement of surgery by contacts with other departments of surgery in Australasia and overseas.