accommodation, equipment, and staff at each hospital, and the comparative economics and personal service of the two schemes have not yet been assessed.

The scheme under consideration services only its own hospital, and there is no doubt that it is fulfilling the original principles for which it was designed. In the early stages there was a certain amount of doubt among both the nursing and the medical staff about its value and increased efficiency, but this has now been proved, and the staff would not consider reverting to former procedures. The time taken to do ward dressings has been reduced by nearly 50%, and the time taken to prepare trolleys between operations has been reduced from 10 to 5 minutes. The surgeons and theatre staff have co-operated fully and are well satisfied with the service provided. Infection records to date indicate a reduction in secondary infection of surgical wounds, but a two-year study at present under way will be necessary before definite conclusions can be arrived at. So far the total sepsis rate has been estimated at 3%.

In the work-study investigation of the department and its functions the salient points noted were: oversupply of equipment, excess demand for packs and gloves (to be controlled by keeping regular records of issues and returns), and the need for improvement of methods in the department by reorganization of storage facilities, packing surfaces, and sterilizer loading. The department is dynamic, and new materials and methods have been on trial since the department opened.

As regards staffing and control of the department, the appointment of a qualified and experienced member of the nursing staff as the officer-in-charge has proved an unqualified success. Only a trained nurse can discuss at a technical level with ward and theatre sisters and surgeons the problems which constantly demand attention; administrative ability and considerable tact are very necessary. Regular inspection and maintenance of equipment, especially sterilizers, should be carried out by the hospital engineer at not less than fortnightly intervals, as a preventive rather than a curative measure. Failure of sterilizers or hot-air ovens could seriously upset the work of the hospital, and for this reason there should be at least two steam-pressure sterilizers and two hot-air ovens. The consultant bacteriologist should play an important part in the maintenance and control of sterility and act in an advisory capacity, and also be conversant with the working of the sterilizers.

Thanks are due to the many people who have co-operated in the setting up of this department, especially the Nuffield Foundation and the Northern Ireland Hospitals Authority. Dr. Darmady has given helpful advice on syringe processing, and the Bowater-Scott Corporation Ltd. has kindly supplied many types of paper for trial. I am also indebted to the sister in charge of the department for much detailed information and co-operation in numerous laboratory tests.

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NEW AMERICAN MEDICAL SCHOOLS

BY

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To visit one of the new American university medical centres is to enter a world which is certainly not English. The language is spoken there, it is true, but much else is vastly different. It is not merely the scale of things, the display of wealth, the bold designs in shimmering glass and aluminium, nor the light and colour of the airy lounges with their murals and bright furnishings. Other things impress more. The entrance to the staff car park is by a gate which the driver opens by leaning out of his car and slipping a card into a slot in a post. In Los Angeles a medical student may drive in 40 miles at 6 a.m. to get a parking-place. Later that day you may see him in the psychiatry department watching an interview through "one-way" glass, listening to patient and doctor through earphones. Or you may meet him in the physiology laboratory performing a classical experiment with the aid of television.

In the wards you may see a patient selecting his meals from a printed and dated menu card or adjusting his electrically operated "high-low" bed or conversing on the bedside "intercomm" with a nurse at her station down the corridor. Like a captain on his bridge, she, with her aides, is in touch with all decks. She has her control panel with its switches and buttons, paging and signal systems, telephones, automatic conveyer, and pneumatic tubes, and, to port or starboard, her "floor manager" or "ward clerk." In the nursery, television helps the staff to keep a watch on a clutch of babies. In the ambulant wing a two-bed hotel-type room

contains man and wife; only one is a patient. In a four-room apartment at the end of a ward floor the family of a disabled patient are taught "home-care." In a laboratory a technician adjusts his auto-analyser (40 blood sugars or ureas in an hour) or his red and white blood cell counter (12 seconds per count).

The physician administrator, who has worked everywhere and knows everyone, says, "Cancer? We'll lick it. It's only a question of dollars!" The matron, on the subject of married medical students (70% of the final year), says, "Why, there are a dozen here who would marry me to-morrow—if I'd put them through college!" The dean in his office (interrupted by a telephone call from a student's wife asking if he would mind telling Joe to pick up a rye loaf on the way home; yes, it happened!) invites you to sit in on to-morrow's interview session for student entry, "You can read their dossiers to-night." (There will be 12 faculty members, 24 applicants, two student observers, and it will last all day, including a "getting-to-know-you" lunch with one doctor and two aspirants at each table.) To-morrow is a Saturday, and interviewing will be repeated every Saturday for ten weeks. And so on.

There are now 85 medical schools in the United States, and, although 12 of these have been started since the last war, there are still nine States without one. It is estimated that a further 15 or so new schools will be required in the next 15 years. In at least 22 places in the country new schools are under consideration

(Willard, 1960). Nine of the 12 new schools are new institutions; the Albert Einstein College of Medicine, in the Bronx, New York; the Downstate Medical Center, Brooklyn, New York; the University of Washington, Seattle; Stanford University, Palo Alto, California; the University of California at Los Angeles; the University of Miami, Florida; the University of Florida, Gainesville; the University of Kentucky, Lexington; and Seton Hall College of Medicine, New Jersey. I visited six of them in 1959, and a brief account of three of them may be of some topical interest.

University of Washington, Seattle

Seattle, in the north-west corner of the State of Washington, enjoys incomparable views of mountains and water. The University of Washington is a State-owned institution in the residential north end of the city on a fine, sloping campus overlooking Portage Bay (Fig. 1). The student population is about 15,000. Medical and Dental Schools were founded in 1945, when the State legislature established the "Health Sciences Division" of the University to include the existing departments of pharmacy and nursing. It was planned to erect these four schools and teaching hospital in one building on the water's edge of the main university campus. By 1948 the Health Sciences Building, housing the School of Nursing, the School of Dentistry, the Basic Sciences Division, the library, and the auditorium was completed. In 1955, on the east end of the Health Sciences Building, Unit 1 of the teaching hospital was completed. It is the hospital's west wing, and is referred to as the "Research Wing." In September, 1959, the second unit of the hospital was opened. The whole project will be completed when the school of pharmacy, which is still situated on the main campus, is built on to the west end of the Health Sciences Building.

The University Hospital is owned by the University of Washington and governed by its Board of Regents. The hospital administrator is responsible to the Dean of the School of Medicine (Dr. George N. Aagaard), who is responsible to the University President. Seventy-five students are admitted annually to the School of Medicine. At present the teaching hospital contains 300 beds and there are clinics for about 75,000 out-patient visits annually. Clinical teaching facilities are also available

at King County Hospital, Veterans' Administration Hospital, Children's Orthopaedic Hospital, and others.

In planning the hospital the authorities wished it to be "truly patient-centred." "Departmental locations and functional relationships were established which would create the atmosphere and working conditions most conducive to the highest quality of patient care." There is a single standard for patient care, and no private accommodation. Patients must be referred in writing by a doctor, and admission implies that they illustrate problems of teaching value. All patients are used in the teaching programme. As in all modern American hospitals, it is hoped that by installing the most modern equipment there will be a considerable saving in operating costs. "The lowest guy on the totem pole here," I was told, "earns \$200 a month; we just cannot afford to have 'em around." There are automatic pneumatic tubes, remote control dictation, conveyers, intercommunication, nurses' call, paging and signal systems; central supply systems, piped oxygen, piped suction, and post-operative recovery rooms; and facilities for television have also been provided. The general design of the hospital will permit later expansion of services on the first and second floors laterally and ward units vertically.

Each hospital floor is in the shape of a cross with a central core containing public and service lifts, the nursing supervisor's office, class-rooms, and students' room and laboratories (Fig. 2). In the west wing of each floor are the offices, laboratories, and teaching-rooms for the departments in charge of that clinical floor. The north, south, and east wings contain the ward units, designed on the double corridor system with the nurse's station at the entrance to each unit (30 beds), central ancillary services, and with bedrooms (for one, two, and four patients) on each side.

Stanford University, Palo Alto, California

The first medical school on the Pacific coast of North America was opened in 1859 in San Francisco. It was called Cooper Medical College after its founder, Dr. Samuel Elias Cooper. In 1908 Stanford University, in Palo Alto, 30 miles south of San Francisco, accepted Cooper Medical College as one of its faculties. Until 1959 and the opening of the New Stanford Medical

FIG. 1.—Aerial view of the University of Washington Medical School and Hospital, Seattle.

Centre at Palo Alto, medical students received their preclinical training on the Stanford campus and their clinical training in Stanford Lane Hospital in San Francisco. The Centre is a huge H-shaped, three-story structure 40 feet (12 metres) in height. It really consists of seven buildings—three hospital and four medical school—all under one roof. The centre was designed with a garden-like atmosphere around pools, fountains, trees, flower-beds, and open courtyards and patios.

FIG. 2.—Diagram of a ward floor at Seattle, showing disposition of main elements.

Precast concrete grill-work is used to screen the various open spaces of the buildings, and the whole effect in the Californian setting is unforgettable.

The hospital consists of two wings joined by a central core which contains both medical and service facilities. There are 440 beds, distributed in three floors of each wing. Each wing has a double corridor system with about 68 beds to each floor (20 rooms of two beds, 4 with five beds, 8 single rooms). On each floor there are two centrally placed nursing stations with a solarium and patients' lounge at one end, and a visitors' lounge at the other (Fig. 3). Within the central core of the

FIG. 3.—Diagram of a ward floor at Stanford, showing disposition of main elements.

hospital, medical and service facilities are situated. Connecting the hospital with the medical school is the large Boswell Building, which houses the out-patient departments, radiotherapy, biophysics, and various research laboratories. The medical school is made up of four buildings, each with its own courtyard. A rough idea of the layout in the three stories of these buildings is given in Fig. 4.

Some 60 medical students are admitted annually. Adjacent Veterans' Administration Hospitals will provide further teaching material. It is estimated that approximately 100,000 visits annually will be made to the out-patient clinics. A new curriculum has been designed (Stowe, 1959). It is based on a five-year course which students enter after three or four college years. In the first three years an amount of time (designated "University Time") equivalent to one academic year

FIG. 4.—Stanford Medical Centre. An H-shaped complex of buildings comprising the medical school and hospital. It is built around a series of courtyards, in three stories. To show general location of main departments.

may be devoted to work in any department of the University. Simultaneously the student begins the study of the basic medical sciences. He is also gradually introduced to clinical problems. The fourth and fifth years are devoted to a series of interdepartmental courses. There is a large amount of free time throughout the curriculum, and in the final year it amounts to a full third of the year's activity. "Integration" is not an end in itself at Stanford; it "contains as many defects as it does advantages and provokes vigorous resistance." Nevertheless, the thoughts that have guided the Stanford staff in preparing the new curriculum have been that (1) education is a continuum: preclinical and clinical work must be brought closer together; (2) there is a core of medical knowledge which should be presented to all students; and (3) the medical student is essentially a graduate student, and his attitude towards, and approach to, problems in medicine are more important than his acquisition of techniques and accumulation of data. With two young Nobel Prize winners (Arthur Kornberg and Joshua Lederberg) in charge of the departments of biochemistry and genetics in this new medical school, Californians can justifiably expect that the £7,500,000 spent in construction and equipment, and the bold plans of the staff, will bring their rewards.

University of Florida, Gainesville

In 1949 the Florida State legislature authorized the University of Florida, Gainesville, to establish a medical and dental school on the campus. The Medical School was opened in 1956, the Teaching Hospital in 1958, and the first class will graduate in 1960. In a series of volumes published by the University of Florida Press (1954-5), a study group reported extensively on the needs and resources of the State in the health field. The dean of the school, Dr. George T. Harrell (1956,

1957, 1958), has described the ideas and aims behind the curriculum and the construction of the school and hospital.

Sociological surveys in Florida revealed that the population was rapidly expanding and an increasing number of old people were moving into the State. The major aim of the school is the training of family physicians for practice in the State: the tradition of the family physician is stronger in the South than in

FIG. 5.—University of Florida Medical School. Theme of human biology that runs through university programme (Harrell, 1956).

the North. The declining number of applicants to medical schools all over the United States means that the university has a responsibility to determine if new types of personnel will be needed to help the physician. It is felt that the field of patient-care should be broadened, and it is for this reason that the unit at Gainesville has been called a "Health Centre" rather than a "medical centre." Undergraduate students at the end of two years in college are advised how to begin pre-professional training, and the role and point of view of the various professions are made clear to them. Members of the medical faculty are now teaching in selected pre-professional courses in the college. Basic biological principles such as variability and adaptability are used to introduce the theme of human biology, which is continued throughout the medical course (Fig. 5). It is felt that the social and behavioural points of view must have some expression in the modern health centre.

The Medical Sciences Building of six stories is connected by a cross-wing to the eight-story teaching hospital (Fig. 6). Those clinical and basic sciences departments which have a common interest are placed on the same floor. They share teaching laboratories, lecture rooms, and facilities in the cross-wing. The

hospital is a T-shaped structure with the main general departments on the first three floors and the clinical departments above. On the latter the teaching and service areas are located at the centre of the "T" (Fig. 7). On each ward floor there is a four-room

FIG. 7.—Diagram of a ward floor at Gainesville, Florida, showing disposition of main elements.

apartment with living-room, kitchen, bedroom, and bath, where patients and their families can be instructed in methods of "home-care," the use of items of equipment, and the preparation of diets. Similar facilities are provided in the out-patient departments. There is an ambulant wing on the third floor consisting of 26 motel-type rooms, each for two persons for whom bedside food and nursing services are not necessary. Medical care in this wing is administratively related to the out-patient department.

Each student is assigned to a "study-desk" on entering medical school. He retains this for two years, and on moving to the hospital is provided with another unit. The idea is that such an arrangement should help the student to capture the flavour of the practising physician's desk and to bring home to him that, "somewhere, sometime each day for the rest of his professional life he must think about what he has done and put it in perspective with what he knows." For the first two years he will collect his data from the basic sciences departments and the second two years he will collect them from patients. It is hoped that the importance of the essential educational process of synthesizing his knowledge will be dramatized for the student in this way.

Teaching Trends

It is not easy to say anything fresh about the education of the American doctor. His teachers seem more dissatisfied than ours and their struggles with their consciences more tormenting. (Why is it that, on both sides of the Atlantic, surgeons are in a happier position? Because they have said less?) The whole

FIG. 6.—Aerial view of the University of Florida Campus with new medical centre in foreground.

subject is awash with solemn nonsense, but in America it is the jargon that bewilders and antagonizes. One tires of "motivation," "challenge," "goals," "skills," "aptitudes," and "drives" ("serendipity" is the latest), but it is only fair to say that so do many American teachers.

Not wishing to add to the folklore of medical education, I shall only mention and comment on a few trends.

"Integration" (pax to the Old Guard!) in the curriculum, about which there has been much hue and cry in the 'fifties, is a topic which still arouses both cynicism and fanaticism. But I found that the majority of teachers appreciated that it is not an end in itself and that structural facilities do not guarantee it. Neither do conferences and seminars and symposia. Many facts seem to defy integration. The derogation of the old-fashioned lecture has gone too far. Poorly done we know it has little educational value, but the same can be said for the small-group discussion and the laboratory exercise. The lecture indeed can be a good way of providing perspective. And is not the necropsy room a good integrator? The weekly clinico-pathological conference at the Massachusetts General Hospital was described by one speaker there as "the last remaining honest quiz-programme in the United States." Walter Bauer (1959) believes "it is the general medical ward that is the basic area of integration." But few will deny that, if in the past 15 years a medical school has not got down to a course-by-course analysis of its curriculum, the scope for integration in that school remains wide. At Harvard the committee which rearranged the curriculum of the preclinical years advocated "the active co-operation of strong departments. The interplay of different approaches was felt to be more desirable than the loss of identity of the various disciplines" (Karnovsky, 1957). From Yale we hear that "these devices cannot be imposed by the administration, but if the atmosphere is favourable they can be encouraged to grow and flourish" (Lippard, 1955). Good teaching will be found wherever there are good teachers, irrespective of facilities, methods, and curricula. Some take refuge in that knowledge. But next to teachers these things are important, and in assessing their value we need not be artless or naive about the new, nor should we be mesmerized by the past.

The multi-discipline teaching laboratories, pioneered at Western Reserve, are a success. They have done away with the wastefulness of semi-vacant, single-purpose laboratories, the duplication of facilities and staff, and the endless flow of students. They encourage interdepartmental teaching and they help to emphasize subject relationships. In some centres they are designed to provide a "home-base" for the student in his pre-clinical years. With the exception of gross anatomy all the work of the basic sciences departments can be done in them. At Gainesville four student groups (64 students) may be taught at one time, or each of the laboratories may be divided by movable partitions into two, three, or four units (Fig. 8). "Sit-down" and "stand-up" types of laboratories are provided on alternate floors. At Stanford each unit is planned for 16 students, and connecting each pair of student laboratories is a central room used for demonstration, or for experiments on human subjects, and for the accommodation of jointly used major pieces of equipment. At the Albert Einstein College of Medicine, New York, completed in the spring of 1959, but yet without its new teaching hospital, student "office-laboratories" have also been provided. Each houses eight students where they pursue the major portion of their studies for the first two years. Here the student can keep his books and microscope and work at any hour he pleases. Teaching in these new laboratories is done autonomously and conjointly by the departments concerned. Standard "cookbook" experiments are being replaced by more imaginative exercises. The lavish provision of small conference and demonstration rooms in school and hospital fosters small-group, seminar methods of teaching. In Britain advocates of these methods rarely possess adequate facilities. The picturesque but forlorn scene of a group of students with their teacher stuck in some corner of a noisy lobby or corridor, in a lift bay or alcove, or on a draughty staircase is one with which we have been too long familiar in our teaching hospitals.

Departments of Behavioural Science

Another trend in the new American schools is in the establishment of departments of behavioural science. Human behaviour is becoming one of the basic essential subjects of the medical curriculum. The term "behavioural science" refers primarily to sociology, cultural anthropology, and social and experimental psychology. For some years courses on "growth and development" (including consideration of genetics, statistics, embryology, somatic and psychic development from infancy through adolescence) have been established in many schools. These are collaborative enterprises in which, as at Harvard, for example, the Department of Social Relations of the University plays a prominent part. It is now felt in some quarters that organization of the several contributions which sociologists, psychologists, and anthropologists can make to the study of human behaviour is required. Within a university these teachers will be found in different departments and their activities may be restricted. Their impact on medical education is limited if their work is

FIG. 8.—University of Florida. Teaching laboratory for physiology and pharmacology. Note folding partitions.

entirely within departments such as those of public health, preventive medicine, and psychiatry. In the new University of Kentucky Medical Centre, at Lexington, a formal department of behavioural science is being established with a medical sociologist (Robert Strauss) at its head. He explained to me that such a department would not have as its object the organization of yet another course. It would contribute to the basic sciences curriculum in a way calculated to demonstrate the relation of behaviour (psychological, social, and environmental) to the natural course of disease (genesis, diagnosis, course, and management). The health needs of society and the understanding of relationships will also be featured. It seemed to me that this broad approach would have more to offer than a course of lectures in normal psychology which British medical students desire (B.M.S.A., 1960).

Closed-circuit Television

The new schools are usually equipped for closed-circuit television, but its potentialities as a teaching instrument have not been widely studied. Many are sceptical of its value, but one feels that the poor reputation of commercial television in the U.S.A. may prejudice judgment. Practical experience will probably await the arrival of cheaper and smaller pieces of equipment, but these are on their way. With hand cameras no larger than a heavy revolver the possibilities are immense. We may soon be seeing on the screen enlarged pictures of the ear-drum and optic fundus, the interiors of such organs as the stomach, the urinary bladder, and the lung.

In Baylor University, Houston, Texas, television is in use as a teaching instrument. In the dental school there are two television studios, one equipped for

standard electrocardiograms or electroencephalograms, or the recording of slow peristaltic waves or very gradual changes in blood-pressure. Professor Hoff has found that the modern generation of American students take to such instruments with surprising ease. The new physiology laboratory comprises 10 student laboratories with operating desks and physiographs, a human studies room with couch and physiograph, and a demonstration theatre equipped with an animal operating-table, physiograph, and raised seats and blackboard (Fig. 9). Both the latter two rooms contain television cameras. Each pair of students has a television screen and intercommunication system at the physiograph station. Broadcast demonstrations are used to exhibit experiments on animals and man which, because of expense, complicated apparatus, or difficult surgery, cannot readily be made available to small groups of students. An excellent "over-the-shoulder" view of an experiment can be transmitted, and the two-way conversations between student and teacher can be heard at all stations.

"Progressive Patient Care"

You cannot travel far in the United States hospital world nowadays before hearing the phrase "progressive patient care" (P.P.C.). It is a concept which has aroused considerable interest and is in operation at Stanford and Gainesville. The United States Public Health Service (U.S.P.H.S.) has published in 1959 a booklet of 80 pages entitled *Elements of Progressive Patient Care* which is based on studies made by a team which was appointed in 1956. P.P.C. is defined as "the organization of facilities, services, and staff around the medical and nursing needs of the patient." Patients are grouped according to their degree of illness and need for care. The general hospital of the future is envisaged as a community health centre concerned with the care of long-term (including the mentally ill) as well as short-term patients. There are five elements in the present concept of P.P.C.; four are contained within the general hospital: (1) *the intensive care unit*, where critically ill patients are concentrated regardless of diagnosis; (2) *the intermediate care unit*, where the average hospital patient is to be found; (3) *the self-care unit*, for ambulant patients who are physically self-sufficient; and (4) *the long-term care unit*, where skilled medical and nursing care play an important part.

It has long been obvious that not all patients entering a general hospital require the full resources of a traditional ward. The indignity of being routinely "put to bed" has been surprisingly tolerated by the public. The patient who is admitted for diagnostic investigations or for treatment such as physical therapy or radiation, the diabetic in for regulation and advice, the post-coronary patient who requires observation of his tolerance of activity, the patient with the mild emotional disorder—are examples of hospital patients who need only simple, hotel-room type of accommodation. It should be possible to provide for them in a more home-like atmosphere with only the necessary supervision and guidance. The patient's schedule can be outlined for him on admission, he takes his meals in a cafeteria or restaurant, and restrictions are minimal. A good case could be made out for the "ambulant wing."

The argument for the intensive-care unit is less convincing, but it may have a part to play in the smaller hospitals of the future. At this end of the scale we have the desperately ill patient whose life is going to be

FIG. 9.—Physiology laboratory, Baylor University. Ten student rooms with physiograph stations, a demonstration theatre, and a human studies room.

clinical teaching and one for laboratory teaching, with monitors in all the unit laboratories (four students in each). More interesting, however, was the television set-up in a new laboratory of the department of physiology under the direction of H. E. Hoff, a former Rhodes Scholar at Oxford University. Here, as in many other schools, the smoked-drum kymograph has been replaced by the "physiograph," an instrument containing pick-ups, amplifiers, and a pen and moving-paper recording system which enables a wide spectrum of physiological events to be simultaneously recorded. The paper speed can be varied to permit the taking of

saved only if constant observation by a highly trained staff, skilled in the handling of modern apparatus and in emergency treatment, can be provided. It cannot be said that this level of care can always be guaranteed in the general wards of smaller hospitals. In large hospitals with special departments the need for such a unit should not arise. In the U.S.P.H.S. booklet, mentioned above, examples are given of the types of patient who might be nursed in such a unit: major surgical cases following release from the recovery room, multiple injuries or burns, major haemorrhage, and myocardial infarction. The team should be skilled in the observation of vital signs, the measurement and recording of fluid intake and output, the detection of complications, the administration of intravenous fluids and oxygen, the techniques of suction, catheterization and bladder irrigation, wound

Various estimates have been made of the percentage ratios in a classification of hospital patients according to their needs. Observations at Manchester, Connecticut, thus far suggests that 60% need the normal intermediate care, 20% intensive care, and 20% self-care. The notion of patients progressing through three departments of a hospital will no doubt raise many eyebrows. But the *majority* would still be treated in the average ward. The new idea is only that some patients need more, others less, treatment, and this approach might increase efficiency, reduce costs, and stimulate experiment. In this country, McKeown (1958, 1959, 1960) has used the phrase "the classification of patients according to their needs" in a somewhat different sense. He suggests the bringing together of all facets of hospital work to a common site. By appropriate designing and equipment the three great groups of hospital patients—the acutely ill, the chronic sick, and the mentally afflicted—could be cared for in multiple buildings in a common site. The standard of care of the second and third class of patients should then rise. Token psychiatric and geriatric departments in a teaching hospital may satisfy the teachers and help the students, but in the long run a much bolder plan is necessary in hospital organization if these relatively neglected subjects are to be tackled in a determined manner.

The Future

In *Architecture U.S.A.* McCallum (1959) writes: "For the young European architect an American Grand Tour is becoming as important as the Italian was to the eighteenth-century English gentleman." Although Mr. McCallum did not touch on hospitals, the three conditions for great architecture which he mentions—a prosperous and lively building industry, creative freedom, and conspicuous expenditure—have undoubtedly led to the development of a flourishing school of hospital architecture in America.

It must have surprised many in this country to learn that in the recent architectural competition for the new medical teaching centre for Wales, at Cardiff, "many competitors scarcely progressed beyond drawing bubble diagrams with a T-square." (*The Architects' Journal*, June 2, 1960). This is a pity, because in the next quarter of a century our hospital architects are going to enjoy golden opportunities. British requirements and tastes may differ from the American, but Medicine on both sides of the Atlantic is being transformed. The new dimensions in Medicine must find adequate expression in the design and function of our teaching hospitals.

I wish to thank the council of the Association for the Study of Medical Education for inviting me to undertake this visit to the United States, and the Commonwealth Fund of New York for their generous financial support. For permission to reproduce photographs I am indebted to Dr. George N. Aagaard, Dean of the Medical School, Seattle; and Dr. George T. Harrell, Dean at the Florida Medical School, Gainesville.

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FIG. 10.—Special experimental observation unit at Rochester Methodist Hospital, Rochester, Minnesota.

dressing, anticoagulant therapy, and the management of the various forms of respiratory paralysis.

Many problems would have to be faced in setting up an intensive care unit in a hospital. Policies of admission and transfer would have to be thoroughly studied. If direct admissions to the unit could not be arranged the advantages claimed for it would be reduced. Experience at Manchester Memorial Hospital, Connecticut, well illustrates many of the factors requiring consideration (Thoms *et al.*, 1958).

At the Rochester Methodist Hospital, staffed by the Mayo Clinic, an experimental intensive-care unit of circular design has been built (Fig. 10). It consists of twelve single rooms placed around the edge of the circle with the nursing station in the centre, from which each patient can be seen. To establish a check on the studies made there a control unit of conventional rectangular design has been set up in another part of the hospital. In a recent monograph published by the American Hospital Association (Sturdavant, 1960) the experience gained in these two units in the past three years has been brought together.

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Medical Memoranda

Pruritus Ani Complicating Transplantation of the Ureters

This is a case report of an uncommon condition. No detailed records of a previous case have been found by either the B.M.A. or Smith Kline and French libraries.

Jacobs and Stirling (1952) mention one case of proctitis in a series of 1,673 patients. Clarke and Leadbetter (1955) do not record any cases in a series of 2,897 patients.

The discomfort suffered by my patient was severe enough to make his history worth reporting in detail.

CASE REPORT

The patient first had haematuria in 1936. A simple papilloma was removed at open operation. He remained well until 1942, when he suffered a relapse and required operation with fulguration. He had no further haematuria until 1953, when a recurrence of the papilloma was treated by diathermy at cystoscopy. In 1955 he had another resection. Until then all histological reports had described a simple papilloma.

In 1956 he had more bleeding. A diagnosis of malignant papilloma of the bladder was made, and in consequence he received two courses of deep x-ray therapy.

In January, 1958, he suffered a severe prolonged haemorrhage which was treated by cystectomy and colonic transplantation of the ureters. It was not possible to remove the whole bladder and some malignant tissue was left behind. The histological report after his discharge from hospital was "transitional cell carcinoma of the bladder." He remained well until March, 1959, apart from some urethral leakage of blood from the malignant stump, and an incisional hernia. At the beginning of March, 1959, he complained of pruritus ani which he himself had treated, unsuccessfully, with 1% cinchocaine ointment. I persuaded him, with difficulty, to allow me to examine him.

He had anal dermatitis. The skin was red, raw, and weeping. The lesion began at the upper end of the natal cleft and extended anteriorly over the entire perineum to the scrotum. It was beginning to affect the skin over the buttocks. The itch was intense. Cinchocaine and coal tar failed to produce improvement. By the beginning of April the dermatitis had spread over the entire scrotum and was advancing over the pubic symphysis to the anterior abdominal wall.

On April 7 biochemical investigations were begun. The urinary pH was 9 and the urinary ammonia was 230 mg./100 ml. (expressed as total nitrogen: normal = 50 mg.). Serum sodium, potassium, chloride, and carbon-dioxide-combining power were all within the normal range. The high ammonia reading suggested that the cause of the dermatitis was ammoniacal irritation following decomposition of the urine by urea-splitting organisms. Bacteriological

culture of anal and perianal swabs yielded "growth of *B. proteus* sensitive to chloramphenicol, streptomycin, and nitrofurantoin."

His treatment was changed to topical magnesium sulphate and oral sulphafurazole. On April 17 the urinary ammonia was 226 mg./100 ml., and the pH was 9. There was some clinical improvement, but not sufficient to justify perseverance with this treatment. It was altered to $\frac{1}{4}$ % hydrocortisone in lactocalamine applied twice daily and oral nitrofurantoin 50 mg. four times daily. By May 1 the itch had gone and the skin lesion was dry and healing. The urinary ammonia was 198 mg./100 ml., though the pH was 9.5. A culture of an anal swab on May 4 yielded "no intestinal pathogens notwithstanding the use of enrichment media." Because of the marked improvement all treatment was stopped, and on May 22 the urinary ammonia was 46 mg./100 ml. and the urinary pH 7.5.

The patient remained clinically well and required no further treatment until August, 1959, when he had further urethral bleeding, for which he was admitted to a hospital for chronic diseases. He had no further pruritus.

COMMENT

The clinical course and investigations indicate that the patient's pruritus ani was produced by ammoniacal dermatitis. The source of the ammonia appears to be the decomposition of urea to ammonia by *Proteus* (probably *vulgaris*).

The following features of the case require comment: (1) the infrequency of the condition, (2) the anomalous behaviour of the urinary pH, and (3) the choice of treatment.

Proteus vulgaris is often found in small amounts in the normal bowel and is a frequent invader in the deranged bowel. It is a potent urea-splitting organism. Why, therefore, is ammoniacal dermatitis such an infrequent complication of uretero-colic anastomosis?

Though the urinary ammonia in this case had dropped from 240 to 198 mg./100 ml. by the third reading the urinary pH had risen from 9 to 9.5. This may be accounted for by the fact that the urine of patients with transplanted ureters is frequently alkaline, owing to chloride retention (L. N. Pyrah, 1959, personal communication). Nevertheless the high urinary ammonia must have contributed to the raised urinary pH.

Sulphafurazole was selected as the first antibiotic to attack the proteus in order to avoid the possibility of diarrhoea produced by secondary bacterial invasion after more potent antibiotics. Since it was not effective enough, it was replaced by nitrofurantoin.

Local treatment was chosen on clinical grounds. The dermatitis was refractory and refused to respond to any treatment other than hydrocortisone. Since the itch was intense, local treatment was necessary until the antibiotic had produced a significant result.

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