Who Will Teach the Basic Medical Sciences?

A study of British physiology departments reveals critical staffing problems and concern for the future.

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In his 1925 study of European medical education, Flexner said, "If the so-called premedical sciences are to be prosecuted primarily as sciences and not as handmaids to medicine, it is relatively immaterial whether a particular teacher be a graduate in science or a graduate in medicine" (*1*).

Flexner wrote at a time when both types of scientists were available for recruitment into preclinical science departments, but times have changed. Thirteen out of 14 chairmen of physiology departments in Great Britain personally interviewed, strongly believe that medically qualified faculty are essential in providing physiology teaching programs of excellence to medical students. The difficulty in recruiting faculty members with medical qualifications is described by several of the chairmen as a serious national issue. Many have had completely negative results for several years. "The preclinical scene is crumbling," said one.

"Crisis in preclinical medical sciences" was the striking title used by the British Medical Association (BMA) (*2*) when, in 1971, it described this staffing problem in the medical schools of Great Britain. That "crisis," plus recent pessimistic statements about the future of physiology and other basic science departments in American medical schools (*3*), prompted me to examine the status of departments of physiology in Great Britain, and to attempt to define those problems that are of relevance to American medical schools.

The choice of Great Britain for this study, where the National Health Service (NHS) is now over 25 years old, was a deliberate one. While there are not yet many voices calling for an NHS in the United States, there is speculation as to what the impact of a comprehensive national health insurance program on our schools would be (*4*). Future legislation in this country will undoubtedly bring us closer to some of the features and effects of the NHS in Great Britain. Beeson has recently described some of these as they relate to clinical teaching (*5*).

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Who Should Teach the Preclinical Sciences?

The following paragraphs are taken from the report of a meeting of the heads of United Kingdom preclinical departments, held 22 May 1972 (*6*):

> Multiple factors contribute to the principle that medically registered (clinically qualified) career preclinical staff have a special role to play in the instruction of medical students in their earlier years . . .
>
> Statutorily-registered staff have personal experience of the training for and of the practice requirements in Medicine.
>
> (i) The medically-registered teacher can convince the student of the relevance of his preclinical subject to clinical work based upon the teacher's personal and enthusiastic involvement with Medicine.
>
> (ii) The increasing use of man to illustrate the scientific principles in all four preclinical subjects requires supervision by medically-registered staff . . .
>
> It is desirable that there should be an adequate number of medically-registered staff for future development of the academic preclinical disciplines. Adverse effects on this development will arise . . . if this number of staff is allowed to drop too low.

These comments were sent to the Committee of Vice Chancellors and Principals and thence to the University Grants Committee (UGC), the principal funding agency for the United Kingdom universities and their 29 medical schools. In a 23 July 1973 memorandum from the UGC to the vice-chancellor of every university with a medical school, these principles are reiterated. In that memorandum it is "agreed" that preclinical teaching to medical students concerns phenomena in human subjects and that their relation to clinical medicine should be emphasized to an extent not appropriate for a pure science department.

In regard to the size of the nucleus of medically qualified staff required, preclinical department chairmen were asked recently to indicate the proportion of medically qualified staff to the total number of staff, which, "on educational grounds," is desirable. From these results the means calculated were for anatomy, 80 percent; biochemistry, 25 percent; pharmacology, 50 percent; and physiology, 60 percent (*6*).

The Recruitment Problem

In nearly every physiology department in the United Kingdom, the chairman and the most senior faculty are physicians, many of the latter near retirement. Among the junior faculty, the situation is quite different, with nonphysicians predominating. In physiology department faculties, the BMA reported that the percentage of medically qualified graduates had fallen from a mean of 67 percent in 1951 for the country as a whole to 48 percent in 1971. In six rapidly expanding schools, it had fallen to 41 percent (*2*).

> An enquiry of 11 physiology departments revealed that, of the medically-qualified staff in post, 44 percent were in the last decade of their service. An enquiry of 12 departments revealed that of the applicants for vacant posts in 1964, 74 percent were medically-qualified whilst in 1969 only 26 percent of applicants were medically-qualified. In 1964, 70 percent of new appointments were medically-qualified, whereas in 1969 only 33 percent were medically-qualified.

For all preclinical departments, the UGC indicates that the percentage of medically qualified applicants for posts fell from 44 in 1967 to 1968, to 31 in 1970 to 1971. The percentage of new appointments of medically qualified staff fell from 58 to 51 in the same period.

A further significant fall is believed to have occurred since the 1970 to 1971 academic year (*6*). All department chairmen are advertising "medical qualifications preferred" but there are few takers.

Reasons for the Decline: Real or Fancied or Both

Interviews with young faculty members support the view that the reason for the decline in recruitment of medically qualified faculty to the preclinical departments lies in the discrepancies in salaries between the NHS-supported hospital consultant and the steps in the career ladder leading to that post, and the university-supported preclinical professor and the steps in the career ladder leading to that post. In the 12 London schools, the problem is compounded by the very high cost of living. Exceptions are to be found, especially at Oxford and Cambridge ("Oxbridge"), where institutional prestige and tutorial fees paid to faculty by the colleges are important additional attractions to talented teachers.

"Financial disincentives" are cited by preclinical department chairmen. Except for Oxbridge. the preclinical salary structure is standardized for all of the United Kingdom and there is little or no opportunity for the university administration or department chairman to have a say in the matter. It is the same salary structure as for the other academic departments of the university.

In the clinical departments, there is a progression of steps through the Registrar (trainee or resident) posts to the status of consultant; physicians passing through these steps are far higher paid for the age of the individual than are members of the preclinical departments passing through the steps toward the scarcer professorial appointments or chairs. Details on clinical salaries are contained in the "Halsbury reports" of 1971 and 1972 (*7*) which examine carefully the workloads, qualifications, and remuneration of "doctors and dentists taking any part in the National Health Service."

Although there is some disagreement on the precise age (*6, 7*), a physician reaches the status of consultant at about 35. As the BMA states (*2*):

> In the past relatively better facilities and opportunities for medical research existed in preclinical departments. This state of affairs no longer exists and almost identical research projects are now often pursued in clinical departments. This development, which is welcomed, has recently been associated with the re-evaluation of the remuneration of clinical teachers in line with their NHS colleagues without a similar re-evaluation of preclinical remuneration. This has led to grievous financial devaluation of preclinical workers of all grades as compared with clinical colleagues of similar standing and seniority.

For the academic year 1973 to 1974, and without regard for the London allowance and distinction awards described below, the University of London submitted to its medical school deans new salary scales wherein the lowest grade of preclinical lecturer or assistant lecturer would receive £1929 (at this writing, with £1 equal to about $2.30, about $4400) and the junior or assistant lecturer in a clinical department (not holding a consultant contract) would receive £2787 (about $6400) (*7*). Registrar salaries for this same period would range from below to considerably more than this latter figure.

At the other end of the scale, the nonclinical professor has a minimum salary of £5,625 ($12,900) with an average stipulated for the professors of the preclinical departments of a school at £6,777 ($15,600). The clinical professor's initial salary is £6,480 ($15,000) and cannot exceed £7,599 ($17,500) (*6*). (Some faculty, not members of preclinical departments, point out that this "average" provision in the determination of a preclinical professor's salary makes it possible for him to earn at the clinical professor's level.)

The greatest source of disgruntlement among preclinical faculty seems to be the distinction award, also referred to as "merit award," system of the NHS. These awards have existed since 1948 and occur in three grades. They were originally intended to provide "for a significant minority the opportunity to earn incomes comparable with the highest which can be earned in other professions" (*7*). Only consultants are eligible. The awards are not made public.

For the year 1972 to 1973 there were recommended 115 A-plus awards of £7350; 420 A awards of £5577; 1215 B awards of £3273; and 2605 C awards of £1392 (*8*). These 4355 awards were to be distributed among less than 10,000 consultants (whole-time equivalents). It is not generally known who holds these awards, but it is almost certain that faculty members of medical schools, and especially productive investigators, hold a high proportion. Thus, the charge is justified that distinction awards, which can go only to consultants in clinical departments, widen greatly the gap in income between clinical and preclinical department members who may hold the same medical qualifications, and who, it is claimed, may be doing the same kind of academic work, teaching, and research. In effect, the clinical teacher can double his salary. (A distinguished professor at Oxbridge who is eligible for a high distinction award has declined it, citing his primary loyalty to the scientific community of his university. This sentiment is said not to be singular.)

Interviews with clinicians, as might be expected, provide a different perspective. They point to their responsibilities regarding patient care, long hours, and long years of training. They deny the claim that there are many members of clinical departments whose work load is confined to research and some teaching, similar to the work load of the preclinical department member.

The "London allowance," for those "whose normal place of work lies within a radius of 16 miles from Charing Cross," is £162 ($373) for 1973 to 1974. This is obviously a token and inadequate amount. The cost of living in London is variously estimated at 40 to 100 percent greater than in the rest of Britain, and the higher figure certainly pertains to the prices of real estate. Young faculty members in London find it impossible to acquire desirable homes. Several who are leaving have cited this as their principal reason. Young faculty members of provincial English or Scottish schools who have been invited to London schools have declined because of the cost of living, and especially real estate values.

The medically qualified scientist has other reasons for opting for the clinical department when presented with the choice. Some, but by no means all, preclinical departments are housed in antiquated and underequipped facilities. Clinical departments have grown and their research efforts are large and well funded. Grants from the Medical Research Council (MRC), unlike grants from the National Institutes of Health, may not be used in any part to pay faculty salaries.

One chairman of a strong department of physiology states that the main difficulty in recruiting good medically qualified people is related to the growth

of research in departments of medicine and surgery that pulls "at the same pool of good people." It is hard to distinguish this from the salary argument, since the attraction of facilities and equipment is accompanied by the financial enticement.

What Is To Be Done about It?

Not everyone considers all of this to be a major problem. Several medical school deans said that they foresee the day when all members of preclinical departments will be nonclinicians, and all preclinical teaching will be done by nonmedical men. Viewing this as no catastrophe, they offer no plan to counteract the trend and see no reasons why medically qualified teachers should seek lower paying work.

Further, it is not uncommon to encounter the view among administrators and clinical department members that, given additional financial and manpower resources, the clinical departments of the medical schools could rather easily assume responsibility for teaching the preclinical sciences. A variation on this theme is the proposal that the preclinical departments be distributed as "divisions" or other types of units of the larger clinical departments.

On the other hand, the UGC has shown that it does recognize a problem. In its 23 July 1973 memorandum, the UGC acknowledged that the observed decline in medically qualified faculty threatens the educational objectives of preclinical departments. Neither the UGC nor the Committee of Vice Chancellors and Principals viewed the threat as justifying the introduction of higher preclinical pay scales. They viewed salary differentials within the same department as undesirable, and indicated lack of certainty that higher salaries would improve recruitment.

The UGC points out that the annual output of medical graduates will increase in the next 10 years from the 1972 level of 2343 to about 3500. Combined with limitations on the number of training appointments in certain popular specialties, and an alleged falling rate of emigration of British doctors, the UGC apparently feels that these factors will make posts in preclinical departments more attractive to physicians.

Another long-term measure, according to the UGC memorandum, is "an evolution of the medical curriculum into forms in which preclinical and clinical studies are less sharply separated than at present."

Short-term measures that may provide "marginal" help, according to the UGC, include the freedom of the universities to place medically qualified individuals higher on the salary scales; freedom to create multiple chairs in preclinical departments; the absence of ceilings on the preclinical professorial salaries; joint appointments with clinical departments; freedom of a hospital board to pay a preclinical staff member for service to patients; improvement in research facilities and the encouragement of collaborative research with clinical department members; and, finally, the use of physicians and surgeons from clinical departments in preclinical teaching (*6*).

The suggestions of the UGC are regarded by many department chairmen as important because they demonstrate recognition of the problem. However, they are regarded as inadequate for ameliorating the impending "crisis." The measures and devices suggested by the UGC have been tried at one time or another in most institutions. Joint appointments, for example, present problems for each department involved in such an appointment. Chairmen of both departments, say of medicine and physiology, must like the idea. As several holders of such appointments have said, when clinical and laboratory obligations enlarge, as they inevitably do, the physiology student tutorial is the first duty that is jettisoned.

The department chairmen favor an improved preclinical career structure, comparable to that available in clinical medicine, especially at the senior levels. They suggest this could be achieved by providing more senior posts and by extending the university pay scale for both medically qualified and nonmedically qualified preclinical faculty on the grounds of special ability. This suggestion is made specifically for the senior lecturer rank, the equivalent of the American associate professor. The chairmen also recommend acceleration of promotions so that the able preclinical staff member can reach the status of senior lecturer by 32 to 35 years of age. These proposals are accompanied by the suggestion that personal or titular "chairs" or professorships be conferred on individuals of exceptional abilities and that the chairmen of departments, who carry heavy administrative responsibilities, be recognized with remuneration comparable with the consultant pay scales.

The chairmen cite the program of Queen's University in Belfast where medically registered preclinical staff may undertake a small amount of clinical work under contract with the Regional Hospital Board who thus pays for the work. The experience at Belfast apparently has shown that "there is no decline in the University commitment of the staff and that it contributes effectively to the functioning of the medical school and hospitals" (*6*).

Many young preclinical faculty members who are medically qualified now undertake part-time clinical work of a "moonlighting" nature. This is mainly part-time general practice relieving regular practitioners of some night coverage. Most departments of physiology have indicated that such opportunities are rare and most are found outside of the NHS.

From many quarters come proposals that heavier investments by the fiscal authorities, particularly the UGC, universities, and MRC, should be made in facilities, equipment, personnel, and training grants in the preclinical departments. The chairmen recommend that grants be made available to medically qualified graduates for training in research in the preclinical sciences, at levels which are comparable to junior NHS posts, as an additional encouragement to adopt careers in preclinical departments.

One solution to this problem that was open to young faculty who accepted posts in preclinical departments is now foreclosing. As the BMA states, "a number of individuals who have previously decided to follow careers in preclinical departments have recently transferred to clinical disciplines" (*2*). For many physicians, not fully trained in a clinical specialty, this has meant accepting offers of positions in general practice. In fact, several young medically qualified preclinical faculty members state that they have considered this device their back door, should life in the preclinical department fail to provide the satisfactions anticipated. Now, the health departments and the profession are agreed that "the basic medical education which entitles a doctor to register on the Medical Register is not sufficient preparation for general practice" (*7*). Required "vocational training" for general practitioners is in the offing. This development will make it necessary for the physician to enter a period of several years of training before becoming eligible to be a principal in general practice.

A London

Complication: "Todd Pairing"

The *Report of the Royal Commission on Medical Education 1965–68* (*8*), commonly referred to as the Todd commission report, is a widely read and influential document. It makes numerous recommendations concerning the future of medical education in Great Britain and, among other features, contains an informative history of medical education in the University of London.

Twelve undergraduate medical schools, each founded in association with a hospital, became associated with the University of London through a lengthy process that was not complete until the present century. An account of the Todd commission report, and of the relationships among the London schools and the relative sizes of the medical schools of Britain is beyond the scope of this article, but the report is worthwhile reading for medical educators on both sides of the Atlantic.

The Todd commission recommendations concerning the London schools have stirred up a great deal of intense feeling and controversy. The commission recommended that the number of undergraduate schools in London be reduced to six and suggested the combinations of currently existing schools that would accomplish this end. The teaching hospitals at present associated with these schools would preserve their identities, the annual preclinical intake of each "Todd pair" would be about 200 students, and each faculty of medicine would become part of a multifaculty university institution.

This last provision was spelled out for each pair; for example: "The St. Bartholomew's–London [Hospital] combination might well aim to become in due course the medical faculty of Queen Mary College. . . . The Middlesex–St. Mary's combination might well aim to become in due course the medical faculty of Bedford College. . . ."

This provision is the one to which all preclinical chairmen seem opposed, as well as some, but not all, deans. It would require the removal of the preclinical departments from their present locations in close proximity to the teaching hospitals to sites farther removed, on multifaculty campuses where no medically related programs are now in progress. It would be, therefore, a step that would aggravate the problem of recruiting medically qualified persons to the preclinical departments by making more difficult their participation in the clinical affairs of the hospital.

Faculty and administrators of the London schools are outspoken in their criticism of "Toddery." Strongly critical articles have appeared (*9*).

The dilemma posed by the commission's recommendations is obvious. The large, strong departments of physiology, such as those at Glasgow and Edinburgh, seem strong by virtue of their critical masses of medical students, honors students, university science students, and graduate students, to say nothing of their leadership and quality of research. These departments occupy positions of strength in traditional university structures. They still have difficulties in recruiting desired numbers of medically qualified faculty, but they are far from the near-nil and hard-pressed position of the London schools. However, to remove the London preclinical departments from their present hospital-oriented locations (St. Bartholomew's, for example, is in comparatively modern quarters) to more university-like campuses is to remove from these departments the important attraction that they have for clinicians who would wish to work in preclinical departments. The move is also counter to the widely espoused "integrated curriculum."

A UGC official agrees that the Todd recommendations cannot be reconciled with the UGC's suggested measures for the alleviation of the problem of recruiting medically qualified faculty, but the UGC has made the decision to implement the Todd recommendations, based on available sites, and on what can be achieved at reasonable costs. The University College–Royal Free Hospital combination, and the St. Bartholomew's–London Hospital combination, are definitely under way. The UGC and the University of London have outlined the circumstances and conditions under which the Todd recommendations are to be implemented. ". . . The ideal will have to give way to the practicable" (*10*). From the same source (*10*):

> In some cases, this will involve separating the preclinical departments from the clinical departments and resiting them in close association with the science departments of a multi-faculty institution. The loss of scientific support which the clinical departments will inevitably suffer as a result of this separation should be made good by the development of strong paraclinical departments. In other cases, where no suitable multi-faculty institution is available, the pre-clinical and clinical departments . . . will remain together without the advantage of direct contacts with other faculties. Here the object should be to increase the student entry and to develop both pre-clinical and clinical departments to a size at which they become educationally and scientifically viable.

Impact on Teaching and Learning

The entering classes in the United Kingdom medical schools are bright, enthusiastic, and scientifically well educated. The average British medical student taking first-year physiology is 2 years younger than our American counterpart who has received the bachelor's degree. While he or she may be socially or educationally less sophisticated than the American student at that point in time, he must soon thereafter reach the level of the American student for he eventually goes to the wards and becomes a well-trained physician. The products of both systems seem equivalent, at least at the hospital consultant level where comparisons are easier to make.

"Integrated" programs, early introduction to patient-centered conferences, an increasing emphasis on social or community medicine, and attempts to bring general practice into academic medicine are encountered everywhere. Among the physiologists and other preclinical faculty, there is the familiar and often-stated belief that much nonscience is encroaching upon the time available for preclinical scientific education.

There is great variability in the time that medical students spend in contact with the departments of physiology. I encountered one department in which there were 50 lectures over a 2-year period, and another in which there were 130. "Practical" laboratory work in physiology seems to range from 60 to 180 hours. Tutorial, seminar, or other types of smaller group discussion periods are universal. Visscher's revealing report (*11*) on the decline in physiology laboratory teaching in U.S. medical schools suggested that, in surveying a relatively small number of British schools, the practical work done by the students might provide a basis for making simple comparisons and for judging the impact of a changing mix of faculty.

Nothing like the drastic reductions noted by Visscher were encountered in my limited review of the situation. Reductions in practical work combined with discussion periods, have varied from 0 to 20 percent over a 10-year period. The use of living ani-

mals, a criterion used by Visscher, provided no measure. As is well known, the practical work in British physiology teaching for the medical curriculum centers about human demonstrations and instrumentation. Animal use is restricted by law.

Two department chairmen confided that their alterations of the practical work and small group discussions were necessitated by the shortage of medically qualified faculty and the inability of the physiology-trained faculty to relate the phenomena under study to the students' future work as physicians. Most department chairmen attributed reductions in time solely to overall curriculum revision. The impression was gained that a vigorous attempt has been made in the British schools to maintain meaningful practical sessions in physiology, emphasizing human studies and laboratory techniques. (The characteristic research emphasis on neurophysiology is evident in the instrumentation employed. More than one student laboratory program, in fact, could be said to be rather long on "gadgetry.") There is widespread enthusiasm for "correlative" conferences with clinical faculty. These observations fit well with the clamor for mechanisms that will make the physiology departments more inviting to medically qualified teachers.

General Observations and Comment

Public or national policy with regard to health care and medical education is more visible in Great Britain than in the United States. It is not evident, however, that the universities or medical schools or their leaders have played any large role in determining policy. This situation can lead to the formulation of policy that may be considered detrimental to the quality of medical education by those who are responsible for the educating.

As in the United States, a shortage of physicians is held to exist in Great Britain. Increased medical school enrollments are considered essential and have been authorized. While this problem is complicated by both immigration and emigration of physicians, long-range planning with regard to numbers of physicians seems to have been accomplished well. The UGC provides funds to the universities for their medical schools on the basis of enrollments. The power of the UGC, exerted through fiscal support, is self-evident.

Although the situation is changing, many British medical school deans are part-time and short-termers, often elected by the faculty. By U.S. standards they are generally short on staff in the dean's office. They are able clinicians, and sometimes preclinical scientists, but they do not act in forceful concert. Perhaps they lobby individually, but there is not a "voice" for the medical schools. The health departments and "the profession" have voices. They speak before important and current recommending bodies (*7*). Since university faculty salaries are determined by government, an "influence" needs to be exerted on issues that concern these salaries. The BMA has shown its sympathy with the cause of the preclinical faculty in this regard (*2*).

The "crisis in preclinical medical sciences" does not appear to be solely the doing of NHS. In fact, the situation with regard to salaries in British medical schools is not much different than in the United States. A physician with clinical responsibilities makes more money in both systems. Nevertheless, it must be admitted that it is unjust to pay a full-time investigator double the money a preclinical colleague receives for similar work. The "crisis" is due to generally low pay in the preclinical departments and the fact that a physician in a medical school must be either in a preclinical or clinical department and cannot be treated as somewhat of both.

There will inevitably be pay differences between clinicians and nonclinicians if medicine is to remain at the high level of quality found in Britain and the United States. This is not resented by bright young scientists who opt for the freedom to do research and teach in stimulating, imaginatively led preclinical departments. However, these bright young scientists need to be paid well enough. Furthermore, the environment must exist in the preclinical departments that will attract good teachers and investigators who are medically qualified. This environment exists in the great universities at Oxbridge, Glasgow, and elsewhere in the United Kingdom. Perhaps this is a function of a "critical mass" of faculty, justified by large numbers of students of various categories. It is also a function of the excellence of contemporary scientific research in progress in these departments.

The London departments of physiology, and this is a generality with a notable exception or two, are at a disadvantage because of small size and inadequate financial resources relative to the cost of living in London. Its many shortcomings not withstanding, the Todd commission recommendations offer viability through the prospect of increased departmental size and more adquate physical facilities, where it is possible to implement the recommendations. Given the present economic state of Britain, the resources to implement this ambitious scheme fully are limited.

Alternatives for the Future

Departments of physiology or other preclinical departments should not be left to decline in size or quality. Choices must be made and long-range planning commenced. Choices and plans are made at a national level in Britain. It is still possible to make them at the university level in the United States. They should be individualized according to local circumstances and the requirements of society.

The San Diego experience (*3, 12*) provides one alternative for U.S. preclinical departments facing uncertain futures. Preclinical instruction could be accomplished by clinical departments, supplemented by university science departments, to the satisfaction of the objectives of medical education. Where the departments and faculty who assume these responsibilities are strong, and quality controls are carefully structured, that group of medical students ought not to suffer. It seems certain, however, that the preclinical discipline, or disciplines, would wither in that situation, and that the long-term needs of medical science would not be served.

Another alternative, one that would ensure the survival of preclinical departments, would be to increase their size, their educational responsibilities, and their financial and physical resources. Medically qualified teachers would be attracted to serve in these departments. Equally important, the preclinical sciences as disciplines would thrive, because professional physiologists and other scientists of high quality would be replicated.

In both countries, the sizes of medical school enrollments have been the subject of discussion for several years. The view has been expressed that, in

many preclinical departments, more student teaching could be done without seriously detracting from the other important activities of the professional faculty, and that small increments in numbers of teachers can result in large increments in numbers of students (*13*). While this view does not go unchallenged, enrollments of upward of 200 students per class are not uncommon in the United States, now. There are no reasons to suspect that such numbers would not be realistic for British schools.

The fundamental principle of the Todd commission recommendations is the "divided" school, with preclinical teaching in one place, and clinical teaching in another. This is as Oxford and Cambridge used to be. The Oxbridge schools are now building to the day when they will be able to provide all clinical instruction for their students in their own clinical facilities. With regard to London, the results of my survey, and the alternative proposals that have been discussed, would imply that the Todd commission recommendations for increased school size make good long-range planning, but that removal of the preclinical departments from proximity to their parent teaching hospitals is misguided and, in the long run, ruinous to the preclinical departments.

Finally, the Todd commission recommendations with regard to London have relevance to other medical educational problems in the United States. London is a great metropolis with 12 medical schools, and it is the only city in Great Britain with more than one medical school. In the United States, there are many cities with more than one medical school and six cities have three or more. Competition, conflicts, and duplication are inevitable in these situations. The Todd commission recommendations on London provide a model, albeit imperfect, of overall planning for medical education and, therefore, for health care, in American cities with more than one medical school. While "Todd pairing" has many opponents, in those instances where such pairing is already being put into effect there are many evidences of the pairs gaining mutual benefits, including the centering of excellence in certain clinical disciplines at one institution or another, and long-range planning for shared or coordinated laboratory and teaching services.

Conclusion

In the United States, circumstances still permit each university to set its own course under relatively broad and generous guidelines. The options for our faculties are relatively unrestricted and they can play important roles in determining university policy. We need never reach a stage which many can label "crisis," if events are predetermined by appropriate planning. The survey described herein points to the need for specific long-range planning of the future of preclinical departments in each university. The overall health care system is clearly involved in the problems described in Britain. The coming of a new order of health care in the United States should cause planners to accelerate their work.

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14. I am grateful to many medical school administrators and faculty members in Great Britain for their time and their views. I also received valuable assistance from officials of the University Grants Committee, Medical Research Council, and Health Department. I am particularly indebted to the chairmen of the departments of physiology at the universities of Aberdeen, Glasgow, and Edinburgh; Bristol, Leeds, and Nottingham; Oxford; and, in London, St. Bartholomew's, The London Hospital, St. Mary's. Middlesex, and University College. Finally, this study was expedited greatly through the generous hospitality of Dr. J. C. Houston, Dean of Guy's Hospital Medical School, and Professor J. N. Hunt, Chairman of the Department of Physiology at Guy's, which served as a "home base" from which to make these observations.

NEWS AND COMMENT

Plutonium (I): Questions of Health in a New Industry

Will Martin is an assembly-line worker at an automobile plant near Buffalo, New York. He is a genial and soft-spoken bachelor of 29, and a troubled young man. Doctors have told him that he has little reason for concern, but Martin worries nonetheless about the possible effects on his future health of an unusual and very modern kind of industrial accident he suffered 7 years ago.

It happened one September afternoon in 1967 while Martin was employed at a nuclear fuel reprocessing plant located in the green rolling hills south of Buffalo and owned by Nuclear Fuels Services, Inc., a subsidiary of the Getty Oil Company. The $35 million plant, which is closed down now for repairs and a major enlargement, chemically extracted uranium and by-product plutonium from the used fuel rods of nuclear power reactors. Simply put, Martin's accident amounted to breathing at the wrong time and place (see page 1028), with the result that he inhaled a massive dose of airborne plutonium.

He left the plant in 1968, but much of the plutonium is still inside him. He remains in apparently robust health, but he wonders about the future. It is true, doctors have told him, that plutonium is one of the most potent carcinogens known, at least in animals. But it is also true, they have pointed out, than in 30 years no human malignancy or other illness has been tied to plutonium inhalation. But the doctors aren't sure why, and Martin continues to worry that the mildly radioactive "hot spots" in his chest and underneath his sacrum may, in time, lead to cancer.

"What does this really mean for me, that's what I want to know," he said