removed on the 12th day. No attempt was made to use chymotrypsin, cortisone generally or by hydrotubation, or to produce a three-month amenorrhoea postoperatively with steroids.

The technique of end to end anastomosis, which may be used in type 1 and type 3 findings, has been described by Seigler⁹ who quoted seven cases. Three of these subsequently delivered at term and one had a tubal pregnancy. The uterine end of the tube is tested for patency with methylene blue after cutting the sealed end, and the fimbriated end tested with a probe. A very fine tube may be induced to pass the intramural part of the tube and is anchored to the infundibulopelvic ligament above and the cervix and vagina below. This acts as a splint for the anastomosis and is removed on the 12th day, though the uterus and tube have a tendency to reject it vaginally earlier than this. If end to end anastomosis is to be done on one side and tubo-uterine implant on the other it is better to do the latter side first.

Salpingostomy was performed by using Bonney's cuff technique. A splint of fine polyethylene, nylon thread, or silkworm gut, if this can be threaded down the intramural part of the tube, helps to keep the ostium open till healing occurs. The use of polyethylene tubing or spiral Teflon stents brought through the abdominal wall, anchored subcutaneously, and removed at eight weeks as an office procedure, has given a patency rate of 86%.¹⁴

FOLLOW-UP

These patients are known to be fertile but nevertheless should be investigated for anovulatory cycles postoperatively. The

results of tubal operations in Britain can be ascertained by the computerization of operations records; but it is important for an honest prognosis that the follow-up of tubal surgery should be correlated as advocated by Williams⁴ in Britain, and Seigler⁹ and Roland and Leisten¹⁴ in America.

I am grateful to all my gynaecological colleagues who, by referring cases, have made this paper possible, and to Professor A. C. Turnbull, University Hospital, Cardiff, for his encouragement and constructive criticism.

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Inside Europe

Clinical Medicine and Research in France

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Britain and France are close together geographically and both have highly developed systems of medical care and invest substantial sums in medical research. Despite this the contacts between the two countries in medicine and medical research are not strong. A British clinician or medical scientist is more likely to know his counterpart in New York or San Francisco than in Paris or Marseille, and the same is true in France.

In January 1973 we undertook a two-week visit to Paris, Lyon, and Marseille on behalf of the British Council to discuss with French colleagues how Anglo-French co-operation might be improved. The itinerary of our visit was arranged in France by the Ministry of Public Health in

consultation with the Institut National de la Santé et de la Recherche Médicale (I.N.S.E.R.M.) and the Ministère des Affaires Étrangères. The centres we visited were selected by our French colleagues after preliminary discussions with due regard to our own particular individual interests in hypertension-nephrology and oncology.

Language and Attitudes

Neither of us is fluent in French although we both understand the spoken language reasonably well. Throughout our visit, therefore, we found that the most satisfactory arrangement was for our hosts to speak in French and for us to reply in English.

Most of the French physicians and scientists we met obviously understood English extremely well, it was clear that many of the younger doctors and research workers were fluent in the language. Most of the young research workers had spent one or two years in the U.S.A. and they now tend to write in English in international journals.

In fact, most people we met felt that the language barrier was not a serious one and certainly should not be too great a deterrent to an English doctor who wanted to work in a French university hospital centre. Inability to speak French would not be a serious hindrance to a British research worker doing predominantly laboratory work. He should be able to learn enough French for his purpose within two or three months and could manage well enough in English during that time. For a clinician it would clearly be more difficult. A senior chef de service at l'Hôpital des Enfants Malades in Paris, said that in a well-staffed unit it should be possible to introduce someone gradually to clinical work while he perfected his French. This rather optimistic opinion was unusual, however. For example, the psychiatrists whom we met at the Hôpital St. Anne in Paris understandably were sceptical. In psychiatry in particular, a very good command of the language would be essential for the interpretation of symptoms, but the same difficulties would apply in all clinical situations.

Throughout our visit we found a warm and friendly reception almost everywhere we went. One austere chef de service said frankly that he thought our visit was unnecessary, but even he mellowed after a while. Mostly we were received with overwhelming hospitality. Our tour coincided with Britain's entry into the European Community. The precise timing of our visit was a coincidence but resulted in us being welcomed as medical "Common Market" ambassadors to France. Unfortunately our stay also coincided with another, less welcomed British contribution to the E.E.C., la grippe anglaise—the English "flu."

Medical Undergraduate Education

Many changes in the medical curriculum and administrative arrangements of medical schools in France took place after "the events" of May 1968. The University of Paris has been split up into more than a dozen smaller units, each with a measure of autonomy. Even the titles of schools have been changed. These are now referred to as Unités d'Enseignement et de Recherche de Médecine (U.E.R.). We visited the medical school of the University of Paris XII Val-de-Marne, at the Hôpital Henri Mondor at Créteil, which provides a typical medical undergraduate curriculum.

The curriculum is divided into three cycles. The first consists of two years of basic science and anatomy, physiology, biochemistry, biophysics, histology, and psychology. The second cycle consists of four years of instruction in medicine, which is for the most part integrated in terms of the organ system under study. The student must attain a certificate to show that he has completed satisfactorily each of the obligatory parts of this course. The obligatory parts include subjects such as gastroenterology, rheumatology and orthopaedics, neurology and psychiatry, gynaecology and obstetrics, cardiology, haematology and oncology, pneumonology, social and preventive medicine, and so forth. The third cycle of one year corresponds closely to our preregistration year.

The most striking feature of medical education is the enormous size of the classes, especially in the first year. In France a student who passes the general school-leaving examination, is entitled to enter the university faculty of his or her choice. Many students choose medicine, so that a first-year class of between one and two thousand students is not unusual. The difficulty of educating and examining so many students was apparent. A professor in one of the basic medical sciences told us, for example, that he and his small staff were confronted with having to mark about 2,000 examination scripts at the end of each year.

At the Hôpital Henri Mondor the student intake is 750 the first year and the number is reduced to about 250 in the second year. This recent decision to limit the size of the second-year class has caused considerable concern, for most accepted medical students cannot now proceed beyond the

first year. When we suggested that this was a wasteful system and that it would be better to restrict entry in the first year some of the teaching staff agreed. Others argued forcibly, however, that it was difficult to predict university performance from school examination results and that, therefore, the present system is fairer in selecting the best medical students.

We concluded from such discussions that planning of manpower in medicine in France is in a state of flux and has not yet fully developed. It is probable that the French Government will eventually have to place some restriction on the number of students entering medical schools.

Medical Research: I.N.S.E.R.M. Units

Most of our visits were to centres at which either clinical or basic research was being carried out. The main source of funds for such research is I.N.S.E.R.M. I.N.S.E.R.M. supports research through established groups, units, and individual research contracts. Almost all the research laboratories we visited were supported by means of established I.N.S.E.R.M. groups or units, of which there are now 117 throughout France. The only important difference between a group and a unit is that a group is housed in a university building, whereas a unit is housed in a purpose-built I.N.S.E.R.M. laboratory building. The I.N.S.E.R.M. unit laboratories which we visited were all modern and appeared to have been of a more generous scale than is the case with the Government-built centres in Britain. The laboratories had lavish modern equipment and most unit directors we met said that they had no particular problems over funds either for essential equipment or for consumable goods.

We were extremely impressed by the quality of most of the research being done in the I.N.S.E.R.M. laboratories, reflecting the high calibre of the staff. Much of the research was fundamental work in the fields of biochemistry, protein hormones, and immunology. Our general impression was of a youthful staff with high morale, untroubled by the financial doubts and difficulties which have afflicted medical research workers in Britain for so long. In many different laboratories, however, we were informed that there was now a strict limit on the number of new junior posts that could be created. As even relatively junior research workers in I.N.S.E.R.M. groups and units have security of tenure as civil servants there are fears that the recent limitation of posts will severely restrict movement and recruitment of new personnel into the laboratories. French medical research, therefore, may be about to experience the "plateau" of expenditure that first afflicted the National Institutes of Health in the United States and subsequently spread across the Atlantic to Britain. For the moment, however, the French are still enjoying the zest and excitement of a period of rapid expansion and considerable achievement.

There are a series of career grade posts in I.N.S.E.R.M. units, and their titles in ascending order of seniority are stagiaire, attaché, chargé, maître, and directeur. The salaries are appreciably lower than for people of corresponding seniority holding integrated posts in the teaching hospitals. A directeur of an I.N.S.E.R.M. unit has a salary of about 7,000 F. a month, compared with that of a full professor in an integrated university post at about 10,500 F. a month.

During our two weeks in France we visited nearly 60 different groups, units, and departments. We were impressed by the obvious strength of the French in certain subjects, such as fundamental neurobiological research. In Paris we visited M. Glowinsky at the Collège de France and Professor Schwartz at the Hôpital St. Anne, both working on central neurotransmitters. In Lyon we met Professor Jouvett, who is working on the neurophysiological mechanisms of sleep and dreams. In Marseille we visited Professor Dell and

Professor Paillard, both of whom direct very forward-looking neurophysiological research programmes. The strength of the French in nephrology and clinical immunology was reflected in our visits to Professor Hamburger and Professor Funck-Brentanno at the Hôpital Necker in Paris, Professor Lagrue's unit at the Hôpital Henri Mondor at Creteil, and Professor Traeger's unit at the Hôpital de l'Antiquaille in Lyon. A feature of these units was their highly developed work in the study of the immunology of glomerular nephritis.

Other areas of obvious strength were in endocrinology and gastroenterology. We visited the active department of Professor Royer at the Hôpital des Enfants Malades and Professor Kordon's I.N.S.E.R.M. unit at the Hôpital St. Anne in Paris. We met Professor Lambert and his team in Lyon and visited the impressive units of Professor Sarles and Professor Lissitsky in Marseille. In these units we saw extremely interesting work in progress on a variety of topics, such as vitamin D metabolism, the release of protein hormones, the composition of intestinal secretions, and the action of thyroid-stimulating hormone.

It is more difficult to comment about strengths and weaknesses in other specialties, for many of our visits were limited in time and representation. Cancer research is obviously given high priority and epidemiological studies are receiving increasing support. A member of the senior staff of the impressive Institut Gustave Roussey at Villejuif, however, told us that he thought that in general research in medical statistics, epidemiology, and social medicine was as yet less well-developed in France than in the United Kingdom. Clinical pharmacology was also mentioned by many people as a subject which has progressed in Britain much more than in France.

We formed the opinion that there is great strength and depth in medical research in France which with certain exceptions, however, is better developed in the laboratory field than in the clinical field. The emphasis seemed to us to be placed most strongly on research with a biochemical slant. This may simply represent the priorities of the moment, however. Many of the laboratories we visited were clearly of such excellence that we would recommend them unreservedly to eligible British postgraduates wishing to spend time abroad.

Apart from I.N.S.E.R.M. there is a second main organization concerned with financing basic medical research, the Centre National de la Recherche Scientifique (C.N.R.S.). There is no precise British equivalent of this body although its role is similar to that of the Science Research Council. C.N.R.S. is older than I.N.S.E.R.M. and obtaining a grant from it appears to be rather more prestigious. Many of the laboratories we visited, in fact, had grants from both bodies. C.N.R.S. also runs its own laboratories, and we visited a vast complex of such laboratories in Marseille, grouped rather as a small university on a separate campus. C.N.R.S. generally supports only basic medical research, and the two units we paid detailed visits to in Marseille were concerned with neurophysiology (Professor Paillard) and chemical bacteriology (Professor Senéz).

From what we saw and heard we judged that there must have been a deliberate policy decided in France 10 or 12 years ago to expand medical research. At this time I.N.S.E.R.M. was created as an independent organization and large numbers of young French medical scientists were sent to the United States for periods of one to two years for training in research. I.N.S.E.R.M. built a large number of new laboratories and created many new units in a relatively short period of time to house its growing numbers of medical research workers.

Professor Burg, the directeur général of I.N.S.E.R.M., told us that he was extremely keen to encourage joint research activity with Britain in subjects in which it appeared that collaboration would be scientifically profitable. He sug-

gested that this could be done relatively easily if agreement could be reached on how to ensure adequate financial support in each country and the provision of funds for reciprocal travel of scientists and technologists concerned.

Career Structure in Clinical and Academic Medicine

One of the most important hurdles that a young French doctor must pass if he wishes to specialize is to secure an intern post in a good centre, available in such cities as Paris, Lyon, and Marseille. These posts are allocated by competitive examination and only about one person in 10 is successful. The intern wishing to specialize spends four years doing general medicine or surgery. He can, however, devote the last two years of this period to developing his specialty and then enter private practice direct. If he wishes to compete for senior hospital appointments he is usually required to spend about three more years in specialist training.

The financial pressures to enter private practice at the end of the period of training are strong. We did not see any official statistics, but several doctors told us that the average income of a specialist in private practice in a large city would be about £20,000 a year. They added that around this "average" there was a wide range, some surgeons, for example, earning a great deal more. Much of the surgery in France is carried out in private hospitals. One estimate we were given was that 50% of all surgical procedures are carried out by surgeons operating in private hospitals. These high salaries in private practice in France make it extremely unlikely that French doctors will wish to work permanently in the United Kingdom. If there is any such general movement of doctors, which seems improbable, it is more likely that it will be in the other direction.

Academic Staff

It is now policy in France that the staff of university hospitals should be full-time, although people who were appointed in the days of part-time practice are being permitted to work out their contracts. For a member of the clinical academic staff the most significant hurdle is to obtain an appointment as professeur agrégé, although this title is now being changed to "maître de conférence agrégé"; another result of the events of May 1968. Before anyone may apply for a post as maître de conférence agrégé he must have been placed on a liste d'aptitude by a review committee of three specialists in his area of learning. One professeur agrégé we met in Lyon described his own career progression in detail. He trained in Lyon and was an intern in the Lyon hospital from 1960 to 1964. During this time his duties were mainly clinical and he did only a little research. In 1964-5 he was in the army but was able to spend part of the time in a laboratory. He spent 1966 in the United States, where he received his laboratory training. He returned to France in 1967 and set up his own laboratory and was appointed a chef de clinique in 1968. He was appointed professeur agrégé in 1970 when he was only 35 years old, but we were told that this was a rather young age to be appointed.

To counter the financial pull from private practice the full-time university clinical staff have what is termed an "integrated" salary. This means that they receive a salary from both the hospital and the university. For a full professor in Paris this amounts to about £11,000 a year. The arrangement not unnaturally appears to be popular with the recipients of the integrated salary. It is criticized by others, however, on the grounds that many laboratory-orientated academic staff are now having to devote a disproportionate amount of time to routine clinical work and their research work has been affected adversely.

Clinical Services

A clinical full professor normally has the title of professeur à la Faculté and chef de service in the hospital. A clinical service typically consists of about 90 beds, so that in a large specialty such as medicine or surgery there may be several chefs de service. In one Marseille hospital we visited there were several separate radiology services, each responsible to individual clinical departments. In some hospitals a "service" will also have a separate "pavillon," so that the administrative division also has its architectural counterpart.

The chef de service takes general responsibility for the clinical activities of his unit, but in practice much of his authority is devolved on the professeurs agrégés and chefs de cliniques. In many ways the system is more like the American one, the French professeurs agrégés corresponding to American associate professors, than that in Britain, where senior lecturers, readers, and professors all have consultant status. An advantage of the French system is that there is not such a sharp division between the "training" and "career" grades as there is in Britain with its consultant system. An obvious disadvantage of the French system is that it is a much sharper pyramid, with relatively few senior career grade posts ("consultants").

A major difference between France and Britain is that almost all the doctors and nurses concerned with clinical care of patients are French nationals. At present it is impossible for someone without a French degree in medicine to enter independent medical practice in France. The centres which we visited appeared to be well staffed and the general atmosphere, the types of patients in hospital, and the treatment they were being given were similar to those in a British hospital. Many French hospitals are suffering from a shortage of nurses, however, and there is serious discussion over whether the regulations should be changed to allow foreign nurses to work in France.

Opportunities in France

Laboratories all over the world are keen to welcome first-rate young research workers for fellowships of one to two years. Those in France are no exception to this rule. At

present those holding fellowships are predominantly from French-speaking countries and Latin America, but we met several Americans and Australians working in French laboratories. The Medical Research Council and the Wellcome Trust have agreements with I.N.S.E.R.M. which provide a number of fellowships for British doctors wishing to work in research posts in France. The Ciba Foundation also has an Anglo-French medical fellowship scheme. These fellowships offer stipends approximately comparable to a middle-grade registrar's salary in the National Health Service in Britain. We were told by young French doctors and by several foreign Fellows we met in France that a stipend of this level is adequate but not generous. It is difficult to make exact comparisons of living costs, but staying in a hotel, eating at restaurants, and using taxis extensively as we did appeared somewhat more expensive than would have been the case in London.

There are also interesting opportunities to do clinical work in France. Professor Fritel, of the Hôpital Ambroise Paré, told us of the "internat" scheme for foreigners, operated by L'Assistance Publique in Paris. L'Assistance Publique provides 40 intern posts which carry stipends of 2,700 F. per month. These are awarded competitively and the number of applicants exceeds the number of posts available. Generally the foreign applicants for these posts have been qualified for three or four years. The work they do on appointment is exactly the same as that done by a French graduate who had achieved the post in the competitive internat examination.

Anyone from Britain wishing to apply for one of these posts would have to obtain the support of the head of a clinical unit in one of the Paris hospitals participating in the scheme. The applicant would need exceptional recommendations from his sponsors in this country. Professor Fritel thought that if there were sufficient good applications from Britain, as many as five of the 40 posts in due course could go to British graduates. Unfortunately the language barrier may discourage many otherwise well-qualified candidates. We believe, however, that for someone going to a well-staffed unit who was determined to learn fluent French in the shortest possible time, this barrier would not be insurmountable. The experience could be invaluable.

A New Look at Infectious Diseases

Rabies

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As an animal and a human disease known to Aristotle and Celsus,¹ and with manifestations apparently little changed since then, rabies is of historic as well as current interest. Nowadays most people recall it in man as a severe encephalomyelitis succeeding a biting attack by a suddenly excitable or violent animal.

The incubation period (often affected by the site and severity of the bite) may be very variable, ranging from less than three weeks in the case of head injuries up to six months or more for wounds of the extremities. There is then a sudden onset of illness with rapid development of paralysis, often ascending in type, hydrophobia—dislike of water and inability to swallow it—dementia, coma, and death. Among animals the picture is one of changes in disposition with extreme restlessness, altered voice sounds, snapping, gnawing at any wounds or abrasions, difficulty in swallowing, drooling, fury or lethargy, leading to paralysis, coma, and death. Many species are susceptible, though rabies affects mainly carnivores such as the fox, wolf,

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