the acute observer can see unconscious patients left unattended or in the care of a junior probationer, wards without the means of efficient suction, powerful drugs given without enough thought to their pharmacological effects, or outmoded techniques used. British anaesthesia stands exceptionally high in world esteem, and this report is an indictment which must be taken note of. In the first place a detailed review is required by regional hospital boards of their arrangements for providing anaesthesia in the hospitals. In doing this certain pertinent questions might be asked: Is the number of specialist staff adequate? Are too many junior trainees being employed without sufficient supervision? Is every modern requirement for safety, such as suction, and proper means of ventilation of the lungs in cases of respiratory failure, available wherever anaesthetics are administered or unconscious patients treated? Is there sufficient staff, both anaesthetic and nursing, to supervise these patients? Is the anaesthetic staff consulted about the arrangements for providing service and have their recommendations been considered? Ultimately the prevention of anaesthetic deaths will be a matter for better training of anaesthetists and nurses—particularly the former, for the report makes clear that more skill and experience would have averted many of those recorded. Anaesthetists have realized that all is not well with the training of young specialists, and a welcome novelty was the holding of a symposium on anaesthetic teaching at the Postgraduate Medical School recently. Meanwhile, good is certain to result from the publication of this report.

A NEW LEASE OF LIFE

C. S. Beck and his colleagues[1] recently reported that a doctor suffering from ischaemic heart disease who died from a sudden heart attack at the moment of leaving hospital had been successfully resuscitated by cardiac massage and defibrillation. He finally left hospital feeling fit enough to return to his practice. Another similar case was reported by L. B. Reagan and his colleagues,[2] in which ventricular fibrillation developed during the recording of an electrocardiogram and the patient was resuscitated by cardiac massage and defibrillation. With the rapid development of new techniques in cardiac surgery, the treatment of cardiac arrest and ventricular fibrillation has become of increasing importance, and much experience in treating these conditions has been gained, both in animal experiments and during cardiac operations. The possibility arises of applying this experience to the treatment of cardiac arrest and ventricular fibrillation when these occur spontaneously in patients with ischaemic heart disease or Stokes–Adams disease, and Beck and Reagan and their colleagues and also P. M. Zoll and colleagues[3] have now demonstrated that resuscitation from these terminal arrhythmias is possible.

The restoration to life of a patient who in normal circumstances with conservative treatment would certainly have died raises the question how far such treatment is generally applicable. Two main problems have to be considered—first, the feasibility of the method, and secondly the chances of successful resuscitation in each individual patient. Whatever the method of resuscitation, immediate treatment is of vital importance, and it is the lack of time for organization or preparation which more than anything else will limit the general applicability of the method. Cardiac massage through the open chest requires oxygen given under positive pressure by intratracheal tube, and it will only be possible to begin treatment within five minutes of the onset of the arrhythmia by a fortunate coincidence of circumstances or when the arrhythmia has been anticipated and a trained team is ready to begin resuscitation immediately. In addition an electrical defibrillator must be available without too long a delay. It would obviously be preferable to resuscitate the patient in an operating theatre, as in the case of Beck's patient, but patients only rarely collapse immediately outside an empty operating theatre. An attempt to carry out resuscitation by such means in the open ward might well prove intensely distressing to other patients in the ward and could certainly not be envisaged as a routine procedure: the privacy of a side room would appear essential. It seems, therefore, that this method of resuscitation could be carried out in hospital only in exceptional circumstances. Another method of resuscitation which has recently been used successfully is the application of the external cardiac pace-maker and the external defibrillator described by Zoll and his colleagues.[3,4] This method has the advantage that it can be applied direct to the intact skin and there is no necessity to open the chest. On the other hand the apparatus and facilities for using it must be immediately available if successful resuscitation is to be achieved, and it is likely to be of use only when a fatal arrhythmia has been anticipated and preparations for resuscitation already made.

The second important consideration in deciding whether to attempt resuscitation must be the underlying pathological process responsible for the terminal arrhythmia. If it is known that the patient has had an extensive cardiac infarct, the chances of successful defibrillation must be small. In addition there is the possibility that, even if cardiac resuscitation is successful, the patient may be left with permanent mental impairment or indeed may never recover consciousness as a result of the prolonged period of cerebral anoxia. In some patients with ischaemic heart disease, on the other hand, who die suddenly and unexpectedly, the

[1] Beck, C. S., Weckesser, E. C., and Barry, F. M., *J. Amer. med. Ass.*, 1956, **161**, 434.
[2] Reagan, L. B., Young, K. R., and Nicholson, J. W., *Surgery*, 1956, **39**, 482.
[3] Zoll, P. M., Linenthal, A. J., Gibson, W., Paul, M. H., and Norman, L. R., *New Engl. J. Med.*, 1956, **254**, 727.
[4] Zoll, P. M., Linenthal, A. J., Norman, L. R., and Belgard, A. H., *Circulation*, 1954, **9**, 482.

heart at necropsy shows only small scattered fibrotic lesions with no major occlusion of a coronary artery and no clear area of cardiac infarction. These patients almost certainly die from ventricular fibrillation or cardiac arrest, and if this terminal arrhythmia can be aborted the heart should be capable of return to normal function. The report of these cases of successful resuscitation serves to emphasize that, though spontaneous cardiac arrest and ventricular fibrillation are usually terminal, they need not necessarily be so if facilities for courageous and energetic treatment are at hand.

ANTIBIOTICS AS FOOD PRESERVATIVES

Several uses have been found for antibiotics apart from the treatment of disease in man, animals, and plants. They are extensively used as food supplements for accelerating growth in young farm stock and poultry, an effect which is still imperfectly understood, although it appears to depend on some change in the intestinal flora. Again, as discussed at a recent conference in Rome and reported at p. 879 of the *Journal* this week, another use is for arresting or delaying the bacterial growth responsible for food spoilage. An odd example of this which has been suggested, though not, it would seem, adopted, is the addition of subtilin to canned foods to inhibit the growth of *Cl. botulinum*.[1]

The principal field for this sort of treatment is meat, and there are several possible methods of applying it. The animal can be given a therapeutic dose of the antibiotic before slaughter, or the carcass can be perfused with a solution. No doubt the penetration so achieved would be most effective, but a simpler process has been found satisfactory and is now widely used in the United States, which is simply to dip meat and poultry in a solution. The most effective antibiotics, presumably because of their wide antibacterial spectrum, are chlor- and oxytetracycline (aureomycin and terramycin). The former is the active constitutent in the "acronize" process, which includes citric acid as a stabilizer. The solutions contain 5 to 10 parts per million, and treatment with them prolongs the storage life of meat and poultry considerably. It is claimed that the minute amounts used are harmless to the consumer, and in any case are destroyed by cooking; that it would be necessary to eat an entire uncooked steer to get a therapeutic dose of the antibiotic, or to eat 2 lb. (0.9 kg.) of chicken daily for 70 years (whether cooked is not clear) to obtain half such a dose. Even shrimps and eggs are mentioned as benefiting from such treatment, and an important application is certainly the preservation of fish. The addition of chlortetracycline to the ice in which fish are preserved in trawlers should enable voyages to be extended by 7–10 days. The Department of Scientific and Industrial Research recently announced that this process was to be applied experimentally to the catch in a trawler which would subsequently visit Aberdeen, Grimsby, and Hull so that the trade could judge its effects.

[1] Anderson, A. A., *J. Bact.*, 1952, **62**, 145.

The present law does not permit this process, but medical authorities may well be asked in the near future to decide whether it should do so. Apart from a general uneasiness about the increasing application of artificial processes in the food industry, or about entrusting such potent substances to people ignorant of their properties, is there any objection to the preservation of meat, poultry, and fish with antibiotics of the tetracycline group? It is true that the dose capable of being taken in a meal is very small, and there is no evidence—although perhaps this should be verified by *ad hoc* experiment—that exposure to minimal concentrations can elicit bacterial resistance. It seems unlikely that the consumption of such minute amounts could induce sensitivity, though this again seems to need confirmation. On the other hand, it is far from certain that the consumption of even minute amounts would be harmless in a person already sensitized by therapeutic doses. Possibly American experience will provide an answer to these questions before a decision is made here.

COLONIC MOTILITY

The colon is normally in a state of more or less continuous muscular activity as judged by the pressure changes recorded by small balloons introduced into it or by the more satisfactory system of open-ended tubes filled with saline and connected to electro-manometers. In 1941 H. F. Adler, A. J. Atkinson, and A. C. Ivy[1] showed that the human colon displays three different types of pressure waves, which correspond closely to what had been found earlier in the dog's colon.[2] Type I waves are simple monophasic waves lasting from 5 to 20 seconds and of low amplitude. Type II are also simple monophasic waves but of longer duration (12 to 60 seconds) and of greater amplitude. They are the major manifestations of muscular activity in the normal pelvic colon, occurring throughout two-fifths of the time of observation. It is probable that they represent localized circular contractions of the colonic wall which produce the appearances of "haustration" in barium enema radiographs. Type III waves are complex, with a change in the basal pressure, regarded as a "tonus" change, and with Type I or II waves superimposed on this. They occur only infrequently in the normal colon and last from one to four minutes. They are thought not to be propulsive waves but possibly to assist in absorption by changing the hydrostatic pressure.

Similar studies made on patients with ulcerative colitis have yielded a picture which differs sharply from the normal.[3 4] The three types of wave observed in normal subjects are either absent or much reduced in number. However, another type of wave (Type IV) is present in these patients. These are unusually large waves, which are apparently propulsive in nature and directly related

[1] Adler, H. F., Atkinson, A. J., and Ivy, A. C., *Amer. J. dig. Dis.*, 1941, **8**, 197.
[2] Templeton, R. D., and Lawson, H., *Amer. J. Physiol.*, 1931, **96**, 667.
[3] Spriggs, E. A., Code, C. F., Bargen, J. A., Curtiss, R. K., and Hightower, N. C., Jr., *Gastroenterology*, 1951, **19**, 480.
[4] Kern, F., Jr., Almy, T. P., Abbott, F. K., and Bogdonoff, M. D., ibid., 1951, **19**, 492.
[5] Davidson, M., Sleisenger, M. H., Almy, T. P., and Levine, S. Z., *Pediatrics*, 1956, **17**, 807.
[6] —— ibid., 1956, **17**, 820.
[7] Lium, R., *Arch. intern. Med.*, 1939, **63**, 210.

to the occurrence of diarrhoea. The absence of the normal Types I, II, and III waves is regarded as responsible for the lack of haustration usually noticed on barium enema films of patients with active ulcerative colitis.

Recent studies at Cornell by M. Davidson and colleagues[5 6] extend these observations to children. Data obtained from 40 normal children agree closely with those for adults. In cases of acute infantile diarrhoea these workers observed the characteristic propulsive waves already noted in adults with ulcerative colitis. They also observed similar waves among those children who responded to oral magnesium sulphate, subcutaneous mecholyl, or the introduction of iced water into the rectum by developing abdominal pain followed by defaecation. On the other hand they did not find these waves in seven children with ulcerative colitis of at least one year's duration. However, none of these seven children was suffering from diarrhoea at the time of study, though three of them were passing blood in the stools and all had characteristic sigmoidoscopic appearances. It would thus appear that Type IV waves are not an essential feature of ulcerative colitis but are to be found whenever diarrhoea occurs in this and other diseases. This is of interest in relation to the view originally put forward by R. Lium[7] that ulcerative colitis may be due to muscular spasm of the colon with secondary necrosis and ulceration of the mucosa. The findings of Davidson and his colleagues would favour the view that the excessive colonic propulsive activity which results in diarrhoea is the consequence of an inflamed colonic mucosa and not the cause of it.

INFANTILE GENETIC AGRANULOCYTOSIS

From time to time doctors are puzzled by an undue, and indeed fatal, susceptibility to infection occurring in several members of a family. One disorder of this kind has now been defined as agammaglobulinaemia, in which the essential anomaly is an absence of gammaglobulin; in the idiopathic form this is probably due to a sex-linked recessive gene.[1] Another disorder has recently been defined in an isolated district of Sweden. In 1950 R. Kostmann[2] reported a sibship with congenital agranulocytosis; one infant, a girl, was fully studied, but three elder children had presented a similar clinical picture. There were also six normal children in the family and the parents were third cousins. He concluded that the disease was a hereditary "reticulosis" due to a recessive gene. Two earlier reports[3 4] are clinically very similar, but in each case only one child in the family was affected. An extensive study of all branches of Kostmann's original family, recently reported by J. A. Böök and Kostmann,[5] revealed three other branches of the family with a child who was affected and had been fully investigated; three further branches contained a child who died with essentially the same clinical picture, though not fully investigated in hospital. No fewer than 10 children, all of the same generation, were affected with this rare disease in this family, which stemmed from common great-great-grandparents and was much inbred. Two further families, one with one affected child and one with two affected sibs, were found in Sweden which were not clearly related to the original large family, but the parents in each case were blood relations and came from the same district as the large family. The proportions affected in these families leave little doubt that a recessive gene with full penetrance in the homozygous state is responsible for the condition. No evidence was found that the heterozygous parents were in any way abnormal.

Clinically the picture is uniform. In a few weeks or months the children develop multiple abscesses, mainly in the skin, and die within the first year. The infection can be temporarily controlled with antibiotics. Blood smears show agranulocytosis or severe granulocytopenia. The bone marrow shows an arrest of maturation of granulocytes at the myelocyte stage. This arrest is also seen in marrow cultures in the patient's plasma, but not in plasma from a normal child. The essential nature of the metabolic error is suggested by the finding originally made by B. Vahlquist and C. M. Plum that the maturation defect seen in culture in the patient's plasma may be corrected by adding the sulphur-containing amino-acid cysteine to the culture medium.[6] The obvious next step is to try the effect of giving this amino-acid to a child suffering from the condition. An interesting point is why this rare and lethal recessive condition should be relatively common in one geographical area. It is presumably a chance effect; the recessive gene mutation occurred in a remarkably fertile family in this isolated area, which in the next few generations indulged in much cousin marriage, bringing the mutation to light.

PARALYTIC POLIOMYELITIS AND PHYSICAL ACTIVITY

Since the outbreak of poliomyelitis in 1947 there have been some changes in the epidemiology of this disease in Britain. The average age of the patients is higher than formerly and it seems that the involuntary muscles are now paralysed more often than when the disease was described as infantile paralysis. At one time it was very rare for more than one in a family to be attacked, but now multiple cases in a family are not uncommon. In some large localized outbreaks which occurred during the epidemic in 1947 it was found that the attack rate varied in different social groups, a higher proportion of children in the residential areas being infected than the children in the crowded central areas. This trend was not apparent in subsequent outbreaks and now environment is not thought to be a factor of any importance in the attack rate. Another belief that seemed to be well established was that paralysis was particularly likely to develop in patients who over-exerted themselves at the onset of the attack. Doubts of the truth of this hypothesis have been raised by the results obtained by I. N. Sutherland[1] from a

[1] *British Medical Journal*, 1955, **2**, 32.
[2] Kostmann, R., *Svenska Läkt.*, 1950, **47**, 2861.
[3] Hotz, A., *Z. Kinderheilk.*, 1941, **62**, 529.
[4] Tobler, W., and Buser-Plüss, E., *Ann. paediat.* (*Basel*), 1942, **159**, 258.
[5] Kostmann, R., and Böök, J. A., *Acta. paediat.* (*Uppsala*), 1956, **45**, 64, Suppt. 105.
[6] —— ibid., 1956, **45**, 34, Suppt. 105.

[1] Sutherland, Ian N., *Brit. J. prev. soc. Med.*, 1956, **10**, 58.

large inquiry into the experience in Scotland during the four years 1950 to 1953. The number of cases of poliomyelitis in this series was 1,718, and consequently he was able to subdivide them by age groups and by degree of activity at onset of attack. In the younger children no association was found between physical activity after onset of illness and the degree of paralysis. Sutherland suggests that the apparent relationship between overexertion and paralysis was due to age, since with increasing age there is a trend towards more severe illness, with greater physical activity before symptoms appear and less rest after the onset of symptoms.

THE KING'S FUND

King Edward's Hospital Fund for London has greatly varied and enlarged its beneficence, even as the problems with which it has to deal have changed their form since, nearly sixty years ago, the prince who afterwards became Edward VII established the Fund to help the metropolitan hospitals. Formerly its grants were made largely with a view to the promotion of the material efficiency of hospitals—uniformity of accounting, for example, and the drawing up of architectural codes. In more recent years it has recognized that its resources could be invested in people as well as in materials. It has taken to heart Sir Richard Livingstone's declaration that the growth of colleges and centres for adult residential study is one of the most interesting developments of post-war Britain, and it has established bursaries and training centres for ward sisters, hospital administrators, cooks and caterers, and, finally, for matrons, for whom it provides four-week refresher courses. Another piece of useful work is the nursing recruitment service which was established by the Fund sixteen years ago. Perhaps the most urgent nursing problem of the moment is the staffing of mental and mental-deficiency hospitals, and it is acknowledged that the recruitment service, while giving what help it can, is no more able to solve it than the hospitals themselves. Some idea of the urgency of the need may be gained from the fact that, while there are over 91,700 beds for male patients in mental and mental-deficiency hospitals, only 460 male nurses qualified in 1954. Last year was notable in the history of the Fund for the exceptionally large allocation of grants to mental hospitals. The amount granted was £250,000, to be used over the three-years period 1955–7, and a new chapter in the relationship between the Fund and the mental hospitals has thus been opened.

The Fund, as shown by its latest annual report, assists in many other directions, among them the personal aid service for the elderly. The emergency bed service is also a special feature of the Fund. It was founded twelve years ago and now has had over half a million applications. About 1,250 calls a week are accepted, varying very much, of course, with the season, and it is its proud boast that the average time required to see a successful admission through from the general practitioner's initial call is 27 minutes, not including the cases of infectious disease which are comparatively easy to admit. It would be a great thing if this service merely resulted in saving the practitioner's time and vexation of spirit, but it has also proved an indispensable link between two partners of the medical service of London. Moreover, the calls upon the service provide an index of any rise or fall of sickness among the people of London, and thus serve to give the medical administrator timely warning of trouble ahead.

FLUOROHYDROCORTISONE

The substitution of a fluorine atom for a hydrogen atom in the hydrocortisone molecule has yielded 9α-fluorohydrocortisone, or fludrocortisone, which turns out to differ from hydrocortisone in some important respects. First, its effect on the excretion of sodium and potassium is so marked that it is doubtful whether systemic administration is ever likely to be indicated. Secondly, it is remarkably more effective quantitatively than hydrocortisone when applied to the skin. Fludrocortisone lotion and ointment, now appearing on the market in Britain, have been available for nearly two years in the U.S.A. and have been carefully assessed by various workers, whose results have reached close agreement.[1 2]

The optimum concentration of the hormone in either lotion or ointment is 0.1%. In this concentration it has been found effective slightly more often than 1% hydrocortisone, but the range of disorders in which it is beneficial is exactly the same. (The cost of 0.1% fludrocortisone is also about the same as that of 1% hydrocortisone.) Individual cases respond differently, however, some doing better on fludrocortisone, and some, though fewer, on hydrocortisone. The base also may have considerable influence, so that a trial of local steroid therapy in any case should not be abandoned until both compounds in various bases have been given. Broadly, the best results are obtained in localized anogenital pruritus, otitis externa, and eczemas of all kinds, including infantile and atopic eczema. Eruptions of the hands and feet do not usually respond so well, psoriasis and lichen planus not at all.

An advantage of hydrocortisone locally applied is that systemic effects are never seen; the same cannot be said of fludrocortisone, the systemic effects of which may be troublesome if large areas are treated, particularly if the skin is denuded. These effects may be countered by a low-salt diet and the administration of potassium, but in general it is evidently better to avoid fludrocortisone when large areas are affected and also in cases of heart failure, renal disease, or when some other condition likely to cause oedema is present.[3]

Combinations of steroids with antibiotics are still under trial. Such applications may be useful in cases where superficial infection is superadded, and there is no serious objection to them.

[1] Witten, V. H., Sulzberger, M. B., Zimmerman, E. H., and Shapiro, A. J., *J. Invest. Derm.*, 1955, **24**, 1.
[2] Robinson, H. M., Robinson, R. C., and Cohen, M. M., *Bull. Sch. Med. Maryland*, 1955, **40**, 72.
[3] Fitzpatrick, T. B., Griswold, H. C., and Hicks, J. H., *J. Amer. med. Ass.*, 1955, **158**, 1149.