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CONTENTS

No. 1. January, 1937

No. 2. April, 1937

No. 3. July, 1937

No. 4. October, 1937

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AIR-RAID PRECAUTIONS

THE address given by Major Blackmore, before the Northern Ireland Branch of the British Medical Association on 4th February last, draws attention to the dangers to the civil population of air-raids in the event of war. The possibility of war in the immediate future is a very real one, and it is most desirable that every member of the community should be trained how to behave under such conditions. Such training should be looked upon in the nature of insurance against the effects of incendiary, explosive, and poison-gas bombs, rather than a preparation for war; and the fate of the community as a whole may depend on each and every individual of the civil population playing his or her part when the eventuality occurs.

Modern aeroplanes, carrying bombs, can travel at the rate of two hundred miles an hour, and only a couple of hours at most would elapse from the time a fleet of aeroplanes was sighted at the east coast of England, until it had arrived over Northern Ireland, to liberate its frightful cargo of destruction and death. The certainty of air-raids over Belfast cannot be over-stressed, as the shipbuilding yards and the aeroplane factories now being erected will draw attacks with the sureness of a magnet. Every possible preparation must be made in advance, so that the risks to life and property will be reduced to the minimum. Every individual must be trained in his or her duty, and the medical profession in particular must be made familiar with the methods of treatment for the various forms of gas poisons.

Incendiary bombs weigh from two to eight pounds, and they are liberated from aeroplanes in showers with the object of starting innumerable small fires over a wide area, so as to make it extremely difficult to extinguish them. These small bombs, small as they are, can penetrate any ordinary slate roof, and they can only be kept out by a layer of concrete from three to five inches in thickness. They fall through the roof, and are stopped by the floor of the room below. This room is generally the "attic," filled with highly inflammable rubbish. The best means of protection is to have the floor covered with sand or dry earth to a depth

of three inches, and to keep all attics free from any inflammatory rubbish. So important is this point held in Germany to-day, that a law has been passed which permits inspectors to enter private dwellings to inspect the condition of the attics and to order their clearance where needed. Further, if such an order is not carried out within a prescribed time, the householder is liable to punishment.

Explosive bombs can penetrate even thick layers of concrete, and it is quite impossible to ensure absolute safety from them, except in specially deep bomb-proof shelters, which could not be prepared by private individuals. Their great danger, apart from a direct hit, is that of flying splinters, which can cause severe and even deadly wounds. Medical services will have to be organised to treat such wounds at short distances throughout the city.

Gas-bombs will be a very real danger, and unless the people are trained how to behave in their presence, may be a source of panic and death. The gas liberated from these bombs may be a true gas, as a kind of toxic smoke, or it may be in the form of clouds of minute particles which attack the eyes and mucous membranes of the respiratory and digestive tracts, or it may be a slowly evaporating oily liquid. The best known of the latter is the so-called "mustard-gas." This substance causes severe burning of all tissues with which it comes into contact, either as an oil or as a vapour. It clings to the soil, walls and other objects, for weeks, and areas can be decontaminated only by special means. Cold water, or even warm water, has no effect upon it, apart from spreading it over a wider area than that originally affected. The training of men for the work of decontaminating will be an important part of air-raid precautions, and medical-treatment centres will require to be established not more than two miles apart, so that persons who have been caught in the mustard-gas area, will not have more than one mile to walk for treatment. Gas-masks, or as they are more correctly referred to, "respirators," will be distributed among civilians, and forty millions of them are being manufactured at present, so that they will be available at short notice.

All these points will require the closest attention, and it will be the duty of every individual to carry out his or her share of the work. Members of the medical profession will be asked to use their influence with the people to bring them to an appreciation of the seriousness of the whole question, and to organize themselves for service in the treatment of the injured.

During the last Great War it was not found necessary to organize the civilian medical services to any degree. But in future wars, air-raid attacks on the civilian population will necessitate as detailed a scheme of organisation as that of the medical services for the armed forces. The medical profession will occupy an exceedingly important place in all general air-raid precautions, and its members will be asked to co-operate with the civil and military powers in a way never before demanded.

At no time has the Government ever asked the medical profession for its assistance and been refused, and in the face of common danger the profession will

rise, as it did during the Great War of 1914-19, and work with the Government for the protection and treatment not only of the armed forces, but for the helpless civilians behind the lines.

R. H. H.

Dental Sepsis in Relation to Constitutional Disease

JOINT DISCUSSION BETWEEN THE ULSTER MEDICAL SOCIETY AND THE NORTHERN IRELAND BRANCH OF THE BRITISH DENTAL ASSSOCIATION

(1) THE MEDICAL AND BACTERIOLOGICAL ASPECTS

By Sir Thomas Houston, O.B.E., M.D., B.A.

The relation of dental sepsis to general disease is a subject of such difficulty and importance that it demands the most thorough investigation of the dentist, X-ray specialist, and physician. This problem, though we are accustomed to look upon it as a modern development, was recognized in the very early history of medicine. Professor Olmstead in his history of Assyria refers to the following translation from tablets found in the ruins of Nineveh and Ashur in ancient Assyria, and is believed to date back to 650 B.C.

"Continually the king has been asking why Arad Nana, his physician, has not made clear his disease and has not cured him. Now Arad has sent a sealed letter which he hopes they will read before the king. He will make a prescription; let the ceremonies be carried out by a seer: Let them bathe the king and straightway the fever will depart from the face of the king: Let they apply to him oil, two or three times; at once the strength of the king will revive: The king shall place on his neck the salve Arad will send him: On the appointed day let the king be anointed: Arad will speak the truth as the king demands; the pain in his head, his sides, and his feet, has come from his teeth, and they must be extracted."

Evidently over 2,500 years ago, this king suffered from a focal dental infection, and his teeth were ordered to be extracted by his physician.

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In more modern times, William Hunter (1900) was the first to use the term oral sepsis. He says :—

"It is not the absence of teeth, but the presence of sepsis; it is not dental defects per se, but chronic septic poisoning; it is not defective mastication, but effective sepsis; it is not accumulation of fermenting food debris between the teeth, but the presence of virulent streptococcal sepsis in open wounds in the gums and sockets, in the teeth and bone, that underlie the ill-health so frequently associated with 'bad mouths.'"

Hunter's emphatic teaching aroused the interest of dentists and physicians, and he thus originated an extensive crusade against oral sepsis. After some years it became evident that the wholesale extraction of teeth was not always followed by amelioration of the conditions believed to be due to dental sepsis. While I do not wish in any way to detract from the honour undoubtedly due to Hunter for his 'pioneer' crusade against oral sepsis, yet the history of William Hunter's researches into the origin and treatment of anaemia should teach us many useful lessons. He believed that many forms of anaemia were primarily due to oral sepsis. He never stated that pernicious anaemia was entirely due to sepsis, but he certainly acted as if it were. Almost every patient that consulted William Hunter for Addison's anaemia was recommended to have wholesale extractions of his teeth, and in some cases with disastrous results. There can, however, be no doubt that almost any chronic disease will be aggravated by oral sepsis, but in such conditions we now know that the greatest care on the part of the dentist and physician must be exercised in extracting septic teeth. In pernicious anaemia, when teeth need to be extracted they should only be removed one or two at a time, and at the most favourable time. Also the liver treatment should be pushed before and after the operation. Similar remarks may be applied to diabetes and phthisis or to any chronic disease.

I have often wondered, if in the future the prevalent idea that dental sepsis is the cause of articular rheumatism, fibrosis, neuritis, and other so-called rheumatic manifestations, will prevail. Many years ago I was greatly impressed by the remarks of the late Mr. Elwood. I had taken him several patients with chronic rheumatism, with a view to getting their teeth extracted. "Yes!" he said, "I will take out any of these teeth that are really bad, but remember that these are rheumatic teeth." I feel that there is a great deal to be said for the view that rheumatism is a general disease, and that teeth extraction, although it often helps nature to subdue or control the rheumatic virus, yet such operations seldom cure the disease. Such reasoning shows us that only teeth which are septic should be removed.

During the height of the crusade against oral sepsis, I remember the following case :—

H. P. doctor, aged 36. *History*—Diphtheria at the age of ten years: Bacillus coli infection at the age of twelve years: Appendicitis when fourteen years of

age, and three slight attacks during the last few years. He had an attack of what was called influenza in March, 1911, and after this illness developed severe polyarthritis—nearly all his joints were involved. He had to give up his practice, and spent two and half years at Harrogate, Droitwich, and Bath, and finally at Heloan. In October, 1913, he returned to England, and was pronounced an incurable case of rheumatoid arthritis by a specialist on this disease. He then consulted a celebrated London physician, who was convinced that his rheumatism was due to his teeth. He was sent to nine dentists before one was found willing to extract his teeth, and he was finally sent to me to give him a vaccine of *streptococcus salivarius* isolated from his teeth. I gave him this vaccine for seven or eight months without any benefit. His case was then re-investigated, and I obtained evidence that he was suffering from an enterococcal infection. He got small doses of this new vaccine and had his appendix removed. He made a gradual but uninterrupted recovery, and served in the war for four years with only occasional twinges of rheumatism.

The dramatic recovery of this patient surprised me greatly, and directed me to study the enterococcus as a cause of rheumatism.

We can all quote cases where the extraction of teeth has benefited some chronic disease of a rheumatic nature, but many of us can also remember cases in which no benefit has resulted. It is undoubtedly wrong to leave teeth which should come out; it is almost as wrong to take out teeth which should be left in. The crux is to decide surely what should be done in a given case.

In cases of difficulty, a consultation between the dentist, X-ray specialist, and physician will often solve the problem. I remember another case that illustrates the value of X-rays:—

The patient was a lady doctor at the Abbey Sanatorium. I was asked by Dr. Rankin to examine her urine, and found it loaded with pus containing staphylococci and streptococci, as if an abscess had burst into the urinary tract. She was admitted to the Royal Victoria Hospital, as I thought a cystoscopy would be necessary, but with rest in bed the cystitis improved. As this patient had been diagnosed by two specialists as a case of apical phthisis, the lungs were photographed, and showed some fibrosis at one apex, but no evidence of active disease. She had no cough or sputum. I asked the patient what she thought was wrong when she consulted the specialists: she said she had a gumboil, and ever since then she could suck pus into her mouth from this tooth. After spending her holiday in Scotland, she found that the discharge from her tooth had ceased, and shortly after this her bladder trouble began. This tooth was photographed, and showed a well-marked apical lesion. The tooth was extracted, and around the apex there was a small abscess which yielded staphylococcus and streptococcus on culture. The bladder trouble was by this time considerably improved, but the urine still contained pus. On the third day after the extraction she had an exacerbation of her bladder trouble, with some rise of temperature, but afterwards made a perfect recovery, and is alive and well to-day.

A case of Dr. Hamilton's (Mrs. M.) presented some points of interest. For three or four years she had suffered from recurring attacks of pain in her limbs, which were gradually getting worse, so that when I was asked to see her she was confined to bed with a temperature. Her temperature when it was taken regularly was intermittent, and resembled a case of malaria or trench-fever: two or three days quite normal, followed by a rise of temperature to 103° or 104° for two or three days. This had gone on for two or three months. She was admitted to Royal Victoria Hospital for investigation. Her blood-culture was done three times, and on the third occasion an enterococcus was isolated. An enterococcus was also isolated from her throat on two occasions, while her serum gave a definite agglutination with a stock Type 1 enterococcus. Her teeth were photographed, and one tooth was found to have a well-marked lesion at the apex. I was anxious to see whether her temperature could be controlled by a vaccine without touching the tooth. This we succeeded in doing after several weeks' treatment. Her tooth was then extracted, and found to have a small abscess at the apex, which when cultured contained numerous cocci resembling enterococci. Nine of these were subcultured and fully tested. They all proved to be enterococci, but all were rough forms of the organism except one, which was a perfect form of the coccus, liquefying gelatine and giving all the reactions of Type 1 enterococcus. The blood of the patient agglutinated this coccus definitely. Her vaccine was continued for several months and she made a complete recovery.

The question of the isolation of the enterococcus from the apex of a tooth or from the root canal seems to me to be a matter of extreme interest. The literature on this subject is not very illuminating, and it would appear that the bacteriologists who have studied this question either cannot recognise the enterococcus or have not taken sufficient trouble to identify the organisms found.

Smith and Ladwick (1919) examined 107 cases of dental abscess in children. They state that—

26 were streptococcus hæmolyticus.
19 were streptococcus pyogenes.
2 were streptococcus viridans.
No mention of enterococcus.

Lucas (1920) examined 181 specimens—
11 were streptococcus viridans.
37 were streptococcus pyogenes.
No mention of enterococcus.

Frazer (1923) examined 120 specimens—
90 per cent. were streptococcus viridans.
No mention of enterococcus.

Weston Brice (1923) in 67 successive cases—
65.5 per cent. streptococcus fæcalis (enterococci).
34.5 per cent. other varieties.

Goldberg (1927) in 200 cases—

144 streptococcus viridans.

23 salivarius.

19 fæcalis (enterococci).

Hadley states that streptococcus (fæcalis) or enterococcus is the commonest infection in dental sepsis.

Dr. Haslett examined a series of teeth, and found that in thirty per cent. enterococci were recovered.

I have isolated enterococci quite frequently from septic teeth—these include a large number of cases with chronic rheumatism, a number of cases of ulcerative colitis, and in several cases of onychia. In some cases the cultures from the root-canal were pure, but in many streptococcus viridans was also found.

The interest of these findings is that the natural habitat of the enterococcus is the bowel, and if the enterococcus is the causal organism in many cases of rheumatism, it is then a secondary infection when it occurs in septic teeth.

Several views are held with reference to the mechanism of the septic focus.

(1) The Theory of Elective Localisation.

Rosenow believes that the patient's tissues or tissue juices afford the conditions favourable for streptococci to acquire and maintain particular elective localising power peculiar to the disease from which the patient is suffering. All bacteriologists recognise that micro-organisms have a certain localising power. In this sense the predilection of the meningococcus for the meninges, of the pneumococcus for the lung or meninges, of the typhoid bacillus or the dysentry bacillus for the gut—these might all be termed examples of elective localisation. It was, however, to describe quite a different series of phenomena that Edward C. Rosenow first coined the phrase.

Haden, a pupil of Rosenow, gives what appears at first a most convincing proof of this theory of elective localisation. He had a patient with onychia who had some septic teeth; the teeth were extracted and the growths were injected into a rabbit, and, wonderful the relate, the rabbit developed onychia in several of its claws.

I have taken the trouble to read Haden's original paper, and in this case he identified the organisms which were injected—they proved to be streptococcus fæcalis or enterococcus. The criticism is that the enterococcus has an elective affinity for the nail-walls, but not in Rosenow's sense.

(2) The Theory of Sensitization of Homer Swift.

This theory was introduced by Swift and others to explain one of the great difficulties of the rheumatic problem, viz., the different varieties of strepococcus found. It was held that sensitising substances were manufactured in the septic focus (tonsils or teeth), and these substances were absorbed into the system and sensitised the joint tissues and nerves to the toxins of the streptococcus. There are various objections to this theory.

(3) The Theory of Symbiosis.

The theory which seems most likely is that a septic focus is one in which the virulence of the streptococci is increased often by symbiosis with other organisms present in the diseased tissues, and the restraining influence of the healthy tissues is broken down so that sub-infection and finally direct infection takes place, and no doubt also toxins are absorbed.

The relation of hæmolytic streptococcus to acute rheumatism is at the present time a very favourite subject, and many seem to think that this organism is the primary cause of acute rheumatic fever: I would rather subscribe to the view that this organism merely acts by activating the virus or true streptococcus of rheumatism.

Weston Price, in his monograph on Dental Infections, Oral and Systematic (1923), says :—

" The type of apical reaction in a person who gives a non-rheumatic history is that of rarefaction around the root of an infected tooth, whereas condensing osteitis is found in the highly susceptible, as shown by a family history of frequent rheumatic lesions. Resistant individuals produce apical granulomata—susceptible people do not. Should a person whose dental radiogram show marked areas of rarefaction around the teeth succumb to a severe rheumatic infection, a condensing osteitis is likely to set up round the rarefied area." He calls this acquired susceptibility, where both types occur together, i.e., where a condensing osteitis is superimposed on rarefaction.

I have mentioned these remarks of Weston Price, as I should like the opinion of the dentists and X-ray experts on the validity of these observations. I myself have come across some cases that seemed to confirm his view, while in others the interpretation of the findings has been obscure.

Quite recently two very important articles have appeared on oral sepsis. One is by O'Kell and Elliott in " The Lancet," in which they show that if blood-cultures be done immediately after teeth extraction, streptococci will generally be found in the blood. The second paper occurs in the " British Dental Journal," and is by Fish and McLean. Its conclusions are of a revolutionary character. It was generally believed by bacteriologists that growths obtained from the apex and root-canal of living teeth with careful technique signified an infection of the tooth. Fish and McLean challenge both the technique and positive findings. Their conclusions are somewhat as follows :—

(1) The apex of a living tooth never shows an inflammatory reaction that is characteristic of infection with streptococci. In the case of dead teeth, where there is a definite infection, such inflammatory reaction is well marked.

(2) They explain this by stating that when the teeth are extracted, streptococci and other organisms are pumped into the pulp by the rocking movement of the forceps. The same mechanism is held to account for the transient bacteræmia observed by O'Kell and Elliott, the organisms being pumped directly into the small blood-vessels.

(3) They assert that by sterilizing the pyorrhoral sockets by cautery before extraction it is possible to extract such teeth without contaminating either the apex or pulp. They state that the apex and pulp of such prepared teeth were always sterile, whereas in controls where the gums were not cauterized they were always infected.

Such work needs further confirmation, but if the contentions of these workers are correct, the implications of this new work on oral sepsis are far-reaching.

I will close my remarks on dental sepsis by quoting from a letter that I received a few weeks ago from a doctor in Donegal:

"Many years ago you came down here at my request to see the then parish priest. He was suffering, as you will remember, from a form of sleeping-sickness. After you had seen him he became partially unconscious for some days, and while in that condition I took the opportunity of clearing his mouth of some twenty foul teeth, most of which I could have removed with my fingers—when he was conscious he would not let me touch them. He has, I am pleased to say, remained in good health ever since, and is now a canon of the Church."

I saw this patient in consultation with the writer of this letter some sixteen years ago. He had been diagnosed as a case of "sleeping-sickness," but the after-history seems to indicate that he was in reality suffering from severe toxæmia from his septic teeth.

(2) DENTAL ASPECTS

By W. Marshall Swan, L.D.S.

The diseases attributed to dental sepsis constitute a formidable list. It is not my intention to enumerate them. I therefore propose to give a few notes on the dental aspect of the subject as it appeals to me.

Take the two focal points of dental sepsis, namely, the apical abscess and paradontal inflammation. How can these cause any harm beyond the local lesion?

It must be evident that a blind apical abscess is a potential source of danger, and that in certain circumstances virulent microbes enter the circulation from this source.

It is easy to conceive that infection from this area may be carried by the blood-stream and, settling on a previously damaged heart-valve, can cause a seemingly remote condition such as infective endocarditis. No doubt the tissues and the blood put up a sound defence, and are usually successful in establishing a natural immunity, otherwise one supposes that the population would be decimated from this cause.

Sometimes the defence is not successful, and the patient may then show symptoms of toxæmia, mild intermittent septicæmia, and other serious disease.

Infection starting at the gum-margin does not operate so directly. The first step is the destruction of the interdental papillæ from a variety of causes, such

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Infection starting at the gum-margin does not operate so directly. The first step is the destruction of the interdental papillæ from a variety of causes, such

as, injury from accumulation of tartar, imperfect fillings, crowns, unfilled cavities, inflammations—for example, untreated Vincent's infection, etc. From whatever cause lost, these interdental papillæ are never renewed in adults, and stagnation areas are thus formed between the necks of teeth, where consequently food debris accumulates and becomes impacted. If this debris is not continually removed, the space becomes larger owing to pressure atrophy, and this is followed by infection of the underlying tissues by pyogenic microbes, which spread to the bone and cause subsequent loosening of the teeth, with enlargement of the neighbouring lymphatic glands. When the infection is virulent it may spread by continuity of the mucous membrane to the respiratory tract, even resulting in bronchitis and pneumonia.

Opinions vary as to the fate of the microbes swallowed. They are usually eliminated, but the opinion is strongly held by some, that swallowed pus and microbes from the mouth do cause toxæmia, and that they are responsible for some gastric disease.

It is also held that in cases of intestinal stasis, secondary foci of stagnation occur in the ileum. Here infective bacteria of a mouth type survive, invade the tissues, and spread so that secondary infections are established in the bowel. In this way dental sepsis, when combined with some alimentary disorders such as temporary absence of hydrochloric acid, ileal stasis, etc., may be the cause of many intestinal lesions, including appendicitis, colitis, and other inflammatory diseases.

On the other hand, it is strongly held that toxæmia engendered by dental sepsis is the deciding point. By lowering the resistance of the tissues to virulent microbes, it is often a contributory factor in the causation of systemic disease and, probably in some cases, the source.

Coming to dental treatment, it should go without saying that any competent dentist will endeavour by all means to render his patients dentally efficient and orally healthy, subject to the limitations imposed on him by the patient's permission, free will, and endurance.

In cases of constitutional disease, it seems to me the dentist is often in some degree on the same footing as a consulting surgeon. The patient is now in a medical category, possibly very ill, and demands special consideration. In these cases the doctor gives the dentist a short history of the case, or at any rate the relevant facts, pointing out the presence of any condition contra-indicating the use of any particular anæsthetic, or any factor demanding care on the part of the dentist. These directions cannot be too explicit, because a dentist may not be expected to possess more than a topical acquaintance with many of the diseases, or combinations of diseases which the doctor is trying to cure.

It occasionally happens that there is some difference of opinion between a medical consultant and the dentist. This is usually about the wholesale clearances of the teeth, and there is usually something to be said on each side. The dentist

is often asked to pass judgment on teeth with slightly receded gums, possibly slightly infected, but still capable of doing good service. This problem presents itself repeatedly in the case of elderly patients of the gouty type, in which natural teeth would be a great comfort in the declining years. It is often a difficult question to decide whether or not teeth should be taken out in such circumstances. There are degrees of infection that might almost be described as normal for people beyond middle age.

Take the case of arthritis in an elderly patient. No focus of infection can be found except the suspected teeth. Here practically all the teeth show hypercementosis or extosis, and sclerosis of the surrounding bone, but no rarefaction. In my opinion this is evidence of a healed lesion, and the teeth should be generally left alone. If, however, the arthritis is getting worse, and one is extracted for bacteriological examination, and the subsequent investigation indicates the removal of more or all of the teeth, then it may be done, for as one high authority—Sir Frank Colyer—puts it : " The patient can have artificial substitutes, but he cannot get movable joints." In these cases extraction is difficult, and healing is delayed, and it is usually wiser to extract teeth only one or two at a time. There are many considerations for the prosthetist in fitting artificial substitutes, but these should never be weighed in the balance against the health of the patient.

Regarding pulpless teeth, medical opinion very naturally looks on them with suspicion, and it must be conceded that this is justified. Some hold the view that it is impossible even to remove a pulp and fill a root so that it will remain sterile. This view is not justified by facts. It should be possible in any healthy individual, but this entails sound technique and that the treatment be carried out in time—that is, before infection has spread from the pulp and permanently damaged the surrounding tissues. Such treated pulpless teeth constantly remain sterile and useful for the greater part of a lifetime, and pass the radiological test.

It is very different with teeth which are treated when a periapical lesion is well established. The difficulty of sterilizing the root-canal is great, and of the surrounding tissues impossible, without the aid of the blood and tissues.

Most dentists now incline to the view that a tooth which has suffered apical periodonditis for, say, one month, is better out, unless there is some very sound reason for saving it. No doubt many such teeth may be rendered comfortable and functional, but the final result is often uncertain and the subsequent radiographic and bacteriological findings are not encouraging.

One may say that, in medical cases in which the symptoms point to focal sepsis, the extraction of all dead teeth, and the extraction of all teeth affected with paradontal disease which cannot be cured in a reasonable time, say three months, gives the best results, whether or not the dental sepsis is the sole cause of illness.

In cases where extractions are necessary for patients who are ill, it is very necessary to consult the patient's doctor, as very unpleasant and dangerous reactions may be produced by suddenly stirring up sepsis. Not a few patients date

their chronic complaints to dental extractions, generally multiple. So far as one's own experience goes, I am strongly of the opinion that in all cases of constitutional disease in people of advanced years, or in any case of lowered health, multiple extractions are not advisable. In such cases it is useful to extract one tooth, note the result, and proceed accordingly.

Regarding anticipated results in medical cases, one must say that patients are generally very much improved by the removal of all obvious focal sepsis. In many cases where the weight is below par, they recover it very quickly and show other signs of improvement. Sometimes it seems to be the main factor in spectacular cures.

Against this there are many cases where the result is disappointing, therefore it is not wise to promise too much from dental treatment. The difficulty must be realised of establishing a causal relationship between the microbes of a dental focus and the disease. This may be too readily assumed by doctor or dentist. It is obvious that it cannot be proved without patient investigation by those possessing a specialised knowledge of blood chemistry and bacteriology along with clinical study and X-rays.

It must be remembered that there are other cavities in the body in addition to the mouth. To quote the words of Sir Kenneth Goadby: "These should be scrutinised carefully, as there is considerable danger at the present time of exaggerating the remote effects of trivial mouth-disease, and thereby overlooking the existence of equally important causes in other regions."

In conclusion, I should say that the great hope for the future lies in early treatment and prevention. Too often the local infection has spread to other regions before it comes under treatment.

Too often the dentist closes the stable door—too often the steed has gone.

(3) RADIOLOGICAL ASPECTS

By R. MAITLAND BEATH, B.A., M.B.(BELF.), M.B., B.S.(LOND.),
Royal Victoria Hospital, Belfast.

WHEN, about two years ago, I had the honour of reading a paper on the "Role of Radiology in Dentistry" before the Northern Ireland Branch of the British Dental Association, I said that I thought it would be a valuable thing for both Societies, if they and the Ulster Medical Association could arrange a joint discussion on dental sepsis—that it would widen the outlook of both parties and clear up misunderstandings.

I am glad my hope has been realised to-night and that I have been given an opportunity of taking part in the discussion.

Our professions have much in common. From the earliest times down to the seventeenth century, dentistry was almost exclusively a preserve of the physician.

After that time the lines gradually diverged. As more was learnt in each, the

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complete mastery of both subjects became increasingly difficult, and cleavage became inevitable.

The dental surgeon tended to narrow his interests to mechanical procedures, while the physician regarded dental trouble as outside his sphere and rather beneath his notice.

Then came the theory of focal infection, drawing together again the interests of the two professions, by recognising that a relationship existed between infections of the teeth and the general health of the body, and tracing down many affections to toxins and bacteria originating in dental foci of infection.

Zeal for the new theory tended at first to over-run moderation, especially on the part of the physician, who seized on it with greater avidity than the dental surgeon. Wholesale extractions were light-heartedly advised, regardless of the certainty of the presence of infection, or the probability of its being, if present, a cause of the general trouble. The teeth were made a whipping-boy for the evils of the whole body, and many unoffending grinders were needlessly sacrificed. The role of the dental surgeon became one of conservation and attempting to curb the misplaced energies of his medical confrère.

Aside altogether from such extremes, there is no doubt that the part played by dental sepsis in general toxæmia is an important one.

The dental surgeon and the physician have been drawn together as colleagues in this fight. Their outlooks have become more in harmony, and both have recognised an ally in radiology, the value of which has become increasingly important as a means of definitely demonstrating the presence of sepsis, localising its site and extent, and, perhaps more important still, showing the early changes that may be forerunners of the later serious infection, and enabling preventive dentistry to deal with such changes in their early stages before the advanced pathological condition has developed.

We are told that about ninety per cent. of infective apical lesions follow a pulp infection. This in its turn is a sequela of untreated or badly treated deep caries. This must have commenced as a slight superficial caries.

Until the public realise that even a very slight caries is a danger signal not to be ignored, and until the physician pays more attention to the condition of the teeth in the young, we shall be faced with cavities developing to the stage where the pulp is infected and the apical lesion occurs, with its train of trouble. In all the stages of this infective progress, from the superficial caries to the apical lesion or cyst, radiology can throw light on the condition, its position, its type, and its extent.

Sir Frank Colyer, in an address which I heard delivered at the First International Congress of Radiology held in London in 1925, made the following statement: "As dental practitioners, we are constantly asked by our medical confrères to express an opinion on the condition of the teeth and to state whether they may be responsible for some other pathological condition present in the

individual. This is not always an easy task, because there are several factors to be considered and their relation, the one to the other, carefully balanced. In the first place, we have to be ever mindful of the fact that because dental sepsis is associated with some other pathological condition, it is not necessarily in the relation of cause and effect. Next, we have to consider the degree of sepsis, and having determined that, we have to form an idea of the resistance of the individual so as to help us to decide whether the sepsis can be held in check by local treatment or whether more radical measures are necessary. In our endeavour to form an opinion, we examine the individual case and try to visualise the actual condition of the bone and soft tissues. Now, we want the radiologist to give us a report on the exact condition of the osseous tissues and so assist us to arrive at more reliable conclusions."

The duty of the radiologist is to describe the pathology as closely as possible, preserving an outlook unbiased by the zeal for extraction or the extreme conservative tendencies of his professional brethren, leaving it to the clinician to decide whether there is a reasonable probability that the pathological condition present is the cause, or a contributory cause of the general trouble.

As has been pointed out, the primary lesion in the progress of infection is in most cases a caries. In many sites caries is easily visible clinically. In others it is not, and in these radiology is of great value.

Caries of the cementum can be shown, also of the approximating surfaces of the teeth difficult to visualise and beneath crowns and fillings. The depth and extent of the lesion can also be seen. In the radiograph of a normal tooth, the enamel shows as a thin homogeneous shadow, outlining the crown of the tooth and tailing off to the cervical margin. Its density is equal throughout, the first sign of an early caries being a localised thinning of the enamel. The rest of the tooth is slightly less dense, representing the dentine and cementum, and within this the pulp chamber is seen, extending down the tooth to end at the apical foramen. The pulp chamber should be clear and well defined, and the fangs should narrow down evenly to a pointed apex.

Surrounding the tooth-shadow is a narrow, clear area—the periodontal space, which represents the non-opaque alveolo-dental periosteum. Outside this is a narrow opaque line of dense bone—the lamina dura of the socket. In normal teeth the periodontal space is of equal width throughout, and the lamina dura shows an unbroken line of equal density. Slight changes in these structures are the earliest signs of dental infection.

Infection of the pulp, in itself, gives no definite radiographic changes. Death of the pulp is obvious where there is a filling of the root or pulp chamber, or calcification in the pulp cavity, it is to be suspected where there is a fracture of the root, or a deep caries, or signs of periodontal infection. (It is estimated that where a caries extends one-quarter of the way through the dentine, that in fifty per cent. of such cases the pulp is infected.)

After the pulp becomes infected, the bacteria pass up the root-canal, through the apical foramen, and involve the periapical tissues. The alveolo-dental periosteum becomes infected, inflammatory, and congested. This is shown in the radiograph by widening of the periodontal space, and thinning of the lamina dura. If the infection continues, it breaks through the lamina dura and involves the periapical bone.

The changes produced in the bone are evidenced in the radiograph, and it is in the diagnosis of these conditions that radiography is so valuable, as many of them have no localising clinical signs or symptoms, while they are a frequent cause of general toxæmia.

The bony change as seen radiographically may be a rarefying osteitis or a sclerosing osteitis. Of the former, there are two main types, a diffuse rarefying osteitis and a localised rarefying osteitis. In the diffuse group, in the radiograph there is a diffuse dark area surrounding the apex of the tooth or teeth. The normal bony trabaculations are lost and the continuity of the lamina dura broken. The affected area shows no sharply defined limits, but fades away into healthy bone. Apices of adjoining teeth are frequently involved, and the apices themselves may be roughened and the tips absorbed. This is usually the acute type, accompanied by swelling and pain, and the hæmolytic streptococcus is the usual causative agent.

In the localised group a similar area of bone destruction is shown, but it has a definite line of demarcation from the healthy bone, and often a sharply defined cortex. Here, also, the continuity of the lamina dura is broken and the apex of the tooth roughened and absorbed, or sometimes bulbous, due to a hyperphasia of the cementum. This is the type frequently described as a granuloma, owing to the granulomatous tissue present.

The conditions here are more chronic. Pus may be formed and discharged through a sinus in the gum. Often there are no clinical symptoms, and as the necrosed area, though walled off, is directly connected with the general blood and lymphatic stream, toxæmia may occur. The infecting organism is usually the streptococcus viridans.

Apical bone-infection may be present with very slight radiographic changes. It is claimed that as many as ten per cent. present no radiographic signs. A slight darkening of the periapical bone with a little loss of trabaculation may be only visible in a radiograph of the highest quality, and may be mistaken for part of a general osteoporosis.

Sclerosing osteitis occurs in low-grade chronic infection, where new bone is formed and an excess of lime-salts deposited in the infected region until the density is greater than that of normal bone. A clear, white structureless area is seen, often difficult to differentiate from a residual tooth fragment.

In addition to these periapical forms of infection, another type of infection occurs—that involving the gum margin and spreading up the periodontal mem-

brane to reach the alveolus. Pyorrhœa alveolaris begins first in the soft tissues of the gum, and while confined to them shows no radiographic changes. It then spreads up the alveolo-dental periosteum, causing a periostitis, shown in the radiograph by widening of the periodontal space, beginning at the alveolar margin and spreading up to the apex. Later the bone becomes involved, shown first by absorption of the bony inter-dental spines, then by gradual destruction of the alveolus, until in the radiograph the teeth seem to have little or no bony support. In such cases radiography shows the extent and localization of the bone-destruction.

We recognise two types—the vertical, where the condition surrounds one tooth and spreads up its socket; and the horizontal, where the process extends horizontally along the alveolus. Coincident with these changes in the investing tissues, changes occur in the teeth themselves.

As we have pointed out, in rarefying osteitis the roots of the teeth may be roughened and absorbed. Two types of this odontolysis of the apex occur—first, where the absorption of the apex is associated with destruction of the periapical bone; and second, where new bone is formed as the apex absorbs, so that we get a truncated apex covered by alveolar bone. On the other hand we may get an enlarged bulbous root which is a hypercementosis due to inflammatory reaction to sepsis.

This brief survey of dental infection shows the variety of its manifestations as seen by the radiologist, and gives some idea of the problems he has to face in interpretation. Having made the interpretation, the question next arises of the responsibility of the condition seen for the general toxæmic trouble. From the type of lesion can we draw any conclusions as to its potential dangers? One is forcibly struck by the fact that the extent and severity of the septic process as seen radiologically seems to bear very little ratio to its dangers. One frequently sees grossly infected mouths in apparently healthy individuals, while a single small, scarcely visible focus is the cause of a profound toxæmia, as is shown by the clearing up of the condition on its removal. Much remains to be learnt about the pathology of all types, but I think as a general rule the pyorrhœic type and the freely discharging abscess type, while they may exercise an evil influence on the alimentary canal, are of less danger as causes of toxæmia, while the so-called granuloma and the cases without much bone destruction are more fruitful causes of trouble. One would naturally expect the sclerosing osteitis group to be less dangerous than the rarefying type, the sclerosis pointing to tissue response to the infection and greater chronicity, but Mr. Warren Crowe, at a meeting in 1927 at the Royal Society of Medicine in London, in a discussion in pitfalls in radiology, stated that in his opinion " It was a pitfall to hold that increased density round the apex was unimportant. Condensed or sclerosed bone in the neighbourhood of the apices of teeth was of far greater significance for systemic disease than rarefaction. He was able to confirm from his own experience this proposition recently put forward by Weston Price."

It is also, however, a pitfall to assume that because a focus of sepsis is demon-

strated it is essential that it is the cause of the systemic disturbance, while personal resistance to the infection must always be considered. Thoma, in the "Boston Medical and Surgical Journal," 1926, says: "Where there is an infection, the röntgen picture will only show very small bone defects, and very often increased density of the bone and enlargement of the apex of the root. We now recognise that pulpless teeth that röntgenographically show but little evidence of bone destruction at the apex, may be serious sources of disease in patients who have a natural or acquired susceptibility to streptococcal infections."

Personally I am not in favour of wholesale extractions of teeth, the danger of which is, to say the least, problematical. At the same time I think we all must acknowledge that a pulpless tooth is a definite pathological entity, and the question to be decided is whether the advantages of extraction outweigh the disadvantages. The dental surgeon is in the worst position to estimate the disadvantages. The patient's dentition, be it natural or artificial, will be a subject of his future care. The physician can best estimate the advantages of a more healthy mouth to the patient's well-being. Such matters as the importance of the tooth in question for mastication or for the retention of a denture, must be borne in mind. On the other hand, the fact that pulpless teeth are carried with impunity by healthy individuals must not hold too much weight. A lowering of the general resistance to infection by some concomitant illness may render the patient susceptible to an infection he could otherwise resist. Many hold that the pulpless tooth is always a risk. Brailsford of Birmingham claims that the risk is so great that the practice of work on dead teeth is indefensible, and that the patient should not be given even the option of having a root filled. He says: "Bacteriological examination has shown that, no matter what medicament is used in the treatment of infected apices, any dressings left in for forty-eight hours are found to be infected, and that even when all care has been used, root-filled teeth may be a source of great danger to the patient."

Mayo of Rochester says: "Although the possessor of a tooth with dead pulp without local reaction may be enabled to eat better for a time, he is conducting his health on borrowed capital, as he may not have a physician or dentist who will appreciate that the disease or broken health that may develop is due to such an apparently trivial cause"; while Inglis says: "At present it looks as though no root-filled tooth can be considered as other than a life risk, while sterile-filled roots can be infected from other sources of infection, of which there are so many."

These are extreme views. Much has to be taken into account—the type of infection and the local and general resistance of the patient.

We have still a lot to learn, and only by the combined efforts of physician, dental surgeon, bacteriologist, and radiologist can we hope to achieve the desired result.

We must see each other's viewpoints, and that is the main value of a discussion such as this.

Recent Views on the Tonsil and Adenoid Problem

By Sloan M. Bolton, M.B., B.CH., D.P.H.

Chairman's Address, British Medical Association, North-East Ulster Division

Before commencing my paper on recent views on the tonsil and adenoid problem, I will take you back to ancient times and very briefly tell you something about the tonsil problem of those days.

In the reign of the Roman Emperor Tiberius there lived a man, Cornelius Calsus, who wrote an encyclopædia, in which, although not himself a medical man, he embodies a treatise on medicine. In his *De Medicina* he writes of "indurated tonsils," that they result from inflammation, and that as they are only covered by a very thin membrane, to remove them it is only necessary to separate them all round with the fingers and lift them out—in other words, enucleate them with the finger. Calsus goes on to say that "if this is not possible, the tonsils should be grasped with a hook and excised with a bistuory." There is a great smack of modernity in this brief monograph on the tonsils by this Ancient.

A writer in the seventh century gives a detailed description of how to stop post-operative hæmorrhage. For slight hæmorrhage he used a tepid decoction of brambles, roses, and myrtle leaves, but for excessive hæmorrhage some special type of earth was plastered on the area. He goes on to say that if on the following day the hæmorrhage has not stopped, the area should be anointed with the flowers of roses, saffron and starch, with milk, or with the white of an egg. If the area looked septic, honey poultices were used. Albucasis, an Arabian surgeon of the eleventh century, was probably the first to recommend the actual cautery as a means for the removal of the tonsils. Needless to say, it was not the electric cautery. Another method for removal tried much later was the application of a ligature round the tonsil, which was gradually tightened until the tonsil sloughed off. The rotting tonsil in the mouth is said to have infected the breath most horribly. A London surgeon wrote a book on surgery in 1768; after describing the crude methods used at that time when operating on tonsils, he winds up with the following: "This operation is not only too severe and cruel, but also too difficult in the performance, to come into the practice of the moderns, because of the obscure situation of the tonsils." When one considers the methods adopted and the fact that there were no anæsthetics then, I certainly agree with him. Much later the old type of guillotine came into use. Some of you will have seen it used and may have operated with it yourselves. Then came the modern guillotine, which was a great improvement, but it was not until Sluder invented the reverse guillotine technique that the tonsil could be enucleated with any degree of certainty.

And now to modern views on the tonsil problem. First—A very brief account of the anatomy and morphology. How does the tonsil originate?

The tonsil originates from a pouch in the neck called the second pharyngeal pouch. At first there is only the pouch, but later the entoderm lining of the pouch grows into the form of little buds, which become hollowed out and form what we know as the crypts of the tonsils. Lymphoid cells accumulate round the crypts and form lymph follicles, and so the tonsil becomes a mass of lymphoid tissue, and not a lymph-gland covered with a capsule, as is usually described.

I have shown the tonsil to be a mass of lymphoid tissue which develops in a pocket. This pocket formation can be traced back in comparative anatomy. The rabbit has a simple pouch with no tonsil in the cavity, the sheep has two cavities, while the dog, like humans, has tonsils projecting from the cavity. You may ask how can we prove the tonsils are developed from this cavity. The course of a congenital fistula of the neck is proof of this. People are occasionally born with this fistula opening in the side of the neck, and the opening can be traced right up to what is called the supra-tonsillar fossa, a fossa which represents the original cavity in which the tonsil developed. This congenital fistula roughly corresponds to what would be a gill in a fish.

The tonsil itself consists of two lobes, an upper and lower. These lobes fuse together, and at this spot are inserted the muscle-fibres of palatopharyngeus muscle. Where these fibres are inserted is generally the most difficult part of the tonsil to free during operation. Round the tonsil is the capsule, continuous with the capsule is a fold of mucous membrane, the upper part of this is called the plica semilunaris—in other words, the half-moon fold, and the lower part is called the plica triangularis, or triangular fold.

In the tonsil there are between twelve and twenty crypts—some of them penetrate as deep as the capsule; these crypts are lined with stratified epithelium, and as they are scantily supplied with mucous glands, anything entering them is not readily washed away by mucus, and the crypts are therefore easily filled with all sorts of bacteria and food particles, and may become an excellent medium for breeding of micro-organism. Normally the crypts empty themselves during the act of swallowing by the action of the pharyngeal muscle, which tightens on the tonsil and so expels matter from the crypts. All of you will have noticed this expulsion of matter at times when you put a tongue depressor far back in the mouth and make the patient wretch—the muscle tightens, shoots the tonsil out a bit, and expels matter from the crypts. The upper crypts, including the supra-tonsillar fossa, slope upwards, and are therefore at a disadvantage for draining. The lower are better placed for this. The half-moon and triangular folds of membrane I have already mentioned partly cover the crypts and may interfere with drainage; infection which causes congestion will have the same effect. The result is stagnation with accumulation of solid particles, giving rise to the fœtid cheese-like material in the crypts you are all familiar with. In chronic tonsillitis the crypts are shut off by scars caused by repeated infection, a blind abscess may thus form not unlike an apical tooth abscess.

I do not intend to take up your time describing the tonsil capsule or the pillars. It is very important, of course, that the pillars should be conserved absolutely intact during operation, as they play an important part in voice production and resonance.

Blood Supply.—Five arteries supply the tonsil, all derived from the external carotid. From the surgeon's point of view, the most important is called the tonsillar artery : it enters the lower lobe. They all break into small twigs as soon as they reach the inner aspect of the capsule. I suppose you have often wondered why bleeding, as a rule, stops so quickly after a tonsil operation. It is generally believed that spontaneous cessation of hæmorrhage during tonsillectomy is due to contraction of the pharyngeal muscle which forms the tonsil bed. It tightens in on the blood-vessels. It is doubtful if this alone accounts for it. It was pointed out recently that the tonsillar arteries possessed very powerful linings, just like the umbilical artery, and for this reason had phenomenal power of contraction, and that to a large extent is responsible for the stopping of hæmorrhage. But it is probably more often from the para-tonsillar vein that troublesome bleeding takes place.

Next, the Lymphatic Drainage.—It has been proved that the tonsil has no afferent lymphatic route. The fact that secondary deposits of carcinoma of the adjacent parts have not been found in the tonsils is one of the proofs, also it has been shown that pigment injected into the mucous linings of the nostrils reached the tonsils, not by the lymphatic route, but by way of the venous channel. The efferent vessels go to two sets of glands, one anterior and the other posterior to the sterno-mastoid. Both anterior and posterior send vessels to an inferior group, then via the thoracic glands to the thoracic duct, and then straight into the general circulation. By this route infection is carried to all parts of the body. Tuberculosis infection of the apices of the lung may take place via the tonsil.

Nerve Supply.—I shall pass over the nerve supply, except to mention that the lingual and glosso-pharyngeal are both liable to injury during tonsillectomy, especially if the technique is faulty.

Physiology.—I will briefly give you the most recent views on the functions of the tonsil. It is now thought that until it becomes diseased it may be of some use. It is thought that the tonsil probably is a filtering structure; within its tissue and its crypts bacteria are not only destroyed, but a vaccine is also prepared. It may be regarded as a culture-tube for preparing a vaccine; this vaccine deals first with the invading bacteria, and is then discharged through the efferent lymphatic vessels of the tonsils into the general circulation.

That is all right for the healthy tonsil, but if, however, more bacteria are absorbed than the tonsillar laboratory can deal with, then the vaccine-preparing property of tonsil breaks down and germs are discharged straight into the system together with their toxins, so you see that in the diseased tonsil bacteria have direct access to the circulation and may thus become a possible portal of systemic infection.

The question of whether the tonsil is an endocrine organ has long been debated. Peller of Vienna states he can now prove it is definitely so, and attempts to do so by statistics. He examined several thousand children of from fourteen to sixteen years of age. From this material he made the following observations :—

1. Tonsillectomized young people are on the average larger and heavier than those with enlarged tonsils.

2. Bust measurement in girls is about 2 cm. greater in tonsillectomized cases than in subjects with hypertrophied tonsils.

3. That there are nearly twice as many tonsillectomized persons among blondes as among dark-haired subjects.

4. Those who have been tonsillectomized menstruate about a year earlier than those with hypertrophied tonsils. Peller concludes that tonsils may be regarded as inhibitory to growth, and that inhibitory impulses are much greater from hypertrophied tonsils. It is generally thought while these statistics are interesting they are hardly convincing.

Bacteriology of the Tonsil.—Cultures made from the throat within twelve hours after birth are almost always sterile. Organisms begin to appear soon after nursing commences. The hæmolytic streptococcus is never found in the healthy throat of infants, staphylococcus non-hæmolytic being found. The consensus of opinion is that the hæmolytic streptococcus is found in about sixty to eighty per cent. of normal adult throats, the carrier himself being immune to it under normal conditions. One can look upon the essential cause of tonsillitis either as an increase in virulence of the cocci already present, or a decrease in resistance of the patient. In chronic diseased tonsils the hæmolytic streptococcus will be found in about ninety per cent. of cases. In acute tonsillitis and quinsies, hæmolytic streptococci are the predominating organism, and are found in the crypts in almost pure culture. In fact, it is generally accepted that a tonsil culture lacking hæmolytic streptococcal colonies would be strong evidence against a diagnosis of acute follicular tonsillitis, and in favour of some other infection such as diphtheria or Vincent's angina.

A focus of infection may be present in a tonsil for many years without causing any visible disturbance, until suddenly symptoms of a systemic disease develop. The consensus of opinion is that tonsillectomy definitely clears the throat of offending microbes causing systemic infection, but that tonsillectomized patients may get acute throat affections due to hæmolytic streptococci : these organisms, however, rapidly disappear after the inflammation has subsided.

Tubercule Bacillus and the Tonsil.—The occurrence of tubercle in the tonsil has variously been given as being between 1.6 to 5 per cent., but it is in all probability less than that. Some authorities say it will be found in about forty per cent. of cases suffering from phthisis. The infection reaches the tonsils either by the blood or via the septum. Primary tuberculosis of the tonsils is rare. There is a definite

relationship between tuberculosis of tonsils and cervical adenitis, whether the tonsil be the primary or secondary seat of infection. It is claimed that in fifty per cent. of cases of cervical adenitis a prompt recovery takes place after tonsillectomy. The relationship between tonsils and pulmonary tuberculosis is not close enough to advocate the removal of tonsils in this condition.

What constitutes a diseased tonsil and what are the means of ascertaining it?

(1) *Size.*—It is now universally admitted it is not the size of the tonsil that matters, but its septicity, and this may prove to be of a high degree in a small tonsil. At times a highly infected tonsil may be almost invisible. Of course, in the large majority of cases the enlarged tonsil is septic, but even in the odd case where it is not septic, if it is so large as to interfere with breathing, operation is indicated.

(2) *Redness.*—Redness of the tonsil and anterior pillar is a more reliable sign than the size. A narrow, sharply limited, and very dark red zone on the anterior pillar is typical of a predominatingly streptococcal infection in the tonsil, while a zone not so red, broader and fading off gradually, is diagnostic of an infection in which streptococci do not predominate, the predominating organisms often being staphylococci. In this latter type one does not expect to find a history of arthritis, neuritis, and the like.

(3) *Pus.*—But to arrive at a certain diagnosis, the demonstration of pus is essential. It often requires very careful examination to demonstrate pus. To begin with, the semilunar and triangular folds I mentioned may be covering the tonsil like a curtain, and therefore hiding the tonsil proper from view; also the infection may be deeply seated.

To get a good view and in order to show a deep-seated infection, two tongue depressors may be used, one to depress the tongue and the other to retract the anterior pillar. Gentle pressure is then put on the tonsil with the latter, and the crypts will open and their contents squeeze out—these may be either plugs or liquid pus.

There are different kinds of plugs—the dry, crumbling plugs, which on light pressure shoot from the tonsils and often contain chalky concretions, are not considered of much pathological signficance; but the semi-solid plugs, offensive to the smell and yellowish in appearance, often contain a great deal of pus. The yellowish discharge which escapes from the infected tonsil in a constant stream is generally pure pus. In our zeal to demonstrate pus we must not exercise too much pressure on the tonsil, because this may produce a thin lymphatic discharge from the supra-tonsillar fossa, due to tissue-lymph and lymphocytes escaping through the torn thin lining of the crypts. The bacteriologist is often a great help in these cases, but the demonstration of pus by whatever method lets us know we are dealing with a diseased tonsil.

Pus may not be demonstrated by all the means at our disposal, and yet the tonsil be severely infected and be a focus of systemic disease, the infection being deep-seated in the crypts and shut off by scars and adhesions, thus escaping clinical observation—this is confirmed by sections made from apparently healthy tonsils, after tonsillectomy, which often show blind abscesses in the parenchyma. The local examination of the tonsil obviously does not always permit us to arrive at a certain diagnosis. It is most important that the previous history of the patient along with his general condition be taken into consideration. If general examination points to frequent tonsillitis and quinsies, and yet the tonsil looks healthy, or if it points to a systemic disease such as rheumatism, neuritis, etc., and other more obvious foci such as teeth infection are not discovered, one would be fully justified on looking upon the tonsils as the probable source of the trouble, no matter what the local examination of it might have revealed. Tonsillectomy is the only logical step, the more so, as it is generally agreed that the harm done, if any, in removing a healthy tonsil is so infinitesimally small as compared with the danger of keeping a structure which is harbouring bacteria and producing pus.

A note of warning—In practically every case, before tonsillectomy is decided upon it is necessary to exclude sinus disease, as this may be at the root of the trouble and be responsible for the infected tonsils.

General Indications for Tonsillectomy.

(1) Large tonsils which are definitely not infected should not be removed unless causing interference with breathing or swallowing. If not very marked, delay if possible until the age of four.

(2) Tonsils shown to be infected, either by direct demonstration of pus or by inference (after the exclusion of nasal sinus disease), should be removed regardless of the patient's age.

A colossal literature has accumulated to show that the infected tonsil is a focus which gives rise to :—

First—*Local Infection,* such as tonsillitis, quinsies, retropharyngeal abscesses, middle-ear disease, etc.

Second—*Systemic Diseases,* of which about forty or fifty are known :—

(1) Rheumatic and arthritic diseases.

(2) Glandular diseases—cervical adenitis, toxic goitre.

(3) Infectious diseases—scarlet fever, diphtheria.

(4) Alimentary diseases—dyspepsia associated with toxæmia, duodenal and gastric ulcer.

(5) Respiratory diseases—bronchitis, tuberculosis.

(6) Heart and kidney disease.

(7) Chorea.

(8) Iritis and associated diseases of the eye.

(9) Skin diseases—urticaria and herpes.

(10) Diseases due to allergy—asthma, hay-fever, etc.

End-Results of Tonsillectomy.

Often it is difficult to access the merits of tonsillectomy clinically, as the full benefits of the operation cannot always be determined at once, nor is it possible to say with certainty what would have happened had the operation not been performed. Many investigators have produced statistics. In each case about two to three thousand children who had their tonsils removed were compared with a similar number of unoperated children of like age and similar pre-operative symptoms, who had been recommended for operation but for various reasons had not had the operation. The children belonging to both groups were examined after an interval of three to ten years respectively. The general summing-up of the end-result of the tonsil and adenoid operation was as follows :—

(1) Effect on general health : nearly always good.

(2) Effect on general condition of throat, nose, and chest : good.

(3) Effect on hearing : good.

(4) Effect on aural discharge : usually good, but often negative, if it is chronic.

(5) Effect on mouth-breathing : nearly always good.

(6) Effect on cervical glands : nearly always good.

(7) Effect on nasal discharge : often good, but fails in many cases to give immediate improvement.

(8) Liability to infectious disease : rather less liable to those where tonsillitis is usually found.

(9) Liability to acute ear infection : incidence much lessened.

All investigators agreed that incomplete tonsillectomy did not offer the same protection as complete removal of tonsils. It may actually leave the patient in a worse condition than before, because the part left behind scarifies, and if there is any infection present in the tonsillar crypts, these are promptly sealed up, and drainage which may have existed before the operation is now interferred with.

Contra-Indications for the Removal of Tonsils.

Operation should not be performed in the following conditions :—

(1) Hæmophilia, for obvious reasons.

(2) Blood diseases such as Hodgkin's disease and pernicious anæmia, because they predispose to bleeding.

(3) The lymphatic state, because of the enlarged thymus which is usually present and consequent danger.

(4) Arterio-sclerosis, as it predisposes to bleeding.

(5) Abnormal enlargement of blood-vessels, as evidenced by a pulsating swelling in the neighbourhood of the tonsil.

Then in the following cases operation is only to be performed after the conditions stated have subsided :—

(1) Acute local and general infectious diseases, e.g., acute colds, tonsillitis, acute otitis media, acute bronchitis, acute nephritis, etc.

(2) Menstruation and pregnancy.

Whether quinsies should be included in the list is now controversial.

I do not intend to take up your time describing the various methods of operating. The old controversy always arises—whether guillotine or dissect. Each method has points in its favour, and the person who claims that either one is the only method to adopt is obviously unable to perform the operation by the other method. Operation by guillotine is a ' nacky ' operation, and many brilliant aural surgeons have never been able to master it. But even the very best guillotine operator will find occasions when it is necessary to use the dissection method to be certain of success.

Again I should like to impress the necessity of having the teeth attended to before operation, the removal of any loose ones, and also to make certain there is no sinus trouble.

PHARYNGEAL TONSIL.

The pharyngeal tonsil is situated in the naso-pharyngeal space, and any abnormal development of it produces what we call adenoids. Adenoids were discovered about 1870, although Hippocrates very nearly detected them, remarking that when people walked about with their mouths open and with running ears and a hard palate like the inside of a saddle, they frequently had some growth at the back of the nose.

The function of the pharyngeal tonsil is similar and accessory to the function of the palatine tonsil. When the pharyngeal tonsil is unable to overcome general and local infection, it becomes enlarged, thus the lymph-tissue is replaced by fibrosis, producing adenoids. It is then a breeding-ground for bacteria and thus a focus of infection. Heredity and malnutrition play a part in the production of adenoids. Adenoids may accompany enlargement of the faucial tonsils, but are often present without undue enlargement of these tonsils. Adenoids alone can either by their bulk or because they are infected produce many symptoms. On account of their bulk they may be responsible for nasal obstruction, deafness, retarded mental development, malocclusion of teeth, etc.; in short, the typcial long-shaped, stupid-looking face with protruding upper teeth, with which we are so familiar.

Infected adenoids can cause cervical adenitis in the posterior triangle, nasal discharge, colds, croup, bronchitis, asthma, otitis media, and systemic infection.

How to examine for adenoids.—Adenoids can be seen with a post-nasal mirror, but if you are not experienced with it, it is better to put the finger into the post-nasal space and feel if there are any there, care being taken to have something between the teeth to prevent the child biting the finger. But the diagnosis can often be made by inference; signs such as glands in the post-triangle of the neck, retracted drum in the ear, mucous plug from the naso-pharynx when the patient is made to gag—all these point to adenoid affection.

Clinical symptoms, after excluding nasal obstructions, such as nasal speech, mouth-breathing, snoring, etc., also point to adenoids.

Adenoids should be removed, no matter how young the patient is. Some children are born with a pad of adenoid tissue which interferes with the baby's breathing and produces discharge from the nose. The modern tendency is to discard the view held formerly, that when the adenoids are removed the tonsils should in all cases be removed at the same time, ostensibly to obviate a second operation. Admittedly the two as a rule go together, but if there is no evidence of the tonsils being infected or grossly enlarged it is better to remove adenoids only, especially if the child is under four years old. The presence of an enlarged tonsillar gland in the anterior triangle is a definite indication that the tonsil is also infected.

I do not intend to say anything about the operation, except to stress how important it is to achieve a clean result and also not to injure the opening to the eustachian tubes and probably set up otitis media, or through the scarring produce deafness. Nasal speech and regurgitation of food through the nose occasionally follows this operation. This is due to the extra room in the pharynx, produced by the removal of the adenoids. Often in those cases a bifid uvula is present, which is the first stage of cleft palate. It may take several months before the voice looses the nasal twang. In the old days this operation was attempted by the finger-nails, and an artificial finger-nail was actually used.

Do Adenoids Recur?

There is no unanimity on this question. Some definitely say they do, others deny it emphatically. It would be safe to assume that even after a complete operation a small portion of patients show a recurrence. It is generally admitted that breathing exercises, by causing a proper aeration of the posterior nasal-space, help materially to diminish the percentage of adenoid recurrences.

Radiology: Its Background and Its Future

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THE year 1935 marked the centenary of the birth of Wilhelm Conrad Röntgen, and it was only forty years ago that his "Preliminary Communication," published in the "Annals of the Medical Society of Wurzburg," stirred the scientific world.

In the light of the age-long histories of medicine and surgery, forty years is a short lifetime, but in those forty years strides have been made by this youthful subject which have brought it to the forefront of medical progress.

Youth is a period of rapid development, but it is also a period of instability, and it would be not unfair to lay the blame for some of the extravagant and unsubstantiated claims made in the name of radiology, in the past and even in the present, at the door of the exuberance of youth and the absence of the mature and more deliberative faculties which age and experience bring.

The announcement of Röntgen's discovery was epoch-making, but like most great discoveries, it was the outcome of years of laborious work, both by the discoverer himself and by his co-workers and predecessors in all countries during the preceding three centuries.

Nowhere is it more true than in Science that "one soweth and another reapeth," and a man of such integrity and simple modesty as Röntgen would have been the first to acknowledge his debt to the great minds of the past.

A study of his life, revealing his human kindliness, his devotion to his science, his open-mindedness to the reception of new ideas, his readiness to help his friends, and the complete absence of self-conceit in his life, tempt one to divert this address to an appreciation of the man himself, but this must be resisted,

Having devoted all his life to research in general physics and especially in heat, this Professor of Physics in the University of Wurzburg decided in October, 1895, to make some experiments with cathode rays, following up the brilliant work of Crooks, Hertz, Lenard, and others.

Following Lenard's suggestion, he was experimenting with a vacuum tube covered with black paper, observing the fluorescence of the rays, passing through a window in the tube, on a screen.

On the night of 8th November, 1895, working, to quote his own words, "at a late hour when assistants were no longer to be found in the laboratory," he noticed some brightly fluorescent crystals on a table at some distance from the tube. His trained mind grasped at once the significance of this apparently unimportant fact.

Knowing that the then familiar cathode rays did not possess this power of penetration, he told a friend: "I have discovered something interesting, but I do not know whether or not my observations are correct." Except for this remark he spoke to no one about his discovery.

For eight weeks he laboured on, for the first few days eating and sleeping in his laboratory to avoid the distraction of daily trivialities, and it was not till the end of December that he published his famous "Preliminary Communication."

Describing in detail the phenomenon he had observed, he deduced from it the presence of a new form of ray, which he christened the X, or unknown ray, the properties of which, especially its penetrative powers, he explained meticulously. Within a very short time, this famous paper was translated into many languages and disseminated throughout the scientific world.

Rarely indeed has information about a new scientific discovery spread so rapidly or aroused so much the interest of the general public. Scientific circles were stirred, and when reports were published in the lay press, the public imagination was captivated. Some scoffed and laughed it off as a joke, but those who knew Röntgen and his accurate and reliable methods of work, were constrained to accept the authenticity of the pictures produced, especially when very soon other observers using similar methods were able to obtain similar results.

Of all the first experimental pictures produced, those of the human hand made the most impression, for in them was at once demonstrated the importance of the new rays to medicine, in showing anatomical conditions in the living subject. Incidentally, one of the first, if not *the* first, radiographs made was of his wife's hand.

Thus, unlike most laboratory discoveries, the practical possibilities were at once apparent, and the X-rays became a factor in practical medicine and not a theoretical laboratory curiosity.

The physics laboratories of the world for a brief spell became clinical departments. They possessed the only available apparatus, and to them patients were first brought to test the diagnostic value of this new and wonderful ray.

The first X-ray picture made in England was of a human hand, in January, 1896, by A. A. C. Swinton and J. C. M. Stanton, demonstrated by them to the Physical Society and to the London Camera Club. The first journal in the world devoted solely to this work was "The Archives of Clinical Skiagraphy," published in London in April, 1896, and this country has also the honour of forming the first Society, "The Röntgen Society," which was founded in 1897 and still exists, incorporated with the British Institute of Radiology.

While the scientific mind continued to investigate, ever finding new wonders in the new discovery, the more fickle popular mind became bored with only being shown pictures of a hand or metal weights in a box. Their optimism as regards the possibilities had gone beyond reason, and their attitude was reflected by the reply of a customer who had applied to an English photographer for samples of X-ray pictures, and had received an example of a needle embedded in the foot

—" Photographs received. Very tame. Send more sensational ones such as interior of the belly, backbones, brains, liver, kidneys, etc."

The popular press looked on radiography as a revolution in photography, and doubted the popular appeal of a portrait showing only the bones and rings on the fingers. They also stressed the dangers to privacy from the power of a ray able to penetrate solid material.

The " Pall Mall Gazette " in March, 1896, remarked: " We are sick of the Röntgen rays. It is now said, we hope untruly, that Mr. Edison has discovered a substance—tungstate of calcium is its repulsive name—which is potential, whatever that means, to the said rays. The consequence of which appears to be that you can see through other people's bones, with the naked eye, and also see through eight inches of solid wood. On the revolting indecency of this there is no need to dwell. But what we seriously put before the attention of the Government is, that the moment tungstate of calcium comes into anything like general use, it will call for legislative restriction of the severest kind."

Popular imagination clung to this idea that X-rays were a new system of photography, whereby pictures could be obtained of anything hidden. The humorous papers suggested protective suits of armour for the men and steel-plated crinolines for the ladies, to combat their illicit use. A London firm advertised a sale of " X-ray-proof Underclothing," while a bill was actually introduced by a Congressman at Tranton, New York State, prohibiting the use of X-rays in opera glasses in theatres.

The humorous press, headed in this country by " Punch," poked fun at the results, as, for example, the following lines from a poem in " Punch," 25th January, 1896—

We only crave to contemplate
  Each other's usual full-dress photo,
Your worse than " altogether " state
  Of portraiture we bar in toto.

The fondest swain would scarcely prize
  A picture of his lady's framework.
To gaze on this with yearning eyes
  Would probably be voted tame work!

Again " Life " in March, 1896, published—

" Lines on an X-Ray Portrait of a Lady."

She is so tall, so slender, and her bones—
  Those frail phosphates, those carbonates of lime—
  Are well produced by cathode-rays sublime.
By oscillations, amperes, and by ohms
  Her dorsal vertebrae are not concealed
  By epidermis, but are well revealed.

Around her ribs, those beauteous twenty-four,
Her flesh a halo makes, misty in line,
Her noseless, eyeless face looks into mine,
And I but whisper, Sweetheart, *je t'adore,*
Her white and gleaming teeth at me do laugh,
Ah! lovely, cruel, sweet cathodograph."

Many scientists, however, while expressing interest in the discovery, pessimistically thought it of little practical value, and a wave of doubt, stimulated by the failure of the early extravagant claims, and by the exposure of some quackery, threatened to spread.

Despite all obstacles of doubt and ignorance, radiology advanced steadily, and soon its position as an agent in diagnosis became established. Röntgen laboratories were opened in all large centres. The commercial side of the subject came into prominence. The "British Journal of Photography" in July, 1896, published an article entitled "Röntgen Work for Profit." In this, it was pointed out that few people would be willing to pay for a portrait of a portion of their body for purely personal or scientific interest, but that the future source of profit would be in work for medical or surgical diagnosis. The writer suggested that the expense involved in the original cost of apparatus, and wear and tear, must be considered, and also the probability of "sitters." The initial outlay was estimated at the vast sum of sixteen pounds. Would it could be met for this price now!

Except for a private demonstration to Kaiser Wilhelm II at Berlin, Röntgen did not speak on his discovery after his original communication till 23rd January, 1896. On that date he lectured at the Wurzburg Physical Medical Society. The widespread publicity accorded to his original statement drew eminent scientists from all over the world, and a packed meeting filled every corner of the lecture-room when the lecturer appeared. Modestly and without self-advertisement or extravagant claims, he submitted his work and its results. At the conclusion, the anatomist of the University, Von Köllicker, whose hand Röntgen photographed in the course of his lecture, proclaimed the discovery as of the utmost significance in the natural sciences, and perhaps also in medicine, and amid loud applause proposed that the rays henceforth be known as "Röntgen's Rays." This was probably the only lecture given by Röntgen on his work to a large audience, but fortunately for twenty-seven years he was able to follow the triumphal progress of the results of his discovery.

He declined all honours except the first Nobel Prize in Physics. On receiving congratulations from his colleagues on this award, he said the prize was not of real importance, for "the greatest and most beautiful joy the scientist can experience, no matter what problems he may be studying, is unprejudiced research, and compared to the inner satisfaction over a problem successfully solved, any outside recognition becomes meaningless."

In 1900 he accepted the Chair of Physics at Munich, and refusing all further offers of preferment, remained there till his retirement in 1920. He continued to work in the Institute of Physics there, where his original laboratory was reserved for him, till his death in 1923 at the age of 78.

Such was the man to whom we owe this discovery, whose simplicity, self-effacement, and devotion to his work for its own sake, made him a worthy model for those who follow along the trail which he blazed.

The results of medical radiology in the early days were wonderful, considering the facilities at the disposal of the workers.

As has already been stated, the earliest work was done in the physical laboratories. Soon the importance to medical subjects drew medical men to its study, and it is to the patient experimentation and the enthusiasm of these pioneers that medical radiology owes its position to-day. By the nature of things, they were all men who had previously been engaged in clinical work, and the clinical experience thus obtained was a great factor in the understanding development of the new method. Only men of a truly scientific bent, with sound knowledge of physics, coupled with ingenuity and mechanical skill, could cope with the difficulties inherent to the primitive apparatus. Their results, even when viewed in the modern light of foolproof apparatus and routine procedure, were astounding.

There was no encouragement then to the dabbler or the quack, and the martyrdom of so many of these early workers, who fell victim to the then unknown baneful effects of radiation, deterred all but the enthusiasts.

No paper dealing with the early days of radiology would be complete without a tribute to the memory of those pioneers, who in many cases tortured with burns, crippled by loss of limbs, shattered in health, continued in the field, and by their labours raised radiology to an ever greater sphere of usefulness.

Nature is not generous. Those who strive to probe her mysteries must pay tribute. These pioneers paid the cost, and paid it generously and freely. Probably in no branch of medical science, not even in tropical research, have the early workers suffered so severely. Not only we, their immediate following, but the whole medical fraternity, and the sufferers of all time, owe them a debt which honouring memory should strive to repay.

Year after year, by the solid work of these men and their successors, the increasing usefulness of X-rays in diagnosis and in therapeusis became more obvious, until the war years showed the radiograph to be essential in the treatment of gun-shot wounds and established it as a necessity in every hospital.

Encouraged by the work of the physicists, the instrument-makers devoted themselves more seriously to the production of more efficient and powerful apparatus, which at the same time was more easily handled. The chemists in association with the photographic experts produced more satisfactory photographic material. Step followed step in this combined advance, until the stage was reached when

it was evident that the production of the radiograph was comparatively easy and that the real skill lay in the interpretation.

Faulty interpretations incurred the distrust of the clinician in radiographic diagnosis. Appearances that seemed to bear a definite interpretation were found later to indicate something quite different. Abnormalities of ossification were mistaken for pathological lesions, and it soon became evident that the man taking up this work would require special and individual training.

As a result the leading British radiologists in 1919 decided that a special diploma in radiology was needed, and they secured the services of the University of Cambridge in establishing the D.M.R.E., which has been followed later by diplomas in Liverpool, Edinburgh, and London Universities, and the English Conjoint Board. One of these diplomas is now considered an essential qualification for anyone seeking an appointment in a large hospital.

Two years ago it was felt that a higher qualification was needed for those holding more important posts, and the British Association of Radiology was founded, which hopes in time to form a College and establish a Fellowship on the lines of the recently established British College of Obstetricians and Gynæcologists.

With the increasing efficiency and power of apparatus and the development of the use of contrast media for delineating hollow viscera and cavities, all parts of the body and their abnormalities have gradually come within its scope.

It has given valuable help in the elucidation of problems in all branches of medicine. But we must never forget that it is supplementary to the clinical examination, and can never displace it from its position of premier importance.

A tendency has grown up, largely based on the good work of the earlier workers, prevalent among the lay public and also to some extent in the profession, to look on the X-ray examination as the final court of appeal, and to throw full responsibility on the radiologist for the diagnosis. This may be complimentary to radiology, but it is a wrong conception. While granting that the radiological examination is an important link in the diagnostic chain, we must never forget that it is only a link. Radiology shows only one side of the picture. It deals with shadows and shadow-defects as evidence of pathological changes. What it shows is definite and must be true. The interpretation of the causes underlying its showings is the real test, and for success, co-operation and consultation between the clinician and the radiologist are essential.

Dr. Twining of Manchester, in a paper on diseases of the chest, said:— "X-ray signs in diseases of the lungs are sometimes pathognomonic, more often merely helpful, and sometimes totally anomalous." This applies to all radiographic work.

Co-operation is the key to progress. The radiologist cannot alone by an X-ray examination, as by turning a handle, produce ready-made diagnosis. Such co-operation is not always easy to obtain, especially in a busy hospital, where radiographic work often savours of mass production. Nevertheless it is the ideal to

be aimed it. Any details the clinician can supply from his knowledge of the case, are always welcome.

Such hasty applications for examination as " Abdominal pain, X-ray please," not only are valueless, as giving no indication as to what is expected clinically, and no guidance to the radiologist as to special features to which to pay attention, but they create an impression (probably a false one) that the clinical examination has been equally scanty.

In one way alone can full use be made of X-ray examination. That is by the clinician and radiologist comparing notes on their respective investigations. Each will have observed certain facts. These are definite facts, and must be true. Each will have made deductions therefrom. These must be correlated and co-ordinated, and if necessary corrected, to fit in with the facts. The radiologist must prepare himself to be a valuable partner in this collaboration. He should approach his work as a clinician, employing certain mechanical aids and working on certain lines. His subject is a clinical one. It requires a knowledge of anatomy, physiology, and clinical medicine. If he lacks this knowledge, he becomes a glorified photographer—a mere machine for producing radiographs, and no matter how perfect these may be, they are of little value without the interpretative skill which is based on sound knowledge and clinical sense.

Some one has said : " The radiograph is the radiologist's physical examination." By means of it, he sees an abnormality and gives an opinion on it, that opinion being based on clinical ability and past experience.

As has already been pointed out, the pioneers possessed this clinical experience. In this age of earlier and more intensive specialisation, there is a danger of this faculty being less well developed, but the radiologist of to-day must strive to fit himself adequately for his work, and become worthy of being regarded by his colleagues as a clinician and a consultant. The help he can give as a diagnostician will depend in some measure on his technical skill, but to a far greater extent on the clinical acumen and experience which he can bring to bear on the problem at issue. It may be argued that if the clinical side of radiology is so important, the ideal method would be for specialists in any line of work to do their own radiology. Apart from its limited use as a check on their clinical findings, I do not believe this is a sound proposition. The busy clinician will not have the time, nor probably the inclination, to gain a sound grounding in radiological work, sufficient to put him in a position to take full advantage of the possibilities it affords. Further, the patient is deprived of the benefit of a second opinion, and this is an important factor. While it is often difficult for the radiologist to approach a problem without a preconceived opinion, that most dangerous pitfall in diagnostic work, it would be much more difficult for the clinician, in the light of his previous investigations, to approach the radiological examination with an unbiassed mind, and radiological examinations lend themselves to the fallacy of seeing what you want or expect to see.

It is worthy of note that in America, that home of intensive specialisation, the consulting radiologist still retains his place.

Thanks to the painstaking research work of the physicists and the constant striving after improvements in apparatus by the manufacturers, the old difficulties which beset the early workers have gradually faded away. The unstable and untrustworthy pieces of apparatus have been replaced by equipment of precision and accuracy requiring far less attention from the operator, enabling him to concentrate more fully on the diagnostic aspect. Apparatus and photographic accessories are now available which can be relied on, and are powerful, so that exposures of a fraction of a second take the place of an hour or so of pioneer days.

The old difficulties have vanished, but new ones have taken their place.

The future holds changes. What will be their effect on radiology and the radiologist of the next generation?

Two main lines of advance stand out, both of which are significant. Firstly, the advent of the modern, high-powered, precision apparatus, by means of which new and elaborate techniques become possible, ever becoming more complicated and ever more expensive, and calling for greater skill and scientific and clinical knowledge on the part of the worker. Secondly, side by side with this, the production by the manufacturers of simple, cheap, and easily handled apparatus, suitable for simpler work. These are two basic features which will effect the future. What will that effect be?

In the case of the first, investigations previously impracticable can now be undertaken. New fields are constantly opening. More is possible for the radiologist and more is expected from him. The work has become highly specialised, and impossible to anyone without sound knowledge and considerable experience.

The cost of keeping up to date with modern technique is an ever-increasing burden, apparatus becoming more elaborate, its types more numerous and more varied.

Whether we like it or not, I believe that in the future the hospitalisation of radiology will increase.

Personally I regret this, and prefer the old methods of private practice, but I believe financial reasons will make the change inevitable. Only by the greater turn-over of hospital work can the expense of these main and auxiliary costly pieces of apparatus be put on a sound financial basis. Many of these instruments are only used for very special work. They are often rapidly superseded by improved models. The number of cases for which they would be required by a radiologist in private practice would be so few, that the fees obtainable would make their purchase an absolutely unprofitable expenditure.

By equipping a hospital department in a very complete fashion, especially where a pay-block is available, and using that department for both hospital and private patients, in the case of the latter the fee being divided on the recognised

basis between hospital and radiologist, the financial result would be profitable to both parties, as has been proved in various centres, and such a department could be kept thoroughly up to date. Such a change in procedure requires a change in outlook on the part of the public, as hospitalisation is not advanced here to anything like the same extent as in other countries. The change, however, is coming in other branches of work, and the cost of modern radiology makes it inevitable in that branch.

What I have said also applies to radio-therapy.

Here, modern technique with greater sub-division of dosage requires a vastly increased number of treatments with more powerful and more costly apparatus. With the limited number of cases available to a private radiologist, the fees that it would be possible to obtain would be quite inadequate to cover the time and expense involved.

I believe, in future, both in radio-diagnosis and in radio-therapy, more and more of the work, especially of the elaborate techniques, will be done in hospital departments for private patients. I believe also, in the larger centres, there will be a tendency for men to devote themselves solely to special branches of radiology-specialisation within a speciality. Many of the special examinations require such elaborate technique and specialised knowledge, that they only attain their real value in the hands of those to whom much experience has afforded special ability.

The growth of this more intensive specialisation will depend largely on whether there is sufficient work within these narrower limits to support the worker. Where there is, there is no doubt that such a step will be to the advantage of both radiology and the patient. The latter will reap the results of more intensive experience, while great advances in any subject are much more likely to be made by men taking a closer and individual interest in one line of work.

As regards the second great general line of advance—the simple, cheap, and easily handled apparatus. This produces its own difficulties and dangers.

It is true that anyone endowed with common sense, with a little instruction and by following directions, can with such an outfit produce quite good radiographs. The growing ease of their production, coupled with the tempting wiles of the manufacturers with the slogan of "Every man his own radiographer," have induced many, without any previous experience or training, to dabble in this work.

No hospital, however small, is considered complete without its X-ray apparatus, irrespective of the ability to make proper use of it.

The public has developed a rather touching faith in the value of an X-ray examination, and tends to believe that the possession of apparatus and the ability to produce radiographs carries with it the knowledge to make diagnostic use of them. This is a dangerous outlook and must be corrected.

Thanks to the painstaking work and clinical acumen of the early workers, the status of radiology as a diagnostic agent is a high one. These men were fitted and

prepared for their special work. They trained themselves to competence in interpreting the radiographs they produced. Discredit will inevitably follow erroneous deductions from radiographs, however technically perfect, by men, medical or lay, untrained in radiological diagnosis.

The profession and the public must realise that the value of an X-ray examination depends entirely on the interpretative skill brought to bear on it. The dangers are very real. Misinterpretations have led to the needless sacrifice of organs and limbs, and even to loss of life. The most skilled and learned may and do err, but the risks are bound to be much greater where knowledge and experience are less.

We must, however, face the fact that this wider dissemination of simple apparatus has come to stay, and that despite its dangers, it has its advantage and its place in the scheme of things.

The patient's interests must be considered, and because a man lives in a remote country district it is unreasonable to debar him from the advantages of a simple X-ray examination, say for a fracture, which can easily be obtained either in hospital or in private by his fellow living in a town. In larger centres where trained radiological facilities are easily obtainable, I do not think the principle is justifiable, for often, even the diagnosis of a fracture is not an altogether simple matter, and the temptation to attempt more difficult work than training and apparatus justify is always present.

If radiological diagnosis is not to be brought into disrepute, this class of work must be kept in its own sphere. The operator should have sufficient training in radiological technique to carry out the simpler work efficiently, and, above all, must realise his limitations. It will not always be easy to keep in the narrow way.

A generous donor provides his local cottage hospital with an X-ray outfit. The need of it for the diagnosis and manipulation of simple fractures is obvious. The donor becomes the victim of some obscure abdominal complaint. He is advised to have an X-ray examination, and feels quite aggrieved when informed that it cannot be done with the gift he has provided. Mr. A's neighbour was X-rayed locally for a Colles fracture. Why cannot he be examined similarly for a doubtful brain tumour? All these and such-like difficulties are bound to occur. They can only be met by a better education of the public and of the profession on the nature and the function of an X-ray examination.

The public must be taught that they are not paying for a photograph, but for an opinion to be correlated with the clinical opinion, and the profession that even the simplest work requires some special knowledge and training, and that limitations must be recognised. Working on these lines, the simple apparatus in private or in hospital, in the remoter districts, will play a really valuable and important rôle.

For the more difficult class of work where experienced radiological knowledge is essential, the difficulty of sending the patient long distances to where this is available could be obviated, if several hospitals, unable alone owing to the small

amount of work to support a radiologist, could combine and pool the services of a trained man, who could visit each centre once or twice a week. This is done in many places in England, and an attempt has recently been made by the Radiological Society of Ireland to arrange something on these lines in the Free State.

Despite the ever-increasing burden of the medical curriculum, the training of students in the principles and uses of radiology must be urged. It is surely essential that the coming medical men should have some knowledge of a subject of ever-growing importance in every field of medicine.

A little knowledge may be a dangerous thing, but there is another side to the picture, and even a slight knowledge will reveal possibilities and make limitations clearer. The more a man knows in any branch of medicine, the less liable he is to dogmatism, with its consequent errors and dangers. A knowledge of the nature and function of radiology, and its possibilities in diagnosis and therapeusis, will enable the best use to be made of it in the future, even if he never practises it himself as a speciality.

Recent Advances in the Treatment of Squint

By Beatrice H. Lynn, f.r.c.s.,
Surgeon, Belfast Ophthalmic Hospital

A strabismus, or squint, is a condition in which the visual axes are not parallel when the eyes are focused for infinity, or in which the visual axes fail to meet at the objective point, due to some want of co-ordination for the ocular muscles. The eyes are constantly changing their focus by means of intra-ocular muscles, from distant objects to near objects and vice versa. The movement of each eyeball is controlled by six extra-ocular muscles, and if a pair of eyes are to work in unison, not only must there be co-ordination as regards the twelve extra-ocular muscles, but also between intra- and extra-ocular muscles. When one considers this complex muscle arrangement, one wonders how any pair of eyes can remain straight. That they do so, in the vast majority of cases, is due not only to the tone of the muscles, but also to another complicated factor which urges the eyes to work in unison.

This factor is a demand, on the part of the human brain, for fusion or single binocular vision, rather than for double vision, which it will not tolerate.

When light from an object falls upon corresponding points of a pair of retinæ, two light stimuli travel via the optic tract to the occipital cortex, and are interpreted as sight. The two separate stimuli, one from each eye, on reaching the cortex, are combined or fused into one, to result in single binocular vision.

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Not only must single vision be produced, but stimuli must leave the cortex and travel by efferent paths to be projected out along the paths by which they entered the eye, so that the object seen can be located in its correct position in space.

This faculty of fusing develops gradually in the growing infant, and if not acquired in childhood, is unlikely to be developed in adult life.

Failure on the part of the fusion faculty, or on the part of the ocular muscles, leads to some form of squint, and squints may therefore be classified according to their underlying cause.

TABLE 1.—CLASSIFICATION OF SQUINTS.

1. Paralytic Squints.
2. Concomitant Squints—
    - (a) Refractive type.
    - (b) Fusional type.
    - (c) Psychological type.
    - (d) Physical deformity type.
3. Latent Squints.

Paralytic strabismus is one in which there is a paralysis of one or more muscles, and defective movement of the eyeball. I do not propose to touch upon the treatment of this class of squint, but to confine my remarks to that large group, the concomitant type, so commonly found among the young children in our large cities, and to refer briefly to the type known as latent squint. By concomitant squint I mean one in which each eyeball separately has a full range of movement in all directions, but where, owing to some defect in co-ordination, the visual axes deviate from parallelism. This type occurs almost always before seven years of age, often in the first year of life, but most commonly about the age of 3, at a time when a child begins to look at picture-books, and toys with small detail—tin soldiers, for example.

To see and examine satisfactorily a number of young squinting children, in the course of a busy morning in the extern department of a hospital, is quite impossible, and to give these children a fair chance, one must deal with them in a department devoted exclusively to squint, and to this department the family doctor may send even the youngest child.

Most of the larger ophthalmic hospitals in England have a special department for dealing with these cases, and with a view to establishing a similar one in our own city, I recently visited the squint departments of the London Hospitals. I was urged to study this matter when it was made known to me that already a number of unqualified men of the chemist-optician type were undertaking the training of squinting children, regardless of both the type and degree of the squint, and thereby doing irreparable damage, in their ignorance of what constitutes a cured squint.

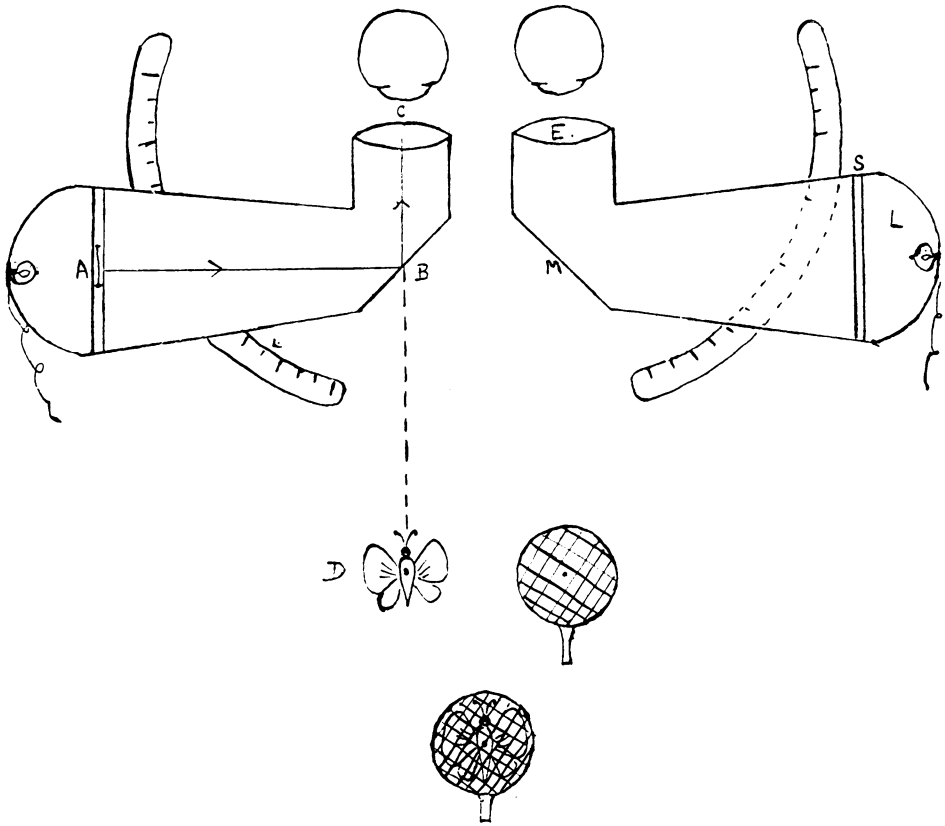

FIG 1.

A squint cannot be said to be cured unless the following three conditions are fulfilled :—

Firstly, the squinting eye must see equally as well as its fellow-eye or must have at least 6/18 vision.

Secondly, the patient must have a high grade of binocular vision, *i.e.*, stereoscopic vision or perception of depth, or at least fusion of flat pictures; and thirdly, the eyes must be straight in the head, that is, the visual axes must be parallel when the eyes are focused for distant objects.

The parents can only fully appreciate the third condition, and are anxious, sometimes even impatient, to have the eyes straight right away, but I have put the three conditions in this order because this is the order in which a stable cure will be effected.

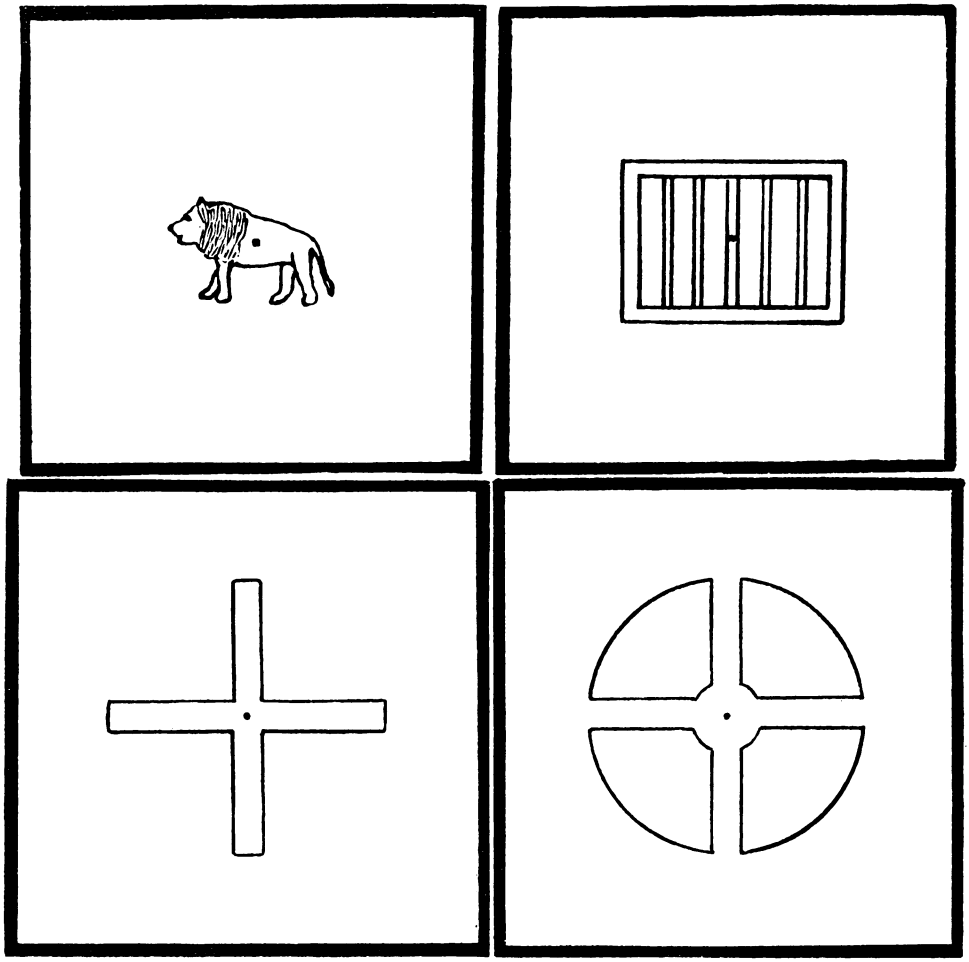

FIG. 2 (S.M.P. Slides).

The squinting child reporting for the first time is carefully refracted under atropine, and a full correction of any error of refraction is given, and vision in each eye, with and without glasses, recorded.

In a young child, the sight in the squinting eye deteriorates very rapidly, and for this reason I cannot too strongly emphasize the necessity of sending a child to the ophthalmic surgeon as soon as a squint is noticed. Up to seven years of age compulsory use of the amblyopic eye restores the vision, sometimes within a few weeks, to 6/18. Progress from 6/18 to full vision 6/6 is then somewhat slower. After seven years of age, sight may be restored, but it is not so certain as in a younger child, nor is the compulsory use of the amblyopic eye so well tolerated.

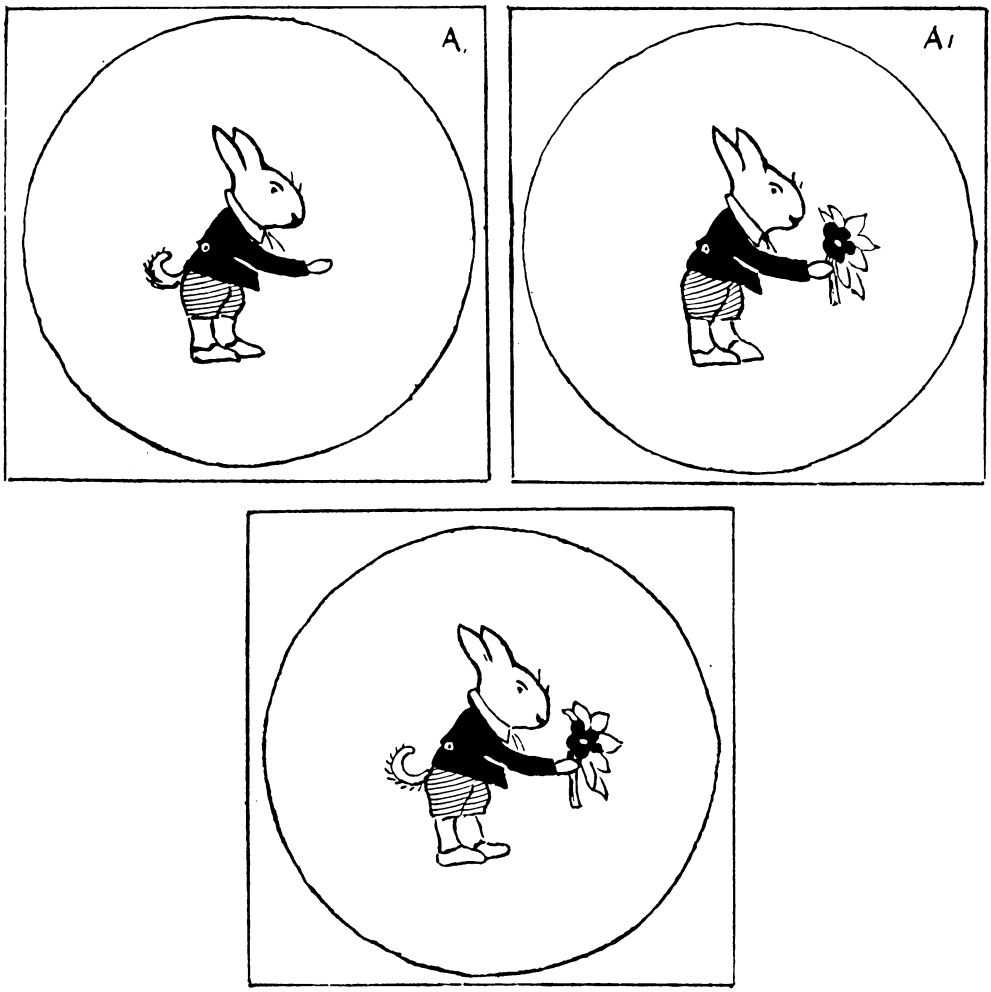

FIG. 3 (Fusion Slides).

The compulsory use of the amblyopic eye is brought about by occluding the good eye by some form of shield or occluder. The type of occlusion used depends upon the degree of amblyopia present. If a child has 6/6 vision in one eye, and 0/60 or even no power of fixation in the other, any form of movable occluder will fail, because the temptation to peep with the good eye cannot be overcome by a child. Therefore a square patch of some non-transparent cloth is placed over the eye and its four edges sealed down firmly to the face by four strips of adhesive plaster. The pain and trouble of lifting adhesive plaster soon overcome any temptation to peep.

When vision has improved to 6/18 some form of partial occluder such as a

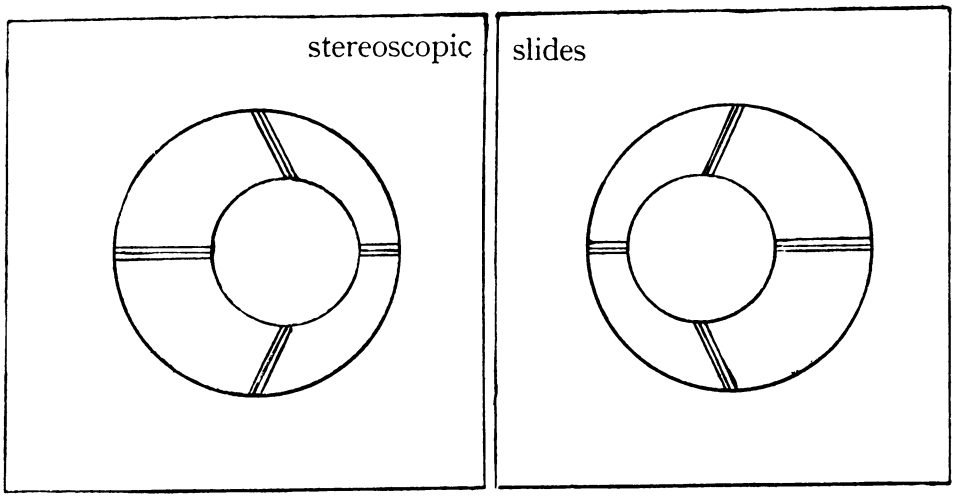

FIG. 4.

Doynes occluder or chalk and collodium painted on the glass will maintain this improvement, or lead to still further improvement.

Small children are given handwork, blocks, or mosaic patterns to play with at home. Older children go to school and are encouraged to do all the school curriculum, using the amblyopic eye only. Muscle exercises, by turning the eye in each of the six directions of gaze, are carried out, and if the parents approve, these children may go to the pictures. The children look upon this as a compensation for having to wear the patch, but the following of moving figures on the screen gives excellent ocular muscle exercise and one may be sure that even an amblyopic eye will make a big effort to see a Mickey-Mouse film.

Having now fulfilled the first condition, namely, having obtained a suitable degree of sight in the squinting eye, attention must be turned to the second condition—binocular vision.

TABLE 2.—GRADES OF BINOCULAR VISION.

1. Perception of Worth's dots.
2. Simultaneous macular perception.
3. Fusion.
4. Stereoscopic vision.

Worth's dots consist of four lights—one red, two green, and one white. Viewed through red and green spectacles, the one red and one white light are seen through the red glass, and two green and one white through the green glass. Therefore, if binocular vision exists, two red plus three green lights are seen, and if binocular

vision together with orthophoria (or absence of squint) exists, the white light, seen red through the red glass and green through the green glass, is superimposed, and four dots—one red, two green, and one a mixture of red and green—are seen. With monocular vision, either two reds or three greens are seen, but never four or five dots.

Further examination is carried out on an instrument called the synoptophore (fig. 1). The essential parts of this instrument are two movable horizontal tubes having an eyepiece (E), a lamphouse (1), and a slot to hold transparent picture slides (S), and a reflecting-mirror (M).

A ray of light from the picture A strikes the mirror at B, and is reflected in the direction of BC, and appears to come from a point (D), an equal distance behind the mirror. The eyepiece consists of a convex lens whose focal distance is CD, therefore a diverging pencil of light emanating from a point D will, after refraction by the eyepiece E, emerge as parallel rays. That is, an eye placed at C is relaxed or focused for objects at a distance.

The tubes rotate round a vertical axis, the amount of rotation being read from a semi-circular scale in either △ D or degrees. The eyepieces can be approximated to suit any interpupillary distance, and the slide raised or lowered and rotated in the slot to facilitate examination of cases of hyperphoria and cyclophoria. The patient looks through the eyepieces at two dissimilar slides dropped into the slide-holders; e.g., a butterfly and net, a lion and a cage. The height of the slides is adjusted to suit any hyperphoria that may be present, and the tubes are rotated until the angle between their axes corresponds to the angle between the patient's visual axes. When the tubes are in the correct position, the light reflexes from the tubes upon the corneæ will be symmetrical, and when the patient is asked to look alternately at the dot on the butterfly and at the dot on the net there will be no movement of the eyes either from side to side or up and down. The patient is now looking with one eye, through a tube, at a butterfly, and with the other eye through a tube at a net—and if simultaneous macular perception exists, the two dissimilar pictures will be superimposed and the butterfly will appear in the net.

Unfortunately, quite fifty per cent. of cases examined have not simultaneous macular perception although they may have 4 or 5 Worth's dots, and when the synoptophore is adjusted so that a picture is thrown simultaneously on each macula, the patient either suppresses one image or sees the butterfly in a false position relative to the net—and in order to see the butterfly in the net, the tubes must be set parallel, or at least at an angle less than that of the squint.

This most disturbing feature is known as "false projection." To demonstrate the third grade of binocular vision fusion, slides are used (figs. 2 and 3).

A pair of fusion-slides consists of two similar pictures each having a distinctive feature. When fused, the similar pictures referred to as "the lock"

run together, and the dissimilar features or "keys" remain separate, e.g., in the two slides A and A1 the rabbits compose the lock, and the tail and flowers the keys. When fused they appear as one rabbit having both tail and flowers. A squinting child, although having simultaneous macular perception may have no fusion. Such a child is always conscious of two pictures. He will say, "The rabbits are nearly on top of each other," or "One rabbit is behind the other." More often with simultaneous macular perception there is some degree of fusion. A child may fuse the pictures at the angle of his squint, but may have no range of fusion, i.e., he can fuse pictures when they are in one position only. The normal person has an average range of fusion from 0° to 30° of convergence, which can be increased by practice. Following fusion comes the fourth stage of binocular vision, the power to fuse two slightly different views of the same object to give the perception of depth.

Squinting children having been subjected to this examination may now be placed in one of four groups :—

(1) Those suitable for muscle-training.

(2) Those suitable for operation, together with post-operative training.

(3) Those requiring treatment before operation is undertaken.

(4) Incurable cases.

In Group 1, those suitable for muscle-training are placed cases with no or cured amblyopia, those with deviations of 20° or under and with simultaneous macular preception or a higher grade of binocular vision. Also all forms of latent squint.

In Group 2, those suitable for operation together with post-operative training are placed cases with large deviations, but having no amblyopia, a true projection, and some degree of fusion.

In Group 3, those requiring treatment before operation is undertaken, are all those cases with amblyopic eyes, false projection, or no power of fusion.

In Group 4 are those cases made up of persistent amblyopia, persistent false projection, persistent alternating squint, and macular lesions. Also under this class must come congenital deformities of orbit, muscle anomalies, and children living in the country who cannot attend hospital regularly, and cases of those whose parents are unwilling or unable to co-operate. A large percentage of this fortunately small Group 4 may be operated upon for cosmetic results only.

The actual training is carried out on the synoptophore by a technician. A technician need not necessarily possess a medical qualification but must be a matriculated student of a British University. A student taking up this work must study at the squint department of a recognised teaching ophthalmic hospital for at least one year.

After passing examinations in the anatomy and physiology of the eye, and in the technique of training, the student may be registered as a qualified technician. Technicians work under the guidance of ophthalmic surgeons, and undertake to train only those cases referred by an ophthalmic surgeon.

The average period of training is three to four months, and during this time the children attend the squint department three times weekly, and carry out, in addition, suitable exercises at home. Each visit lasts twenty to thirty minutes.

The age at which training is undertaken depends upon the ability of the child to co-operate. The majority of these squinting children are extremely intelligent, and, with a little patience, training may be undertaken at an early age. In my experience the average age is about 5. Quite an exceptional case is that of a child age 1 year 10 months when I prescribed her first glasses, and who commenced training six months later.

Cases for treatment before operation also attend the department regularly. The frequency of their visits is varied to suit the defect being treated; for example, those with amblyopic eyes have the good eye occluded, and report once in three weeks, whilst those with false projections attend daily, if possible. They are operated upon when the amblyopia has been overcome and some degree of fusion gained, and when they are old enough to take advantage of the few months' post-operative training which is desirable.

Cured cases report frequently for re-examination. In my group of cases suitable for muscle-training I have included all cases of latent strabismus. A latent strabismus is a squint which is not noticeable so long as the person is fit, but which becomes manifest when the person is ill or fatigued. People with latent squints suffer from headaches and other forms of ocular discomfort. Recently the importance of latent squints has been shown in the case of air-pilots. An air-pilot must have a perfect ocular muscle balance, that is, he must have no tendency to squint, so that after a long and fatiguing flight he may still have perfect single binocular vision. Not only must an air-pilot have perfect single binocular vision, but he must also have a remarkable power of converging the eyes so that as the plane is descending he may focus the rapidly approaching ground clearly and so ensure a safe landing. It is the exception for an applicant to pass the required convergence-accommodation test for airmen without some preliminary training on the synoptophore.

I cannot quote statistics of my own, as the squint centre at Belfast Ophthalmic Hospital is still in embryo, but I should like to put before you those collected by Miss Jackson, senior technician at the Royal Westminister Ophthalmic Hospital, London.

In conclusion, may I say that, like so many advances in medicine and surgery—modifications or revivals of old time-tried remedies or instruments—the recent advances in the treatment of squint display no entirely new principle.

TABLE 3—CONVERGENT CONCOMITANT SQUINT

PARTICULARS	TREATMENT	RESULT
Angle of Squint $< 40°$ true projection	Training alone	75% Cures
Angle $< 40°$ false projection	Treatment to overcome false projection, followed by Training	75% Cures
Angle $> 40°$ true projection	Operation + Training	79% Cures
Angle $> 40°$ false projection	Correction of false projection, + Operation + Training	79% Cures
All degrees of Squint, false projection	Operation alone	40% Cures

ALTERNATING AND DIVERGENT SQUINT

The number collected up to date is too small to be of any statistical value

The synoptophore is the Worth amblyoscope, with which we are all familiar, brought up to date and modified by the increased skill in instrument-making. Its advantages over the old-time amblyoscope are many—the lighting is better and the tubes move more smoothly and are capable of independent movement. The patient sits at the instrument and, as the surgeon stands facing the patient, the light-reflexes upon the cornea can be closely watched and the patient's responses checked by the surgeon's observations. This is very important in determining the angle of the squint in those cases with false projection. Separate switches on the lamps enable the two pictures to be shown alternately, or together, and this gives a further method of checking the accuracy of the patient's observations. It must be remembered that the patients are, with a few exceptions, young children in whom the power of concentration is very limited. A child, after a visit or two, soon learns what he is to expected to see, and may therefore either consciously or unconsciously mislead one in his anxiety to be right or to get away to play.

There is little new as regards the technique of operation, but as the synoptophore has made possible a very thorough examination of squinting children, cases for operation may be selected and, as the angle of the squint may be accurately measured, the operation may be done under general anæsthesia, and therefore in quite young children where previously a desirable age was fourteen years or more, and the co-operation of the patient on the operation-table and local anæsthesia were judged almost essential. Perhaps the greatest advance has been the realisation on the part of the ophthalmic surgeons that a good cosmetic result, although most gratifying, is not sufficient at a time when employment, a difficult problem even for the fit, is unobtainable by those with an amblyopic eye or lack of single binocular vision, under the present regulations applying to factory workers, motor drivers, and many other occupations.

A few weeks ago I was very reluctantly obliged to agree with the factory doctor in an industrial town when he certified a child of 14½ years as unfit for work amongst machinery, on account of her amblyopic eye. The child was the only member of the household of seven earning wages, and it was most distressing that this child had to be turned away from the factory. Similar cases are sent to me all too frequently.

The ideal cure is a good cosmetic result together with equal vision in each eye (or at least 6/18 in the poorer eye) and single binocular vision. To reach this ideal, I am strongly of the opinion that our hospitals must organise squint departments, where the squinting child may have special attention and supervision from the time the squint is first noticed until adult life is reached, and that to ensure the amount of individual attention necessary for each child our surgeons must solicit the help of trained technicians, who will work in harmony with them, to gain the maximum result for the largest number of cases in the shortest possible time.

THE BELFAST HOSPITALS

No. 2. The Benn Ulster Eye, Ear, and Throat Hospital

THE institution now known as the Benn Ulster Eye, Ear, and Throat Hospital had its genesis in a small private dispensary, conducted by a certain Dr. William McKeown of Belfast, for the free treatment of diseases of the eye among the poor people of the town. Mr. Edward Benn, one of the greatest philanthropists Belfast has ever known, was so impressed with the value of McKeown's work that he built a small hospital for him to enable him to carry on his work. This building, situated in Great Patrick Street, was opened on January 21, 1871, and is one of three special hospitals which owe their existence to the philanthropy of Mr. Benn, the other two being the Belfast Hospital for Diseases of the Skin and the Samaritan Hospital for Diseases of Women.

From the foundation of this small hospital, Mr. Benn devoted a large part of his time in devising and carrying out schemes for its improvement, and eventually decided to build, at his own expense, a larger and properly planned hospital for the special treatment of patients suffering from diseases of the eye, ear, and throat. Suitable ground was secured for this building, the foundation stone of which was laid by the then Mayor of Belfast, Mr. James Alexander Henderson, in March, 1873, and the hospital was declared open for the reception of patients in May, 1874. The cost of this building was £3,180. A number of ladies, under the presidency of a Mrs. Plunkett, formed themselves into a committee, and collected £171. 12s., and realized by a bazaar £560. 18s. 7d., to furnish the hospital, so that it opened clear of debt.

During the first year of its existence, the hospital justified its establishment by

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treating 1,528 patients, and thus showed the need of such an institution, and subscriptions for its maintenance were freely subscribed. Mr. George Benn gave a donation of £1,000 towards an endowment for the hospital, and on his death bequeathed a further £1,000 towards the same fund.

The work continued, and the number of patients increased to 2,006 in the second year of the hospital's existence, to 2,721 in the third year, to 3,423 in the fourth year, and in the fifth year the number rose to 3,556. This rapid increase in the number of patients attending the hospital produced considerable congestion, and it became obvious that if the work was to continue, increased accommodation would have to be procured. It was not, however, until 1882 that the first official notice of this required extension was made, and this, owing to lack of funds, was not undertaken until fourteen years later. Three members of the committee, on their own responsibility, secured thirty feet of building ground fronting Clifton Street, beside the hospital, at a rent of 13s. 6d. per foot, and offered it to the committee on the same terms on which they had obtained it. The committee gladly accepted this offer and, a sum of £400 having been collected, the building of this extension was begun.

This first extension consisted of a laundry, two large bathrooms and closets, and two dayrooms connected to the original building. The committee then obtained a sum of £1,000 on loan at four per cent. on the security of the ground and building, and a further extension of six small wards, two bathrooms and closets, and a large operating-room with ante-room were erected. This building was so designed that a number of shops occupied the ground floor, and the rent received from their letting more than paid for the whole interest on the loan. The second part of the extension was completed in 1896.

Up till this time difficulties had been experienced during the dark days of winter in performing some of the more delicate operations on the eye, because of the absence of any good form of artificial light, and to overcome this difficulty the committee decided to instal a plant for the production of "a most brilliant light from acetylene gas, until an electric supply from the city would be available."

During the early days of the hospital, the relations between it and the Royal Hospital (afterwards the Royal Victoria Hospital), and with the old Queen's College, do not appear to have been very cordial. This apparently was caused by the students of the medical school not attending Dr. McKeown's clinic. A somewhat one-sided controversy was raised by Dr. McKeown by a speech which he made at the annual meeting of the Benn Hospital in 1882. This rather unhappy speech accused the Council of Queen's College of failing in its duty to provide adequate clinical teaching facilities for the students enrolled in the Faculty of Medicine. Fortunately, the matter was treated with academic dignity, and the matter ended, but it was many years before the relations between the hospitals again became harmonious.

When the hospital was first opened, the extern department was "absolutely free," but the committee soon found that the expenditure exceeded their income, and they were obliged to consider their position. They then came to the conclusion

that indiscriminate charity lowered the moral tone of the community, and resolved that "whilst those who were without means should be treated as free patients; those who were able to do so should contribute towards the support of the hospital, whether they were extern or intern patients." This rule proved of great advantage to the hospital finances, and enabled its committee to carry on, treating all the poor patients who attend free of charge.

It was the original intention of Mr. Benn that all classes of the community should have the resources of the hospital at their disposal on equitable terms, and accordingly four of the six small wards were set aside as private wards for the use of paying patients, thus introducing a principle which all hospitals to-day are either practising or are considering ways and means of doing.

The work of the hospital continued from year to year, until the number of patients seeking treatment became so vast that in 1924 further extensions were decided upon. These were carried out at a cost of £3,600, and included, in addition to other rooms, a new operating-theatre and dark rooms. These extensions were declared open by Her Grace the Duchess of Abercorn. But these extensions seemed to have attracted patients even in greater numbers, and the pressure on the intern accommodation became so great that within twelve months the medical and surgical staffs were obliged to ask the committee of management to consider an increase in the number of beds available for patients.

The committee of management were so impressed with the need of this additional accommodation that they spent a further sum of £4,000 on the hospital, rearranging the wards for smoother and better working, installing central heating, increasing the nursing staff, building new nurses' quarters, and erecting a new ear-room at the back of the hospital, thus making it a most up-to-date and efficient institution, worthy of the city of Belfast.

But one thing was lacking. Patients requiring examination by X-ray photography had to be sent to outside institutions, and in the following year (1936) an anonymous friend sent the committee a sum of £800 to remedy this defect. A modern X-ray apparatus is now installed.

The hospital is working free of debt, and attracts patients from every class of society. The last medical and surgical report shows that 4,965 patients attended during the year (2,478 in the eye department and 2,487 in the ear department) in the extern department, with a total attendance of 16,792. Patients in the wards numbered 908, and 1,512 operations were performed.

Many distinguished physicians and surgeons have been on the staff of the hospital. The first and greatest of these was undoubtedly Dr. William McKeown, an ophthalmic surgeon of great originality. He had an international reputation, gained in the first instance by his use of the magnet for the removal of metal from the *interior* of the eye. This operation he performed for the first time, after making a surgical incision into the sclera, in 1873, on a lad from Harland & Wolff's shipyard. But his reputation really rested on his method for operating on cases of cataract. Until his time, patients suffering from this condition were allowed to become slowly blind before operating on the opaque lens. McKeown devised a

technique to inject a few drops of water below the capsule of the lens, and by this means producing a rapid "ripening" of the cataract. The operation could then be performed in a few weeks' time, without the patient having to pass through the unhappy period of waiting for months before the removal of the lens was possible. He also devised a method of "irrigation" of the anterior chamber after removal of the lens. These facts are recorded both in the American and the French Encyclopædias of Ophthalmology. Dr. McKeown held his appointment in the hospital from 1871 till 1904.

Dr. W. M. Killen, until recently, was an able and careful physician on the staff of the hospital. Dr. Isaac Davidson, who is still with us, although taking a less active part in the practical work of the hospital, was for years a tower of strength in its work. Dr. W. S. Gibson, whose tragic death removed him from the midst of his activities in the ear department at the early age of 30, and Dr. W. A. Anderson; Mr. J. Allison Corkey and Mr. Kennedy Hunter.

ROYAL MATERNITY HOSPITAL, BELFAST

REGISTRAR'S REPORT, JANUARY 1932—DECEMBER 1935

THIS report, unlike its predecessors, covers a period of four years, and those perhaps the most interesting in the Hospital's growing history. On 31st July, 1933, Townsend Street was vacated for a new home beside the Royal Victoria Hospital. The attendant changes have presumably been responsible for this omnibus review. One understands with relief, however, that the report for 1936 will take the old annual form : for it must be admitted that the volume under consideration is necessarily so condensed as to render its digestion difficult.

TABLE I (General Figures) shows that, in its new environment, the Hospital's total admissions are about half as many again as before the change; the figures for 1932 and 1935 being 954 and 1,413, respectively. The same applies to ante-natal or 'booked' admissions.

The non-ante-natal or 'unbooked' admissions, the numbers admitted for treatment (without confinement), and the numbers admitted for operation, all show even greater proportionate increases than the above.

TABLE II (Maternal Mortality), as indicated, shows that emergency admissions have nearly doubled as compared with Townsend Street days. The death-rate for emergency admissions averages 3.8 per cent.—the period with the greatest number of admissions shows the lowest death-rate—and the figure for 1935 is 4.4 per cent.

In the latter year, of 1,413 total admissions, it appears that 24 patients died, giving a death-rate nearer 1.7 per cent. than the 1.6 per cent. quoted in the table. Broadly speaking, the death-rate of purely emergency admissions is from two to

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three times that of the total admissions, and from three to seven times that of purely ante-natal or 'booked' admissions. In 1935, of 1,027 of these 'booked' cases, the mortality was only 0.6 per cent.

The new Rea Unit for potential and established cases of sepsis, admits to the Hospital, and to these tables, many cases frankly septic, and often well advanced in the puerperium, from outside the Hospital's maternity practice. This produces an adverse effect on statistics, and will do so until, as in some hospitals, these cases are calculated separately. The registrar has alluded to this difficulty in his introduction, but we found his concluding paragraphs somewhat confusing, and even now are uncertain of his meaning. With an adjustment in respect of these septic admissions, the figures in the table appear to compare favourably with those of analagous institutions in England.

Following this Maternal Mortality table, we find the Maternal Deaths discussed individually: a section, to our mind, always the most interesting part of any such report. The 'four-year plan' has produced seventy-five such cases. Unfortunately, considerations of space have reduced the descriptions to minimal lengths, and this terseness, albeit perhaps necessary, may often be less than just to the work done. Too often are the sadder sequelæ of parturition recorded as having ended fatally without more than the briefest—or no—allusion being made to the measures we believe were unceasingly tried to save life.

Here is where the benefits of comparison, justification, and education tend to be withheld by undue brevity, and as we say, we look forward to a return to more detailed descriptions in the next annual report.

The 1935 cases number twenty-four (in 1,413 admissions), and a brief survey of these is of much interest.

We calculate that five patients died with chest disease as the chief factor (one lobar pneumonia, one asthma, and three pulmonary tuberculosis); while five more died of diseases of the heart and circulation (one primary anæmia, one thyrotoxicosis, and three cases of advanced pancarditis).

Three died of eclampsia (all unbooked and presumably preventable); four died of sepsis (three unbooked; and frankly septic on admission to the Rea Unit); one died of shock and trauma following premature attempts to deliver with forceps outside.

One died of puerperal shock following a *normal* delivery inside. One died of post-partum hæmorrhage and shock following removal of an adherent placenta. One (unbooked) died of uræmia following pyonephrosis. Another unbooked case died of tuberculous peritonitis, being admitted to the Rea Unit a month after delivery. Two booked cases died of acute yellow atrophy of the liver.

Of the first ten, one may wonder how many an amended sociology would have allowed to become pregnant at all. Of the next eight, even leaving out the vexed question of sepsis, one feels that better education of patient and doctor would have saved not a few.

The next four are perhaps unavoidable, certainly so by the obstetrician; but

cases of death from puerperal shock (and often under the best conditions) seem to be commoner since maternal publicity became a social function. Education should be *con*structive.

The last two cases raise a more complex problem, and, with a third similar case occuring in 1932, cause some disquiet, the more so as no other hospital report that we have studied records such a death.

Nothing is said of the morbid anatomy nor of the histology of these three cases, nor of their treatment. All we can gather of etiology is that they were all antenatal or 'booked' cases, and young and apparently healthy primigravidæ when they came into labour. All were delivered with forceps after prolonged labours, in one case fifty, in another seventy-five hours.

We know that liver-glycogen is diminished by exercise, exposure to cold, fasting, and the influence of adrenaline, thyroxine, and pituitrin experimentally. Many of these factors may operate in prolonged labour; and a liver, thus rendered vulnerable, may then be damaged by the imperfectly understood toxins of pregnancy and not a little chloroform.

Looking elsewhere in the report for the alternatives to this long drawn-out ordeal (which may damage many livers it does not destroy) one has to infer (from Table XVI) that the staff of this Hospital have, no doubt judicially, tended of late years to abandon the practice of induction for disproportion. Nineteen inductions were performed for disproportion in 1930, nine in 1931. The year 1932 is unaccounted for, and during the years 1933-5, inclusive, only two such inductions are recorded. Yet in these last thirty Belfast cases no harm befell a mother or child.

During 1935, seventy-four inductions for disproportion occurred in a great London hospital. Manchester had one hundred and forty-four in 1933, and one hundred and sixty-two in 1934 (with one maternal death, contributed to by tuberculosis, in the latter year). Liverpool in 1935 had ninety-seven inductions for disproportion without a death.

We do not love cæsarean section, but in the seventy-eight consecutive cases undertaken for disproportion in the three years 1933-5, the Hospital under review did not lose a mother or a baby.

Surveying these figures, the onlooker may be forgiven if he wonders whether "non-intervention" and the principle of the "test of labour" are not assuming too exaggerated a value in this Hospital's policy.

For the rest, one need only repeat that one misses some of the elaborations of familiar tables in the previous reports from this Hospital, such as give a clue to its policy.

Indeed, a few notes on this would have very real value, stimulating comparison and promoting education. It is not suggested that a report such as this is to be a textbook of midwifery, but, by the analogy of those little reports familiar to the forearmed medico, which reach him annually from his Defence Society, and cause him to review his own life, one feels that the staff of a great Maternity

Hospital such as this could gracefully contribute to the shaping of the policy of lesser practitioners.

The reviewer has occasionally the thankless task of investigating, for the Ministry of Health, maternal deaths in an area belonging to a large local authority. Obvious comparisons have engendered in him two reflections. *First*: How well for maternity were the services of such a Hospital as this everywhere available! *Secondly*: How tragic are the circumstances surrounding some of the cases he has investigated.

On a rough draft of one such report is pencilled, " These investigations would make one sick." No such thoughts need distress the compiler of a report such as we are reviewing. In all modesty, the registrar and his colleagues of the Royal Maternity Hospital may justly claim that they have added to their knowledge and technical skill good faith and good care, and have remained worthy stewards of their great responsibilities.

HEALTH AND POVERTY IN BELFAST

Report by the Ulster Society of Economic Research

M'Gonigle and Kirby[1] have recently shown that, in the normal circumstances of a large proportion of the population of Great Britain, income may be one of the main factors which determines death-rate. Examining, for example, a series of income groups, rising step by step from a group at 25/- to 35/- per family weekly, to a group at 75/- and over per family per week, they found an astonishing difference in death-rates. Mortality in the 25/- to 35/- group was 25.96 per thousand. It fell regularly, as income rose, to 19.23 per thousand in the 45/- to 55/- group. In the group living on 75/- a week or more, the death-rate had fallen to 11.52 per thousand. These results are derived from too small a total sample (3,196 persons) to be regarded as conclusive, and they relate only to the town of Stockton-on-Tees. But the field opened up by these authors is a very significant one; fresh surveys elsewhere may be of the greatest value.

In addition to the main results indicated by this example, a very important principle is demonstrated. It is that causes, which are not to be discovered from a broad average, emerge when a lump is split into proper groups, and handled as a series. It was with the object of confirming or refuting M'Gonigle's results that the work, of which the following is a preliminary account, was undertaken.

The method of approach, which aimed at utilising the statistical resources already available, was based on the assumption that people with equal incomes live in the same or similar districts. Belfast is divided into districts on two systems. For the purposes of registration of births, marriages, and deaths, it is divided into sixteen Dispensary Districts, known by their numbers. For municipal elections, the city is subdivided into fifteen Wards. Such data, as are at present available with regard to the distribution of unemployment, relate to Wards.

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The first step was to calculate, for each Dispensary District, certain of the most suitable statistics. The rates selected were :—

1. The infant mortality-rate, taken as the annual number of deaths of infants under one year per thousand live births.
2. The annual number of deaths of children between the ages of 1 and 5 per thousand living children of one year old.
3. The deaths from all types of tuberculosis per thousand of the population in each District.

An annual average was taken from returns, between the first quarter of 1933 and the third quarter of 1936.[2] The resulting rates showed a remarkable variability from District to District, amounting, for each rate measured, to a difference of about one hundred per cent. between the lowest and the highest figures. In general, in all three rates, it was the same Districts which had low figures, and the same Districts which had high figures. Figure 1 is a pictorial representation of the results, omitting Districts numbered 7, 8, and 14 (respectively Greencastle, Ligoniel, and Ballymachan), on account of the smallness, or variability, of their population. There is no doubt that these new outlying Districts present some extremely interesting problems, but they cannot be readily dealt with without a more intimate survey. When the new census results are available, it should be possible to examine these Districts more profitably.

The above Dispensary Districts, which are usually known by their numbers, have been named for the convenience of the reader. These names must not be confused with those of the Wards. To the reader who knows Belfast, it is not necessary to stress that the District death-rates in figure 1 correspond fairly well with what he might estimate, from observation, to be the income level in a District. So far it has not been possible to obtain any exact measure of the income level in a Dispensary District.

In the Wards, however, it is possible to make two measurements. The yearly number of *fresh cases* of tuberculosis in each separate Ward is listed in the Medical Officer's report.[3] It is also possible to obtain an index of the poverty of the Ward. The numbers of applications, in each Ward, for transitional payments (a kind of unemployment relief) were made available to us by courtesy of the Unemployment Assistance Board. These figures covered the period from October, 1931, to September, 1933. They yielded, therefore, the percentage of the Ward population, who at any time in this two-year period, applied for transitional payments. The spells of unemployment following these applications are not indicated; judging by the highness of the percentages, a considerable number of people must have applied more than once in this period. Most of the applicants will have had one or more persons dependent upon them.

These percentages, therefore, will give a sound index of the proportion of persons with low income in each Ward. It omits, however, a class of persons, even poorer than the above, supported on outdoor relief, of whom one may guess there were about ten thousand in all Belfast at that period.

The above index of very low incomes was then plotted against the number of fresh cases of tuberculosis, per thousand inhabitants in each Ward, for the two years 1932 and 1933. The result is shown in figure 2.

This striking result may be reduced to another form by the following procedure. The Wards are divided into four blocks, according to the percentage of applications for transitional payments, as follows :—

Block I contains the Wards with under 8 per cent. of applications. These are Windsor and Cromac.

Block II contains the Wards with between 8.1 per cent. and 10 per cent. of applications. These are Clifton, St. George's, Woodvale, and Duncairn.

Block III contains the Wards with between 10.1 per cent. and 12 per cent. of applications. These are Ormeau, Dock, Falls, Smithfield, and Shankill.

Block IV contains Wards with over 12 per cent. of applications for transitional payments. These are St. Anne's, Court, Pottinger, and Victoria.

The number of fresh cases of tuberculosis, over the two-year period 1932, 1933, per thousand inhabitants of each of Blocks I-IV was then calculated. The result is set out graphically in figure 3. Since the least number of cases in any one block was 138 out of 51,490 inhabitants (Block III), these results are statistically reliable. The conclusion is that, in Districts where the number of persons of low income, as indicated by the unemployment-rate, is high, the incidence of tuberculosis is correspondingly high, and vice versa. If we are to go further into what particular condition, resulting from being in possession of a low income, causes the high morbidity and mortality, we need not look further, at present, than the factor of food. For the full evidence of this, the reader may be referred to Orr.[4]

The research, of which the above is the first result, has been carried out by a number of private persons, who have formed the Ulster Society for Economic Research, and is published in the name of the secretary. It is hoped, in future reports, to confirm and extend these results.

We wish to express our thanks to the Unemployment Assistance Board, to whom we are indebted for the figures of the local distribution of the unemployed. We also wish to express our thanks to the Vice-Chancellor of Queen's University, and to Professor H. O. Meredith, for their help in this research.

MRS. H. COLLIER, *Hon. Secretary.*

108 Deerpark Road, Belfast.

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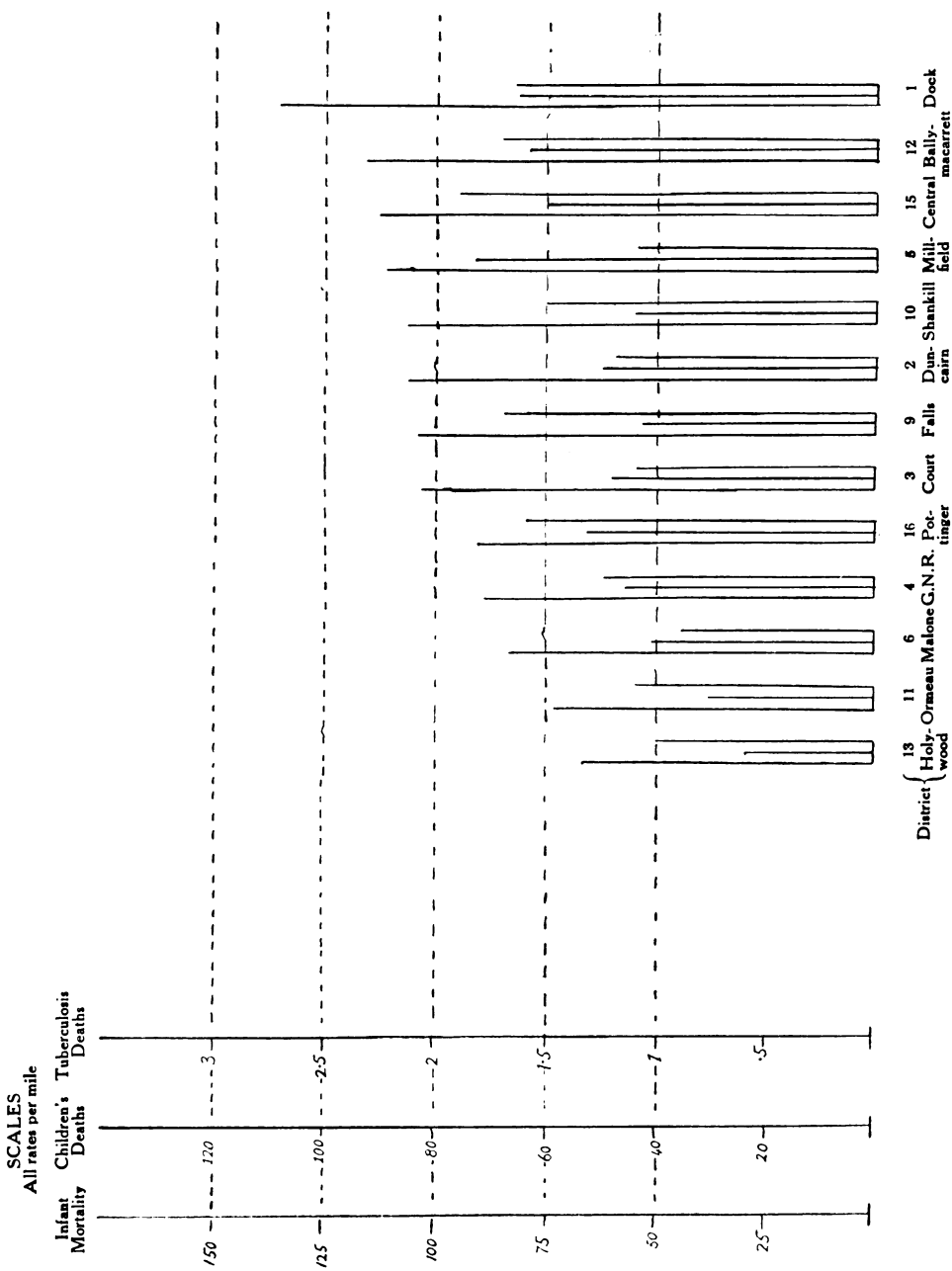


FIG. 1—Certain death-dates in different Districts. The height of the left-hand column indicates the infant mortality-rate. The central column indicates the deaths of children. The right-hand column indicates tuberculosis deaths.

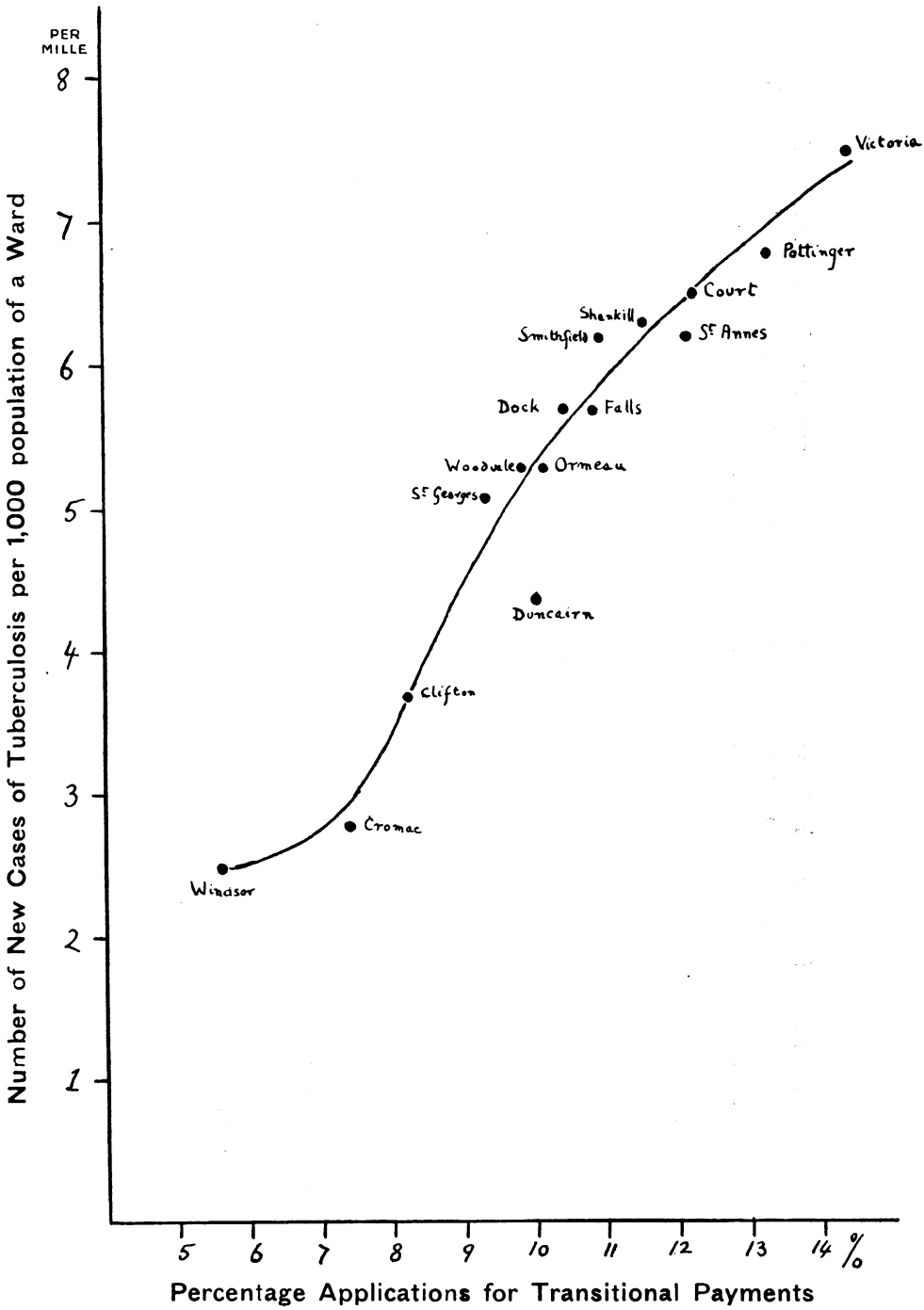

PER MILLE
8
7
6
5
4
3
2
1
Number of New Cases of Tuberculosis per 1,000 population of a Ward
Victoria
Pottinger
Court
Shankill
Smithfield
St Annes
Dock
Falls
Woodvale
Ormeau
St Georges
Duncairn
Clifton
Cromac
Windsor
5
6
7
8
9
10
11
12
13
14 %
Percentage Applications for Transitional Payments

FIG. 2.

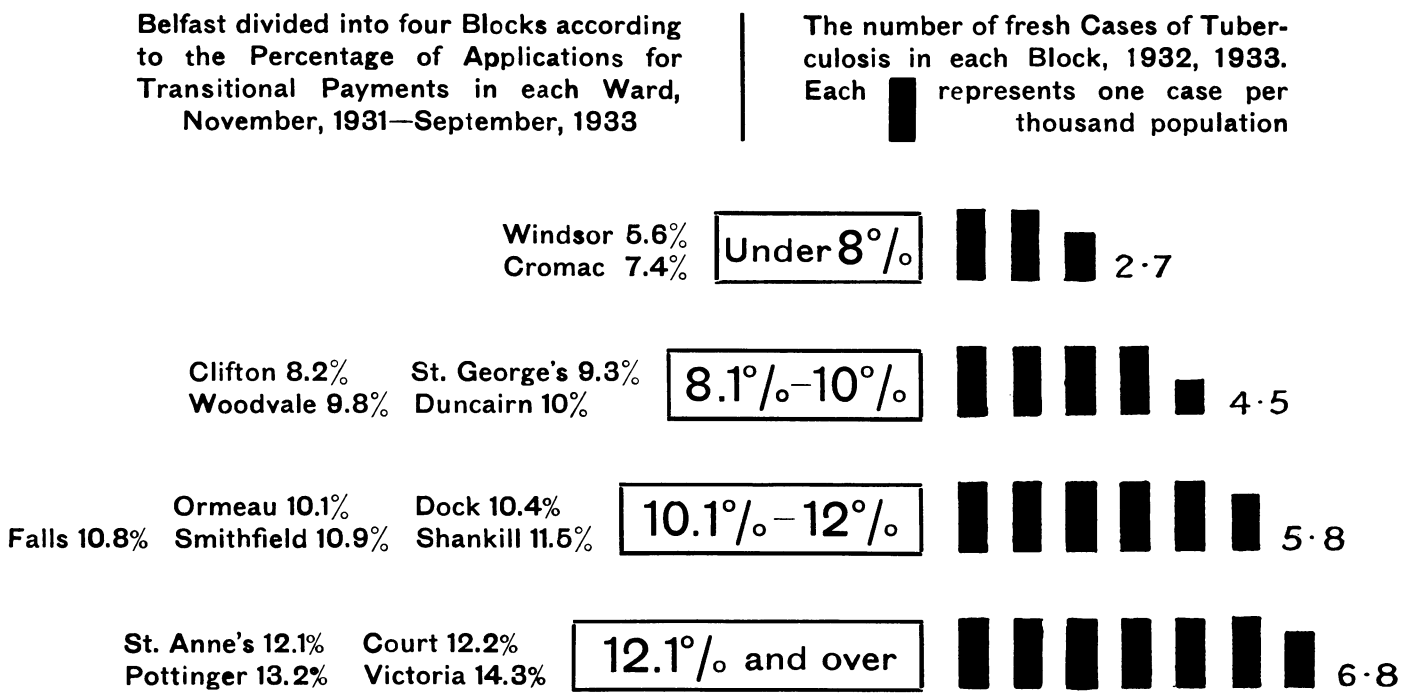


FIG. 3—Unemployment and Tuberculosis.

Concerning a Maternity Service

By H. L. HARDY GREER, F.R.C.S., F.C.O.G.,

Presidential Address read before Northern Ireland Branch of the British Medical Association

WHILST I was considering a suitable subject for my opening address to the Division, I received an "Occasional Letter" from the secretary of the Association, Dr. Anderson. With your permission, I shall read you some portions of this letter:—

"The proposals contained in the Maternity Services (Scotland) Bill constitute the first real attempt on the part of the Government to grapple intelligently with the problem of puerperal morbidity and mortality. It is the first step of the Secretary of State for Scotland to carry into practical effect some of the recommendations contained in the Scottish Report, and if the Bill becomes an Act, local authorities in Scotland will be given the duty of initiating schemes upon certain defined lines. . . .

"As the local authority is directed to consult with such local organisation of registered practitioners as appears to the authority effectively to represent the opinion of such practitioners practising in the area, an opportunity will be afforded to the Divisions and Division Branches of the Association in Scotland to induce the local authorities to adopt schemes in accordance with the principles enunciated by the Association in its Maternity Service Scheme.

"All general practitioners and those carrying on special obstetric practice are vitally concerned, for upon the measure of success which attends this comprehensive attempt to improve the standard of domiciliary midwifery in Scotland may well depend the initiation of similar schemes in England and Wales.

"Further participation by State and local authority in the development of health services is inevitable. The changes which have already taken place are not revolutionary, but are the logical outcome of the development of sociological principles which have characterised legislation irrespective of the party holding the reins of office, and the effect which further developments will have upon the medical profession depends altogether upon the manner in which we meet such developments.

"The whole position is being watched very carefully at the centre: Can the same be said of the Divisions?

"May I appeal to you to use your influence to induce your own Division Executive or Branch Council to 'sit up and take notice'; to give serious consideration to the problem of local health services during the coming session, and to make every effort to persuade the local authority to seek the co-operation of the medical profession in the moulding of schemes which concern the health of the community.

" I make no apology for once having referred to the need for greater interest in the development of local health services. I shall probably continue to refer to it until I hear less complaint of encroachment in the field of private practice and see a fuller determination on the part of the general medical practitioner to re-establish himself in his position of full responsibility as family doctor, attending to the care of the family health from a preventive as well as from a curative aspect, and ready at all times to utilize the services which the local authority has provided.

" Once we have convinced local authorities of our willingness and ability to participate in the development of the various schemes which it is their duty to foster, we shall have gone a long way to break down the barriers which up to now have prevented helpful co-operation in many areas."

Stimulated by the secretary's letter, I determined to make consideration of a maternity service the subject matter of my address, feeling that its importance and urgency fully warranted careful and prolonged consideration by the medical profession in Northern Ireland.

As you are doubtless aware, the matter has of recent years been the subject of inquiry by two Departmental Committees, one appointed by the Ministry of Health and the other by the Department of Health for Scotland. In addition, the B.M.A., after mature consideration, has approved a scheme for a National Maternity Service, and at the moment there is a Maternity Service (Scotland) Bill before Parliament.

I propose to review, as briefly as possible, the conclusions and recommendations of these various bodies, so that you may be enabled to judge how far the Maternity Service (Scotland) Bill goes towards meeting them.

B.M.A. Memo. Regarding a National Maternity Service.

(As Approved by Council, 20th November, 1935.)

The Council endorses the following resolution by the Annual Representative Meeting, 1935 :—

" That the B.M.A. regrets that the question of maternal mortality has become the subject of widespread political discussion, receiving great publicity in the lay press. Maternal mortality is a scientific and administrative problem which deserves careful and scientific study, but, in the experience of practising doctors, the publicity which it is receiving to-day is tending to terrify child-bearing women, and is, in itself, a cause of increased mortality." In this connection, Sir Henry Brackenbury, in a recent paper on maternity in its sociological aspects, emphasises that " the psychological attitude of the mother and her friends towards motherhood, the extent to which fright may have been aroused either by the propaganda for birth-control or by exaggerated statements made in the course of a campaign for easy or safe maternity, or the knowledge even that in her

own neighbourhood the maternal mortality-rate is, as a fact, unduly high, are in many cases not without their influence upon the outcome."

The Council of the B.M.A. wishes to emphasise that writers and commentators who refer to rates of mortality in pregnancy and child-bearing should be very certain that the rates they quote are truly comparable.

The basis of the rates used may be total births, or live births only, or actual confinements. The deaths may or may not include deaths from abortion, but the total number of cases of abortion against which they ought to be placed is never known.

The term "maternal mortality" may or may not include deaths due to causes associated with pregnancy, parturition, or the puerperium, but not directly due to this state.

The Registrar-General for England and Wales uses the term "puerperal mortality-rate" to describe the number of deaths due to diseases of pregnancy, childbirth, and the puerperal state per 1,000 registered births (live or dead). (Still-births have been registrable only since 1928.) The Registrar-General also gives a rate which includes not only these deaths, but also deaths from causes not classed to pregnancy nor child-bearing, but occurring in association with that state, e.g., influenza, pernicious anæmia, mitral-valve disease, etc. For purposes of distinction this inclusive rate may conveniently be called the "maternal mortality rate."

The Council holds strongly to the opinion that no national maternity scheme has any prospect of success unless it is based upon the principle of continuity of medical and nursing care throughout pregnancy, labour, and the puerperium. This object may be attained in two ways :—

A. The services of a staff of obstetric specialists providing ante-natal, intra-natal, and post-natal care should be engaged for the conduct of all state-aided and rate-aided maternity services.

The main arguments in favour of this scheme are :—

1. In recent years the number of women seeking to be confined in institutions has increased. It is assumed that further institutionalisation of midwifery is inevitable, and that it is at least as safe as domiciliary confinement in respect of infection.
2. As midwifery in many areas is passing out of the hands of the general practitioner, he is failing to obtain the continuous post-graduate experience necessary to enable him to deal efficiently with emergencies to which midwives have to summon him.
3. It is contended that obstetric specialists supervising the ante-natal care of midwives' cases, and attending a number of cases throughout, would give a more competent service, with the result that maternal mortality would decline and maternal health improve.

B. Arguments against the above proposals and in favour of a service in which the general practitioner plays a prominent part are summarized as follows :—

1. The proposal of a special service is based on the assumption of an increasing tendency to institutionalisation, and that this tendency is inevitable and advantageous.

   There is ample evidence that institutional confinement carries with it a greater danger of infection than domiciliary confinement. In certain towns where both hospitalisation and ante-natal work have increased, the maternal mortality-rate has either remained unaffected or even shown a rise.

2. In view of the fact that the financial arrangements of local authorities making this provision are playing an increasing part in persuading women to leave home for their confinements, the Council believes that there is a need for widespread public education on the advantages and the safety of domiciliary confinement.

3. In recent years the general practitioner in the larger town has been separated to an increasing extent from midwifery, but there has been no corresponding decline in maternal mortality in these towns. Taking the country as a whole, the general practitioner is still called in, or remains liable to be called in, to over four hundred thousand births a year. The incident of pregnancy should not be the signal for the transference of a woman from the care of one practitioner to another, for care during labour should be continuous with the normal medical care under the general practitioner.

DOMICILIARY MIDWIFERY.—"Many of the adverse circumstances in this sphere of practice are not inherent, but can be mitigated or eradicated. Were general practitioners to be made responsible for the ante-natal care of midwives' cases they would be able during pregnancy to instil confidence into the minds of these women, which would render them more prone to follow the doctor's advice should the labour prove to be prolonged or otherwise abnormal. Were a competent midwife present in every doctor's case, he would be saved much anxiety and many unnecessary and tiring calls. Were he able to remove a patient to hospital and continue in attendance, if necessary with the co-operation of the specialist, he would be enabled to undertake certain operations in more suitable surroundings."

The Council has come to the conclusion that the continuity of medical care should be secured by the provision in any national maternity service of a general practitioner and a certified midwife for every maternity case. If the training of the general practitioner in this branch of practice can be shown to be defective, the remedy lies in its reorganisation and improvement. All available evidence suggests that the institution is not safer than the home, and in the view of the

Council the remedy lies not in a more complete separation of the general practitioner from midwifery, but in a full recognition of his position as the person responsible for the continuous care of the mother.

The Association's scheme for an efficient maternity service is as follows :—

1. Efficient ante-natal care by, or under the responsibility of, a medical practitioner throughout pregnancy in every case.
2. Attendance in every case by a certified midwife during the ante-natal period, labour, and the puerperal period.
3. Attendance by the practitioner chosen by the patient during pregnancy, labour, and the puerperal period, when, as a result of his ante-natal examination, the practitioner has declared his personal attendance to be necessary, or when his attendance is requested by the midwife.
4. The provision in every case of at least one post-natal consultation between the patient and the practitioner, including, if necessary, examination.
5. The services, when necessary, of a second practitioner (for example, to administer anæsthetic).
6. The services of a consultant, when considered necessary by the practitioner.
7. The provision of laboratory services, when considered necessary by the practitioner.
8. The provision of beds for such cases as in the opinion of the practitioner require institutional treatment; treatment in the institution being, as far as possible, continued by the same practitioner.
9. Supply of sterilized obstetric dressings in every case.
10. Provision of ambulance facilities for patients requiring to be removed to institutions.
11. The provision of "home helps" (*i.e.*, women trained in domestic work) who would relieve the mother of the worries of domestic management during the lying-in period.

MATERNAL MORTALITY IN NEW YORK CITY.—A study of all puerperal deaths, 1930-1932, by the New York Academy of Medicine Committee on Public Health Relations. Total deaths investigated, 2,041. The number of births on which these figures were based was 348,310, of which 102,105 occurred in the home and 246,205 in hospital. Domiciliary confinements had a mortality-rate of 1.9 per 1,000, and hospital confinements a mortality-rate of 4.5. After an examination of the various factors, the Committee reports :—

"The hospital is and will remain the only proper environment for the care and management of the *abnormalities* of pregnancy, labour, and delivery. The great increase in the hospitalisation of the normal parturient has failed to bring

the hoped-for reduction in puerperal morbidity and mortality, and this in spite of great advances in our knowledge of the processes involved and the proper way of treating them. It would seem that the present attitude toward home confinement requires re-examination, and a programme looking toward an increase in the practice of domiciliary obstetrics deserves careful investigation."

Coming from such an authoritative Committee, this is a very significant expression of opinion when we remember that the United States has only four schools for midwives, that the status of midwives is much below that of our own, that their work is very imperfectly supervised, and that the midwife suffers severely from lack of co-operation, if not actual hostility, on the part of many doctors and hospitals. (Total live births attended by midwives, 29,519; death-rate per 1,000 live births, 1.6).

INTERIM REPORT OF DEPARTMENTAL COMMITTEE ON MATERNAL MORTALITY AND MORBIDITY (MINISTRY OF HEALTH, 1930.) (5,800 MATERNAL DEATHS INVESTIGATED.) FINAL REPORT, 1932.

"The Committee are of the opinion that it will not be possible ever to secure the full value of the existing knowledge of the science and art of midwifery until there is a *unified service* in which hospitals, clinics, specialists, general practitioners, midwives, and local authorities are all *interdependent* units, and that such co-operation can only be brought about by the administrative local authorities, appropriately organised by the Ministry of Health."

The type of service which commends itself to the Committee is based on two main principles—"First, that, provided *medical* ante-natal and post-natal supervision is secured, attendance on normal cases should be the function of the midwife; and, secondly, that with certain important exceptions referred to later in the Report, institutional provision should be made mainly for abnormal cases. The essential services to be provided may be summed up as below:—

"1. The provision in every case of the services of a registered midwife to act either as *midwife* or as *maternity nurse* (the midwife being responsible for normal midwifery and routine ante-natal supervision).

"2. The provision of a doctor to carry out *ante-natal* and *post-natal* examination in every case, and to attend, as may prove necessary during pregnancy, labour, and the puerperium, all cases showing any abnormality.

"3. The provision of a consultant, when desired by the attending doctor, during pregnancy, labour, and the puerperium.

"4. The provision of hospital beds for such cases as need institutional care.

"5. The provision of certain auxiliary services, dentistry, home helps, sterilized outfits, and facilities for pathological investigation, as desired by the doctor."

Certain recommendations of the Committee have a specially important bearing on any proposed maternity service, and may be quoted here :—

Training of Medical Students.—The Committee wish to impress on teaching hospitals and local authorities the need for their co-operation in the provision of facilities for the instruction of sudents in obstetrics. In order to avoid the present serious " wastage " of cases in the instruction of pupil-midwives who will not ultimately practise midwifery or take posts as health-visitors, the C.M.B. certificate should not be made a requisite for appointments in which midwifery experience is not essential.

Facilities for Post-Graduate Instruction.—The Committee recommend that steps should be taken to provide increased opportunity, either at special post-graduate hospitals or elsewhere, whereby doctors already in practice may be enabled easily to obtain further practical instruction in ante-natal care and in obstetrics.

Training and Employment of Midwives.—The Committee consider that some means should be found for providing post-certificate experience before registration as a practising midwife. " Refresher " courses should be provided for midwives already in practice and special efforts made to encourage their attendance. Except in certain rural areas, there is at present no organised service of midwives with adequate status and traditions of its own. The independent midwife is often harassed by financial anxiety, and the absence of security is discouraging.

Ante-Natal Supervision.—The Committee recommend that the care of the patient during pregnancy should, whenever possible, be undertaken by the person who will be responsible for the delivery. There is great need for more general staffing of ante-natal clinics by medical officers who are closely in touch with the actual practice of midwifery, whether they be obstetric specialists or general practitioners. Furthermore, ante-natal clinics should, whenever possible, have an intimate working connection with a hospital where maternity beds are available.

Encouragement of Specialisation.—The Committee consider it important, in order that expert obstetric advice and assistance may be readily available in every part of the country, that gynæcological departments should be established, when they do not already exist, in all the larger non-teaching provincial hospitals, and that such departments should be staffed, not by general surgeons, but by obstetricians.

Report of the Committee on Scottish Health Services (Department of Health for Scotland), 1936.

The Committee's findings and recommendations are summarised as follows :—

1. The high maternal mortality-rate of Scotland justifies national concern.

2. The problem of maternal welfare calls for the provision of a comprehensive maternity service, with the object of preserving the lives of parturient women, avoiding invalidism among mothers, and preventing the wastage of infant life.

3. The maternity service should be based on the doctor and midwife acting in concord, supplemented by consultants and institutional facilities.

4. The need for continuous medical supervision by a general practitioner would be met by an arrangement linked up with our proposals for extension of general-practitioner services. It should be part of the arrangements with the general practitioner under the maternity service that he should provide continuous ante-natal supervision, should be available for consultation at every stage of labour and the puerperium, and should report on the case to the local authority, the report to include the result of post-natal examination.

5. More practical training of doctors and midwives, along with other measures, are required to raise the general standard of midwifery practice.

6. An essential step towards raising the standard of practice of midwives is to raise their remuneration and otherwise improve their conditions and status.

7. An adequate service of trained midwives should be introduced. In arranging the supply of midwives, the authorities should be free to make arrangements with district nursing associations, to contract with individual midwives for prescribed services, or to institute a whole-time service.

8. Consultant obstetricians should be provided, so far as practicable, and the practitioners should be encouraged to use their services. The work of the clinics should be developed in co-operation with the practitioners.

9. There is a serious shortage of hospital facilities, particularly for ante-natal care. In providing these, every effort should be made to secure units large enough to justify the employment of a resident medical officer.

10. It should be a definite function of the maternity service to give advice on *medical and health* grounds on the control of conception.

11. A system of registration of still-births should be instituted.

12. The arrangements for investigating all maternal deaths in Scotland should be continued.

13. The introduction of a comprehensive maternity service on the above lines will call for special measures, possibly legal as well as administrative and financial.

Four members of the Committee made reservations regarding the proposed maternity service. Their reasons and recommendations may be summarised as follows :—

" We do not agree with the proposals for a maternity service, as the scheme outlined is based upon participation in it by general medical practitioners as part of their contract under an extended medical service for dependants. We regard this proposal as unsound. In the first place, it makes the provision of an improved maternity service contingent upon the introduction of an extended medical service for dependants, with which the administration and finance of the scheme are intimately interlocked. This association is not, in our opinion, essential to the introduction of a maternity service. A maternity service separately administered and financed would be much more satisfactory.

" In the second place, the scheme as proposed makes the services required for maternity an integral part of general medical practice; it requires that every doctor who intends to engage in contract practice will be bound by his contract to undertake maternity work, and assumes that he is both willing and able to do so. Any such condition will prejudice from the outset the success of a maternity service, at any rate in the larger centres of population, where the tendency is for doctors to exercise a choice whether they will or will not practise midwifery. For these reasons we consider that a maternity service should be an *ad hoc* service, administered and financed independently of the proposed scheme of medical benefit for dependants, and that it should be sufficiently elastic to enable local authorities to exercise a discretion as to the best arrangements suited to the circumstances of their area. An improved and extended maternity service should, in our opinion, develop along the following lines :—

" 1. The basic provision should be an improved midwife service with whole-time midwives.

" 2. A consultant or specialist service should be made available to medical practitioners where required.

" 3. Hospital facilities should be provided sufficiently adequate for abnormal conditions arising during the ante-natal period, for difficult obstetric cases, for abortions requiring indoor treatment, and for the orderly booking of cases where admission to hospital is thought to be desirable for other reasons—economic or housing.

" 4. The routine ante-natal work would continue to be based on the present ante-natal system of clinics, where these have been established, conducted in close relationship with maternity hospital units, and with a consultant service. The ante-natal centre, the midwife, and the medical practitioner would co-operate so as to secure adequate supervision during pregnancy, labour, and the puerperium. For the purposes of the scheme there would be available an approved list of medical practi-

tioners to whom midwives would appeal in cases of difficulty, and who would have available to them the services of specialist obstetricians."

"(*Signed*) A. S. M. MACGREGOR, M.D., D.P.H.
HELEN LESLIE MACKENZIE, C.B.E.
VIOLET M. C. ROBERTON, C.B.E., J.P.
JOE WESTWOOD."

MATERNITY SERVICE (SCOTLAND) BILL.

The main purpose of the Bill is to improve the standard of domiciliary midwifery in Scotland and to secure adequate nursing and medical services for domiciliary maternity cases. The 1935 report on maternal mortality and morbidity in Scotland recommended action on these lines.

The present Bill places an obligation on each local authority to make adequate arrangements within its area, and provides for an Exchequer grant towards the cost of additional services. Under :—

CLAUSE 1 (1), the local authority must provide women in their own homes with certified midwives, either by arrangement with voluntary associations employing midwives, or with midwives in private practice, or the local authority may themselves employ midwives.

CLAUSE 1 (2), every local authority shall, as required by the Department of Health, take steps to make available for every woman

(*a*) medical examination and treatment during pregnancy,

(*b*) medical supervision during childbirth and the lying-in period,

(*c*) medical examination after the expiry of one month after childbirth,

(*d*) the services of an obstetrician for consultant purposes.

After consultation with

(*a*) any voluntary organisation which employs domiciliary midwives in their area,

(*b*) such local organisation as effectively represents the opinion of midwives practising in the area,

every local authority shall submit to the Department their proposals for carrying out their duties under sub-section (1) of this section.

After consultation with such local organisation as represents the opinions of medical practitioners in the area, the local authority shall submit to the Department their proposals for carrying out the requirement of the Department under sub-section (2) of this section.

Copies of the local authorities' proposals under sub-sections (1) and (2) shall at the same time be delivered to the local organisations representing (*a*) midwives, (*b*) medical practitioners, who, if dissatisfied with the proposed arrangements, may, within two months, make representations to the Department.

7. The Department may modify or amend the proposals of the local authority.

8. The local authority and the Department shall have regard to special circumstances affecting the area, particularly difficulties of communication and sparseness of population.

9. The local authority may at any time submit revised proposals for approval to the Department, which has power to call for revised proposals.

Under CLAUSE 2 the local authority will recover appropriate fees according to a scale approved by the Department, or such part, if any, as the patient's circumstances permit. Women are enabled to authorise payment to the local authority out of maternity benefit.

CLAUSE 3 sets out the provisions governing the grants which shall be made by the Exchequer towards the cost of the new service.

On such statistics as are available, it is estimated that the total additional expenditure of the authorities on the new service may ultimately amount to £120,000 per annum.

CLAUSE 4 provides that a midwife who agrees to cease practice shall receive compensation based on her emoluments for the past three years, and that any midwife who is required to surrender her certificate by reason of age or infirmity shall receive compensation based on her emoluments for the past five years. One half of the expenditure incurred under this clause will be borne by the Exchequer.

The remaining clauses of the Bill contain provisions for preventing unqualified (excepting pupil-midwives and medical students) persons from attending on a woman in childbirth or ten days thereafter, for securing the periodical attendance of certified midwives at courses of instruction to be provided by the authorities, and for certain miscellaneous amendments in the Midwives (Scotland) Act, 1915. These latter include the scale of fees payable to medical practitioners, the qualifications of persons appointed to supervise midwives, and the grants of diplomas in the teaching of midwifery.

CASE REPORTS

A CASE OF ALVEOLAR CARCINOMA WITH METASTASES IN BRAIN AND ADRENAL GLAND

By ROBERT MARSHALL, M.D., F.R.C.P.I.,
from the Royal Victoria Hospital, Belfast.

R. N., aged 38, a coal-carter, was admitted to Ward 6 of the Royal Victoria Hospital, Belfast, on 11th April, 1936. His family history was good. He stated that he had no serious illness, that he had served in the Army during the Great War, and that he had been in his present employment for several years. On the morning of 29th February, 1936, he said, he fell when handling a sack of coal, and struck his left elbow on the ground; his forearm "tingled right down to the fingers," but he was able to continue his work. Some hours later he was having a meal in his own home when his wife said to him, "What are you doing with your left hand?" He looked down and saw that he was twitching or moving his left hand, but had not been aware of it. Soon afterwards he consulted his doctor, who advised him to go to hospital.

He attended at Doctor Lewis's out-patient department, and was shortly afterwards admitted to Ward 6.

In appearance he was a slim, dark-haired man who looked younger than stated age; he had a rather sallow, bronzed skin. He exhibited a continuously repeated, involuntary, purposeful movement of the left upper limb, involving arm, forearm, and hand, occurring about every fifteen seconds, but varying in time and intensity. Briefly, he appeared to be continuously striking his own upper abdomen. These blows were so forceful that soon the Ward Sister had to pad his abdomen with gamgee tissue to protect it. He also lurched about in the bed, trying, as he said, to stop these movements. He volunteered the information that he could throw a fit if he breathed very deeply, and proceeded to demonstrate this; after eleven deep breaths his left arm went into clonic contractions, his head and eyes turned towards the right, his face became cyanosed and his neck rigid. The "fit" lasted about thirty seconds, after which the left arm was apparently paralysed of movement, but the reflexes could be easily elicited. After two minutes the tic-like movements of left arm and hand began again, gradually increasing in intensity until the usual height was attained. Consciousness was maintained throughout. He was not encouraged to repeat this performance.

At this stage his pulse and temperature were normal. His appetite was very variable; for some days he could not be coaxed to take food, and then for a day or so he would eat quite hungrily. Physical examination revealed little or nothing: his heart, lungs, and abdomen showed nothing abnormal. His blood-pressure was 135/80. Examination of C.N.S. was equally indefinite: there was no papillœdema, but the outer halves of the optic discs were thought to be a

little pale; there was a slight adhesion of the iris of the right eye, but otherwise the pupils were normal; there was a rather doubtful coarse nystagmus to the right side.

The other cranial nerves were normal. There was slight weakness of the left hand-grip as exerted. Sensory and reflex functions were normal. X-ray of skull showed no abnormality. The C.S.F. was normal. The Wasserman reaction was negative. All these findings were strongly suggestive of "functional" condition, but two points puzzled us: first, I gave a general anæsthetic (C.E.) myself, and even when deeply anæsthetized his coarse tremor never entirely disappeared from his left hand; secondly, my house-physician, Dr. Topping, reported that his tremor persisted during natural sleep.

His general condition gradually deteriorated, and the spasmodic movement spread to the left leg and to the left side of the face, giving rise to a grotesque winking movement.

He did not improve with any sort of treatment, and his skin became noticeably more bronzed and he lost several pounds in weight. On 6th June his temperature rose to 103°F.; he died, apparently of a terminal pneumonia, on 8th June.

At post-mortem, Professor Young found a tumour, spherical in shape and about one inch in diameter, in the subcortical zone of the parietal region of the right cerebral hemisphere, and presenting foci of necrosis and hæmorrhage; a large tumour was also found which had apparently completely destroyed the left adrenal gland. These findings made the pathologist examine the bronchi and lungs with particular care: the appearances were, macroscopically, those of a terminal pneumonia involving the upper lobe of the right and the lower lobe of the left lung. The lungs, therefore, were not completely preserved, but subsequent microscopical examination of the tissue kept for this purpose showed that while the consolidation of the left lung was due to pneumonia, that of the right lung was due to the presence of the typical cells of alveolar carcinoma, and the tumours of brain and adrenal gland were metastases of this.

Photographs of these metastases, and micro-photographs of the consolidated areas of both lungs, appear in the centre inset of the Journal.

The case is an excellent example of "functional" phenomena superimposed on an "organic" base, like the elaborate superstructure of icing on the solidity of a bride's-cake, and of the difficulty of determining what is the nature of the cake underneath the icing.

The medico-legal aspect of the case is not without interest. The widow of the deceased applied to the Court for compensation under the Workmen's Compensation Act, on the grounds that the accident of 29th February, 1936, had led to his death. The employers filed an answer repudiating liability, and supported this by medical certificates from Professor Young and myself. On the day the case was to come before His Honour the Recorder of Belfast negotiations were commenced, and resulted in the claims being settled for fifty pounds, without an admission of liability, the employers paying a proportion of the costs incurred. These terms of settlement were approved by His Honour the Recorder.

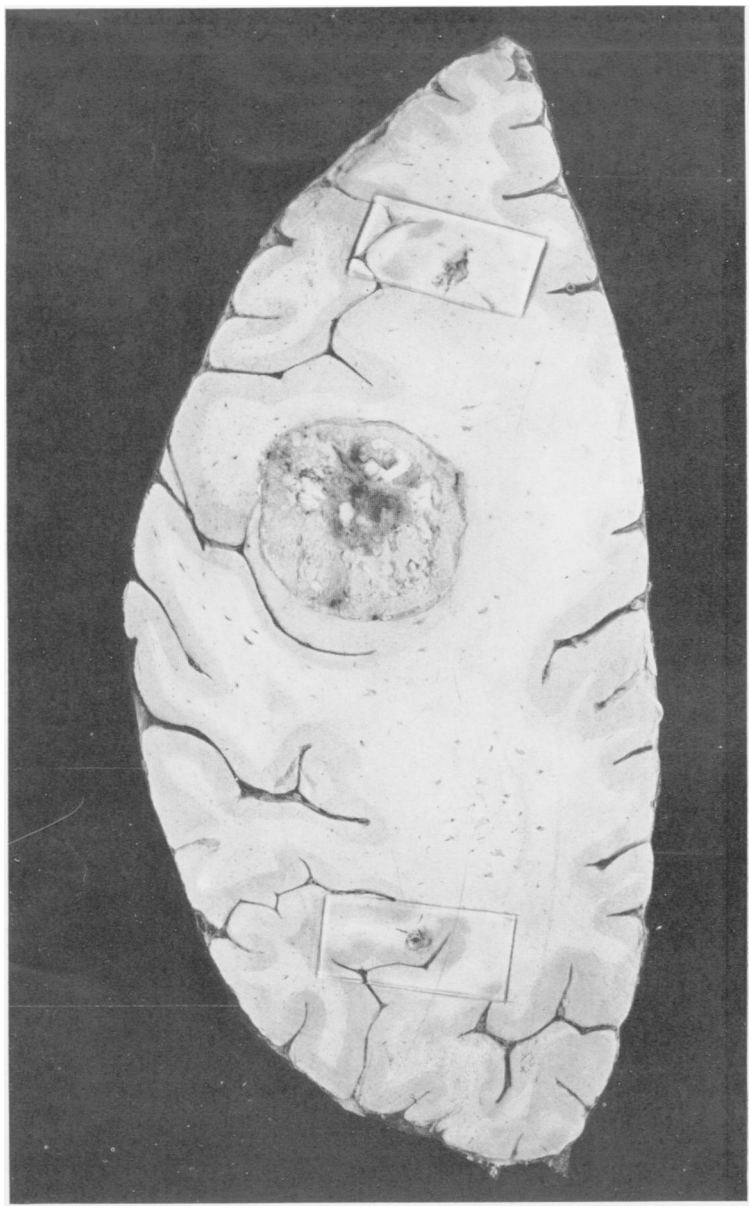


PHOTO BY MR. A. M'C. A. MAHAFFY

Cerebral Metastasis of Alveolar Carcinoma

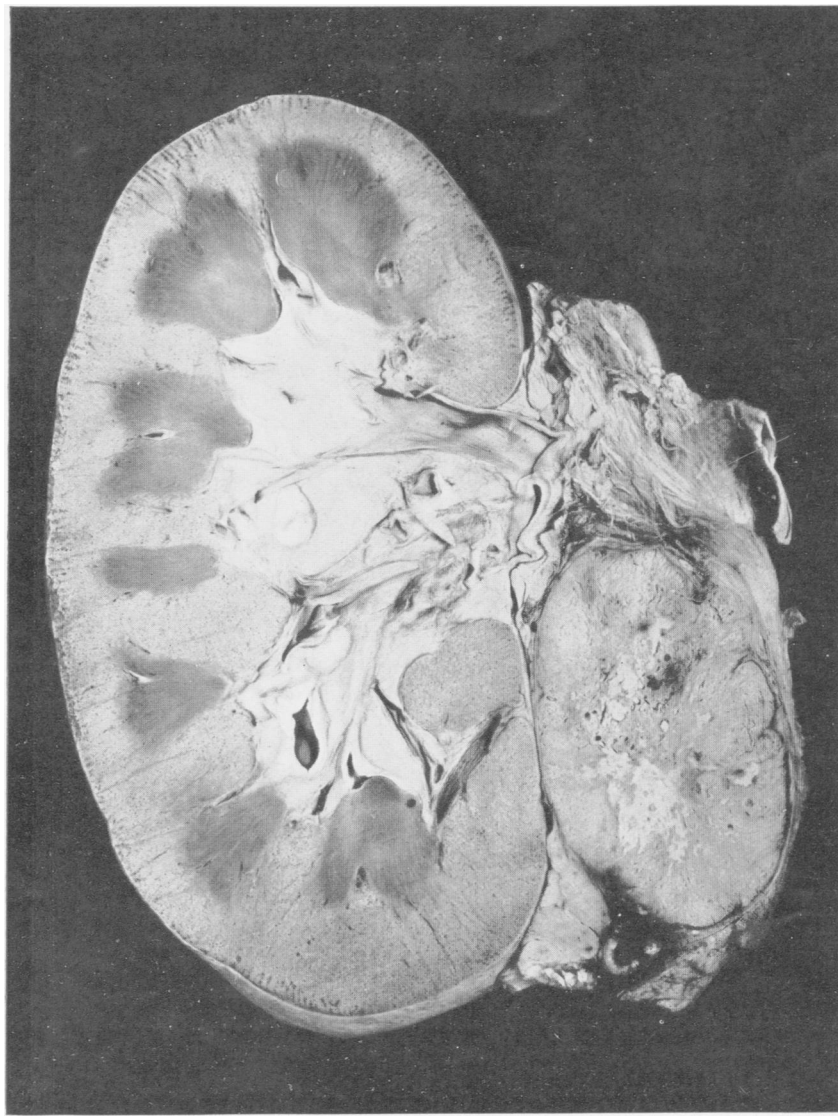
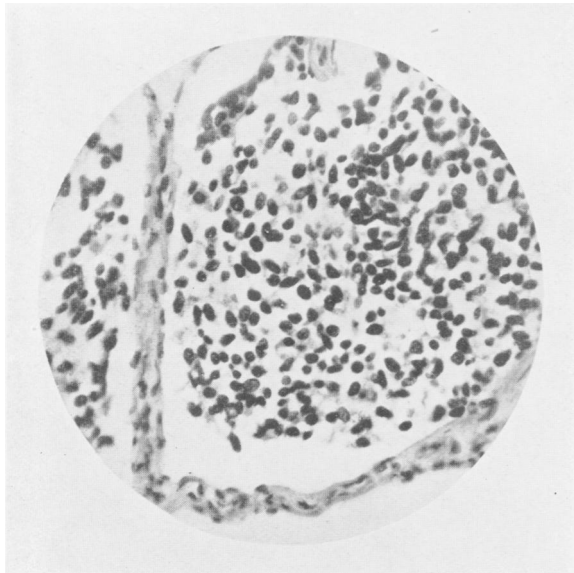
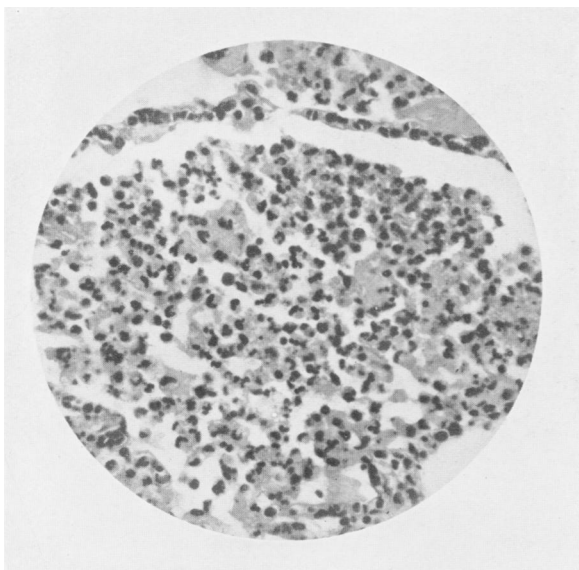


PHOTO BY MR. A. M'C. A. MAHAFFY

Adrenal Metastasis of Alveolar Carcinoma



Right Lung, Upper Lobe. Alveolar Cell Carcinoma



MICROPHOTOS BY MR. A. M'C. A. MAHAFFY

Left Lung, Lower Lobe. Pneumonic Consolidation

A CASE OF SULPHÆMOGLOBINÆMIA FOLLOWING THE ADMINISTRATION OF DRUGS OF THE SULPHONAMIDE GROUP

By F. F. KANE, M.D., M.R.C.P.I., D.P.H.
Purdysburn Fever Hospital, Belfast.

THE following case is worthy of note as an example of a possible, though rare, sequel to the administration of the sulphonamide group of drugs. The common preparations of these drugs are Prontosil (Bayer), Proseptasine (May & Baker), and Streptocide (Evans).

M. E. C., aged 21 years, unmarried, was admitted to Purdysburn Fever Hospital on 19th November, 1936, on the seventh day of puerperium following the normal delivery of a full-term infant.

On the fifth day of an apparently normal puerperium she had had a sharp rigor and vomited once; her temperature at that time is not reported. Next day she complained of sore throat, with a temperature of 104°. On the following day, with a persisting sore throat and malaise, and the development of a scarlatiniform rash on trunk and limbs, she had a temperature of 103.8°. She was given 30 c.c. scarlatina antitoxin intramuscularly before admission to this hospital.

On admission she had a scarlatiniform rash on her limbs only, temperature 102° and pulse 120; tongue dry and coated, and moderately congested fauces with palpable angular glands. She had a soft tender fundus at the umbilicus, with foul scanty lochia, and a perineal repair threatening to give way. Her right breast was engorged and tender.

From 20th November the patient was given Proseptasine tablets gm. 0.5 at the rate of two thrice daily, increased to four times daily on 21st. These were omitted on 23rd in favour of Prontosil tablets gm. 0.3 three thrice daily, increased on 24th to four times daily, and omitted entirely from 25th. In all she had twenty tablets of Proseptasine from 20th to 23rd and twenty-one tablets of Prontosil from 23rd to 25th. At the same time she was having an alkaline mixture of pot. cit. and pot. bicarb. of each 3 drahms daily; quinine and ergot; and two drahms of magnesium sulphate every morning from 20th November to 10th December.

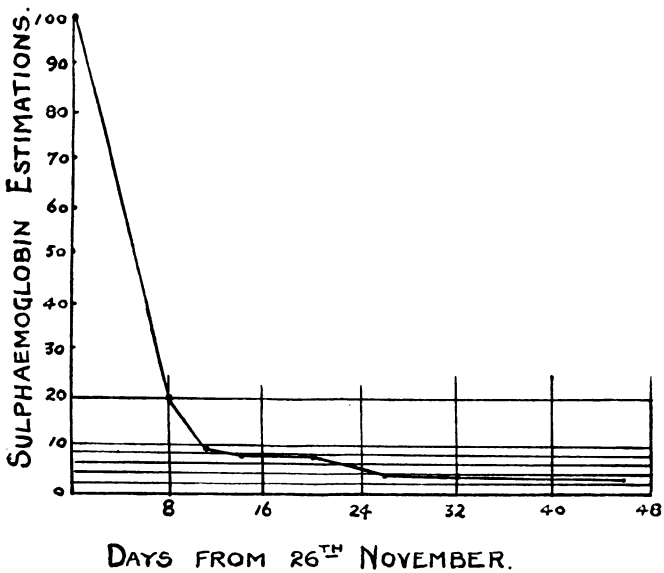
During the afternoon of 22nd November cyanosis of the features and extremities developed without any symptoms. This cyanosis increased steadily to a maximum on 26th November, and during this time the appearance of the patient, asleep or awake, suggested the imminence of death, but she was constantly bright and without any symptom attributable to the cyanosis. Dyspnœa was never present, and the cyanosis did not yield to oxygen administration. Her temperature became normal on 23rd November, and thereafter was only once above 98.4°, with the development of a serum rash on 30th November. Her pulse-rate whilst the cyanosis was maximal varied from 72 to 80. With the onset of cyanosis a small petechial spot appeared at the margin of the hair on

the forehead, and became necrotic, finally crusting to leave a superficial scar. The perineal sutures sloughed and were removed on 23rd November. The uterine condition became satisfactory, the lochia and involution behaving normally. Mastitis of the right breast progressed to abscess formation with discharge from 7th till 16th December. At no time was albuminuria present.

On 26th November the diagnosis of enterogenous cyanosis was made, and the following spectroscopic examinations on the patient's blood were carried out. Sulphæmoglobin was demonstrable spectroscopically in the patient's blood on 26th November, but was not present in her urine. Regarding the cyanotic condition as maximal clinically at that date, and taking the quantity of sulphæmoglobin then demonstrable at the optional figure of 100, the following estimations of the sulphæmoglobin were obtained subsequently :—

26/11/36	-	100.0	16/12/36	-	7.0
4/12/36	-	20.0	22/12/36	-	5.5
7/12/36	-	9.5	28/12/36	-	4.0
10/12/36	-	7.5	11/1/37	-	3.0

These figures are graphically appended and show an amazing lag in the elimination of sulphæmoglobin following a rapid diminution during the eight days between the first two estimations. Further estimations of sulphæmoglobin were rendered impossible, if not unnecessary, by the patient's discharge from hospital on 14th January, 1937. She had made a complete recovery, and was up and about from 14th December. There was no clinical evidence of cyanosis after 7th December, i.e., when the sulphæmoglobin had fallen to the figure of 9.5.



GRAPH OF SULPHÆMOGLOBIN ESTIMATIONS.

SUMMARY.

The development of symptomless cyanosis followed the administration of drugs of the sulphonamide groups. The simultaneous administration of magnesium sulphate is to be noted as a probable etiological factor. Colebrook[1], in his first series of forty cases, all of whom were taking magnesium sulphate, had three cases of sulphæmoglobinæmia. In his second series[2] of twenty-six cases similarly treated with Prontosil, but excluding magnesium sulphate, no case of cyanosis was observed. The possible association of magnesium sulphate with an azo dye in producing sulphæmoglobinæmia was mentioned by Van den Bergh and Revers.[3]

Recovery from the condition was spontaneous, and apparently no ill-effects result.

I am indebted to Professor W. W. D. Thomson for advice and assistance, Professor D. C. Harrison for the spectroscopic examinations, and Dr. A. Gardner Robb for permission to record the case.

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CHILD OF FIVE YEARS WITH GALL STONES: REMOVAL OF SPLEEN AND GALL BLADDER

By IAN FRASER, M.D., M.CH., F.R.C.S.I., F.R.C.S.ENG.

MARY, aged five years, was the sixth child of a large family. Her siblings were normal, and the family history on both the maternal and paternal side was negative. She herself from the age of ten months had suffered from jaundice, off and on, and with varying intensity of colour.

She had exacerbations when this painless jaundice was very deep, but at all times her urine was free from bile. There was marked increase in the fragility of her red-blood cells, and she was in all respects a typical case of acholuric jaundice of the congenital variety, with absence of family or hereditary history. The spleen was moderately enlarged, painless, smooth, and freely mobile.

The operation of splenectomy was performed through a vertical incision along the outer border of the left rectus: this gives, I think, the best approach and allows rotation of the spleen more readily than the transverse incision used by some. As is usual in such cases, there were no adhesions; the spleen was easily exteriorized and the pedicle ligatured. The spleen enlarged four to eight times its normal size is always easier to remove than either the normal spleen or the giant enlargement, where almost the whole abdomen is filled. These moderate enlargements

SUMMARY.

The development of symptomless cyanosis followed the administration of drugs of the sulphonamide groups. The simultaneous administration of magnesium sulphate is to be noted as a probable etiological factor. Colebrook[1], in his first series of forty cases, all of whom were taking magnesium sulphate, had three cases of sulphæmoglobinæmia. In his second series[2] of twenty-six cases similarly treated with Prontosil, but excluding magnesium sulphate, no case of cyanosis was observed. The possible association of magnesium sulphate with an azo dye in producing sulphæmoglobinæmia was mentioned by Van den Bergh and Revers.[3]

Recovery from the condition was spontaneous, and apparently no ill-effects result.

I am indebted to Professor W. W. D. Thomson for advice and assistance, Professor D. C. Harrison for the spectroscopic examinations, and Dr. A. Gardner Robb for permission to record the case.

REFERENCES.

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2. COLEBROOK, L., and KENNY, M.: Ibid., 1936, ii. 1,319.
3. VAN DEN BERGH, H., and REVERS, F. E.: Deut. Med. Woch., 1931, lvii., 706.

CHILD OF FIVE YEARS WITH GALL STONES: REMOVAL OF SPLEEN AND GALL BLADDER

By IAN FRASER, M.D., M.CH., F.R.C.S.I., F.R.C.S.ENG.

MARY, aged five years, was the sixth child of a large family. Her siblings were normal, and the family history on both the maternal and paternal side was negative. She herself from the age of ten months had suffered from jaundice, off and on, and with varying intensity of colour.

She had exacerbations when this painless jaundice was very deep, but at all times her urine was free from bile. There was marked increase in the fragility of her red-blood cells, and she was in all respects a typical case of acholuric jaundice of the congenital variety, with absence of family or hereditary history. The spleen was moderately enlarged, painless, smooth, and freely mobile.

The operation of splenectomy was performed through a vertical incision along the outer border of the left rectus: this gives, I think, the best approach and allows rotation of the spleen more readily than the transverse incision used by some. As is usual in such cases, there were no adhesions; the spleen was easily exteriorized and the pedicle ligatured. The spleen enlarged four to eight times its normal size is always easier to remove than either the normal spleen or the giant enlargement, where almost the whole abdomen is filled. These moderate enlargements

seem to draw out a fair-sized pedicle for themselves, and yet are not so enormous that approach to the pedicle is impossible.

Prior to closing the abdomen, the gall-bladder—small, firm, thick-walled, and contracted—was examined, and found to contain up near the cystic duct three calculi, each the size of a small pea.

Cholecystectomy was perfomed, which was not easy through the left-sided incision, particularly as the gall-bladder was small and fibrosed. The liver was normal in appearance.

Gall-stones are not infrequent with acholuric jaundice, although most common with the adult or acquired type, in whom they are said to be as frequent as forty per cent.

With the congenital variety they are said to occur less frequently, and the percentage is not mentioned. This naturally is difficult to ascertain, as the cases are all operated upon at different ages. These stones are usually regarded as a deposit of inspissated bile, but in this particular case a radiogram of the gall-bladder when removed showed that the calculi were rich in calcium, and the fact that the gall-bladder was thick and fibrosed suggested a cholecystitis of some sort, and further, the examination of the calculi themselves showed that they were of the mixed variety, with calcium, cholesterol, and bile pigments (Dr. J. A. Fisher).

What is the correct treatment in such a case—removal or drainage? In this case with thickened wall, removal was justified, but with normal transparent wall —would drainage or cholecystotomy with closure be correct? By some it is advised to crush the stones with the fingers through the gall-bladder wall, which sounds very unconvincing.

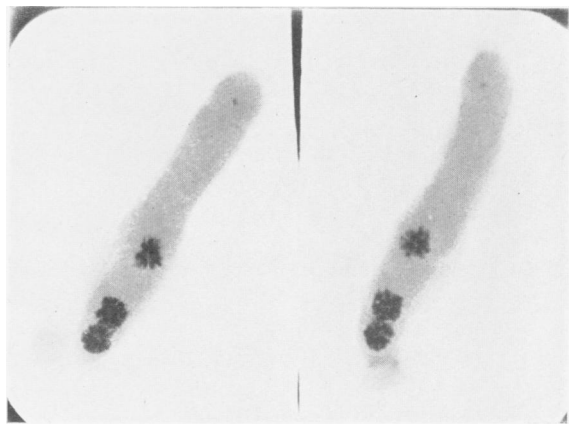
The case is interesting in a child of this age. The child has since lost her jaundice and is free from all symptoms.

I wish to thank Dr. Rowland Hill, under whose care in the Belfast Hospital for Sick Children the child has been.

ROYAL MEDICAL BENEVOLENT FUND SOCIETY OF IRELAND

Doctor A. G. Malcolm's "History of the Belfast General Hospital" (published in 1851) is a treasure-house for all those who find an interest in the early days of Medical Charity in Belfast, and here is a paragraph from its pages:

> A benevolent institution in connexion with our profession was originated in 1842. The 26th of May was the first day of its existence, for which we are indebted to the vigorous and untiring exertions of Doctor Kingsley, of Roscrea, who named it the Medical Benevolent Fund Society of Ireland.



X-Ray of Specimen after Removal
It shows Contracted Gall Bladder and Three Stones

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One year had scarcely elapsed, when many members of the Belfast Medical Society became convinced of its importance; and, accordingly, on the suggestion of the late Doctor Sanders, in February, 1843, a Branch was formed in this town. The object of the Fund is the "relief of Medical men, under severe and urgent distress, occasioned by sickness, accident, or any other calamity." Under circumstances of peculiar emergency, relief may also be afforded to the Widows and Orphans of Medical Practitioners.

Based upon these simple views, the Society, from possessing on the close of the first year only the small sum of £360, can now boast of having funded £2,648, besides having an annual income of above £300; and, in addition, the late Mr. Carmichael has bequeathed, in reversion, the munificent sum of £4,500. Other Branches have already been formed at Armagh, Cork, and Newry. Within the last twelve months, 47 families, consisting of five medical men, with their wives and children, 32 widows, and 119 orphans, have been relieved; and, when it is understood that, amongst the suppliants, are found the relations of men who once held the highest rank in the profession, the necessity for this noble institution must be apparent to the least reflecting mind. Indeed, there is no profession—no calling in which life is so precarious as ours, and nowhere is this truth more deeply confirmed than in this very country, where the fever-plague is constantly creeping about, "seeking whom it may devour." . . . The Society's annual operations carry with them their own justification and their own claims. Let it suffice to say, in the touching language of Scripture:—"It has delivered the poor that cried; the fatherless and him that had none to help"; and has caused "the widow's heart to sing for joy."

We can readily understand Doctor Malcolm's delight that at last something was being done to relieve the suffering of the widows and orphans of his comrades. It is obvious that he felt that this was the beginning of a noble work, and that even the distribution of some £425 amongst 170 recipients was an occasion of rejoicing. His claim that the calling was most precarious is amply justified by the records of the time. For example, in the annual report of the Belfast General Hospital (now the Royal Victoria Hospital) for 1847 we read, "The mortality from fever among the medical profession in Ireland during the past year has been considerably greater than that of the British officers engaged in the Peninsular War."

Typhus no longer decimates our ranks, but medicine is still the most risky of the peaceful professions, and the income on a couple of thousand pounds of life-insurance does not give a widow and family the bare necessities of life.

The grants are still too small, and we very urgently ask your help. Last year £1,901. 10s. was divided over the 248 persons who were applicants for relief and their dependants. This meant a grant of £7. 13s. 4d. per person. Of the £1,901. 10s., less than £870 represented the income from subscriptions, the remainder having been derived from the interest on legacies and donations.

What a difference it would make if every medical man—*and* medical woman—actually earning money in Ireland were each to give a guinea a year! Then indeed we might claim, with greater reason than Doctor Malcolm, that the Society had "delivered the fatherless and him that had none to help, and caused the widow's heart to sing for joy."

ROBERT MARSHALL,
Hon. Secretary and Treasurer, Co. Antrim Branch.
9 College Gardens, Belfast.

BRITISH MEDICAL ASSOCIATION
105TH ANNUAL MEETING, BELFAST, 1937

THE second draft programme for the 105th Annual Meeting will in all probability appear in the "B.M.J." before this report is published, and it is unnecessary to repeat it here. Several of the items on this programme are more than usually interesting. The tours arranged for the representatives and members include visits to the Mourne Mountains and the Silent Valley Waterworks, with the additional attraction of afternoon tea at Mrs. Leathem's, when we will have an opportunity of seeing her magnificent gardens at "Mount Norris." The other principal tour includes the Antrim Coast Road and Giant's Causeway, and is bound to attract a large number of our visitors, even though it is no longer a novelty for us.

The principal industrial concerns of the town have been good enough to arrange visits for us to their works.

The arrangements for the evening functions have now been worked out in greater detail. Professor Johnstone's reception will be held in the University, and it will be possible to invite all the members and their ladies to it. On the following evening the civic reception will not be able to accommodate all our visitors, but alternative diversion in the form of a public dance in Belfast, as well possibly as a dance on board the "Almanzora," has been arranged. An innovation will be made on the evening of Thursday, 22nd, when, instead of the annual dinner, a dinner-dance will be held in the King's Hall, Balmoral, and the twelve hundred guests whom the Hall will dine will doubtless find this arrangement rather more congenial than a more formal dinner. A special dance-floor will be laid down, some six thousand square feet in size, this being as large as any dance-floor in Belfast.

The Scientific Programme is now almost complete. Considerable use is being made of the cinematograph, especially the talkie film, to demonstrate clinical subjects. The Association is fortunate in having been offered the use of his talkie film of "Breech Delivery," by Professor Joseph De Lee, of Chicago, and several other sound films will also be used.

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The joint meetings of the Section of Medicine on "Hæmorrhagic States," with Pathology, and on "Lung Abscess," with Surgery, are of such general interest that probably not even visits to industrial concerns or private gardens are likely to prove serious rivals.

At the scientific meetings, the various sections have arranged programmes mainly of set discussions. The following is the list of discussions already arranged, with the names of the openers.

SECTION OF ANATOMY, PHYSIOLOGY, AND BIO-CHEMISTRY.

Discussion No. 1—"The Sex Glands," to be opened by Professor E. C. Dodds, London.

Discussion No. 2—"Visceral Pain," to be opened by Professor John Morley, Manchester.

SECTION OF DERMATOLOGY.

Discussion No. 1—"Autophytic Dermatitis," to be opened by Dr. Henry MacCormac, London.

Discussion No. 2—"Afflictions of the Eye in Relation to Skin Diseases," to be opened by Mr. J. A. Doggart. The Section of Ophthalmology will take part in this discussion.

SECTION OF DISEASES OF CHILDREN.

Discussion No. 1—"Dilatation and Elongation of the Colon," to be opened by Professor J. R. Learmonth, Aberdeen.

Discussion No. 2—"Enuresis," to be opened by Dr. Robert Hutchison, London.

SECTION OF HYGIENE AND PUBLIC HEALTH.

Discussion No. 1—"Enteric Fever," to be opened by Dr. Ritchie, Dumfries.

Discussion No. 2—"Prevention and Treatment of Diphtheria," to be opened by Dr. A. Gardner Robb.

SECTION OF MEDICINE.

Discussion No. 1—"The Hæmorrhagic States," to be opened by Professor L. J. Witts, London. The Section of Pathology will take part in this discussion.

Discussion No. 2—"The Diagnosis and Treatment of Abscess of the Lung," to be opened by Dr. Burrell, London. The Section of Surgery and Radiology will take part in this discussion.

Discussion No. 3—"Cholecystitis," to be opened by Professor J. W. McNee, Glasgow.

SECTION OF MEDICAL SOCIOLOGY.

Discussion—"The Wider Issues of Health Legislation in Industry," to be opened by Dr. L. P. Lockhart, Nottingham. This discussion will be open to the general public.

SECTION OF NEUROLOGY AND PSYCHOLOGICAL MEDICINE.

Discussion No. 1—"Early Diagnosis of Cerebral Tumours," to be opened by Dr. F. M. R. Walshe, London, and Dr. N. M. Dott, Edinburgh.

Discussion No. 2.—"The Mental Manifestations of Head Injuries," to be opened by Dr. J. P. Martin, London.

Section of Nutrition.

Discussion No. 1.—"The Nutritional Needs of Pregnancy," to be opened by Sir Robert McCarrison, Oxford, Dame Louise McIlroy, London, and Dr. McGonigal, Stockton-on-Tees. The Section of Obstetrics and Gynæcology will take part in this discussion.

Discussion No. 2.—"The Physiological Basis and the Standards of Nutrition," to be opened by Professor S. J. Cowell, London.

Section of Obstetrics and Gynæcology.

Discussion No. 1.—"The Nutritional Needs of Pregnancy," in conjunction with the Section of Nutrition.

Discussion No. 2.—"The Clinical Value of Prontosil and Similar Compounds in the Treatment of Puerperal Infections," to be opened by Mr. G. F. Gibberd, London.

Professor Joseph De Lee has generously lent the Association his talking motion picture of the Forceps Operation, including Episiotomy and its Anatomy . . . this also includes delivery of the after-coming head and resuscitation of the new-born child.

Section of Ophthalmology.

Discussion.—"Squint and Heterophoria, with Special Reference to Orthoptic Treatment," to be opened by Mr. W. H. McMullan, London.

Section of Orthopædics.

Discussion No. 1.—"Operation Treatment and Results in Fractures of the Neck of the Femur," to be opened by Professor Hey Groves, Bristol, Dr. Eliss Jones, Los Angeles, and Mr. H. O. Clarke, Manchester.

Discussion No. 2.—"Modern Treatment of Club Foot," to be opened by Mr. Dennis Browne, London, and Mr. E. P. Brockman, London.

Section of Oto-Rhino-Laryngology.

Discussion.—"Prevention and Treatment of Diphtheria," to be opened by Dr. A. Gardner Robb. The Section of Hygiene and Public Health will take part in this discussion.

Section of Pathology.

Discussion No. 1.—"The Hæmorrhagic States," in conjunction with the Section of Medicine.

Discussion No. 2—"Bone Tumours," to be opened by Dr. R. E. Roberts, Liverpool, Professor J. S. Young, Belfast, and Mr. Harry Platt, Manchester. The Sections of Radiology and of Orthopædics will take part in this discussion.

Discussion No. 3—"Influenza," to be opened by Dr. C. H. Andrews, London.

Discussion No. 4—"Staphylococcal Infections in Man," to be opened by Professor J. W. Bigger, Dublin.

Section of Pharmacology and Therapeutics.

Discussion No. 1—"Individual Variations in Response to Drugs," to be opened by Professor A. J. Clarke, Edinburgh.

Discussion No. 2—"The Treatment of Circulatory Failure," to be opened by Dr. Crighton Bramwell, Manchester.

Discussion No. 3—"Anæsthesia in Minor Surgery," to be opened by Dr. J. H. Challis, Woodford Green.

Section of Radiology.

Discussion—"Bone Tumours," with the Sections of Pathology and Orthopædics.

Section of Surgery.

Discussion No. 1—"The Surgical Treatment of Non-stenosing Peptic Ulcer," to be opened by Professor John Morley, Manchester.

Discussion No. 2—"Obstructions of the Common Bile Duct," to be opened by Mr. E. R. Flint, Leeds.

Section of Tuberculosis.

Discussion No. 1—"Tuberculosis in Hospital Workers," to be opened by Dr. Peter W. Edwards.

Discussion No. 2—"The Early Diagnosis of Pulmonary Tuberculosis," to be opened by Dr. G. Marshall, Leeds.

Discussion No. 3—"The Surgical Treatment of Apical Tuberculous Cavities," to be opened by Dr. Carl Semb, Oslo.

Discussion No. 4—"Artificial Pneumothorax with Special Reference to Bilateral Collapse," to be opened by Dr. J. Crockett, Glasgow.

In addition to the above discussions, in which many outstanding members of the medical profession will take part in addition to the openers, there will be an important series of individual papers, ranging over a wide variety of topics.

R. W. M. Strain,
Hon. Asst. Sec., General Section.

9 University Square, Belfast.

BRITISH MEDICAL ASSOCIATION
NORTH-EAST ULSTER DIVISION

THE Division met in the British Legion Hall, Magherafelt, on 19th February. The chairman, Dr. Sloan M. Bolton, was in the chair, and there was a fair attendance.

Professor R. J. Johnstone, M.P., President-Elect of B.M.A., read a most interesting paper on maternity services in Northern Ireland. He began by saying that he intended to ask for information from country practitioners rather than to give information. He then raised many points on which the authorities wished to find out the experience of doctors in rural districts. The questions, for instance, of facilities for ante-natal and post-natal care and treatment for sepsis, required attention. The speaker also inquired as to what extent midwives have replaced doctors, and if this was desirable; also, if the unqualified midwife still existed. He also asked what arrangements were made for anæsthetics in difficult cases, and how the services of specialists were obtained when necessary.

Professor Johnstone insisted that every primipara should see a doctor, also every multipara, and that septic cases should always be treated in hospital. Every patient should have the benefit of a post-natal examination.

Finally, Professor Johnstone suggested that the Division might form a small committee to obtain information on these points, in which case he would be glad to arrange for one or two members to give evidence before the inter-departmental committee in Belfast, at present considering these problems. An interesting discussion followed, during which many present gave their opinions and experiences.

On the proposal of Dr. Hegarty, seconded by Dr. Evans, an enthusiastic vote of thanks was given to Professor Johnstone for his most stimulating address.

The usual silver collection for medical charities was taken, and the meeting adjourned for tea.

J. M. HUNTER, *Hon. Secretary*

15 Eglinton Terrace, Portrush.

BRITISH MEDICAL ASSOCIATION
NORTHERN IRELAND BRANCH

THE Whitla Medical Institute was filled to capacity on 4th February last, on the occasion of the lecture on "Air-Raid Precautions from the Medical Aspect," by Major H. S. Blackmore, of the Air-Raids Precautions Department of the Home Office, London. The audience included prominent officials from the Ministry of

Home Affairs, the Belfast Corporation and University. The lecture was very informative, and Major Blackmore had a most attentive audience during his address, which dealt with the menace of incendiary bombs, high-explosive bombs, and various gases, and the measures to be adopted in dealing with air attacks. At the conclusion he gave an outline of the organization of medical services which is being established for the protection of the civilian population.

The visit of Major Blackmore was utilised also for an address to University students in the Great Hall and to nurses in the King Edward VII Memorial Hall of the Royal Victoria Hospital on the next day.

In view of the many activities in connection with the organization of the 105th Annual Meeting of the Association, it has been decided not to hold the usual Clinical meeting on the occasion of the annual meeting of the Branch in May.

F. M. B. ALLEN, *Hon. Secretary.*

REVIEWS

EXPERIMENTAL PHYSIOLOGY. By George H. Bell, M.B., B.Sc. John Smith & Son (Glasgow), Ltd., 1937. pp. 70. Price 4s. 6d. net.

This book gives detailed instructions for the carrying out of a series of experiments in practical physiology for medical students. It consists of thirty-two hours laboratory work. Of this time, fourteen hours are spent in frog experiments and the remaining eighteen hours in practical work in human physiology, the whole comprising a well-balanced course. The work in the latter half of the course has been designed to give the student some insight into clinical methods as well as to illustrate his lecture course in physiology, and this aspect of the work is to be highly commended.

Clear descriptions are given of apparatus used, which is not elaborate. A captious critic might point out that the switchboard, for example, in use at Glasgow University is not necessarily installed at all medical schools, but the fundamentals of the apparatus are clearly set out and points usually puzzling to the students are clearly explained.

The illustrations are few, but well chosen. Descriptions of method only are given, the student being left to enter his own conclusions, the book being interleaved with plain paper for the purpose, and for the entering of records, so that on completion of his course he may have a reference work of personal observations.

The book should lessen the work of teachers where this course is adapted, as practically no further explanations should be necessary. It is attractively bound in paper boards strong enough to withstand the abuse that such a volume will necessarily receive in a junior laboratory.

SICK CHILDREN. By Donald Patterson, B.A., M.D., F.R.C.P.Lond. Second Edition. London: Cassell & Co., Ltd. pp. 600; figs. 73, plates 15. Price 12s. 6d. net.

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but etiology and pathology have been most carefully reviewed. The less common maladies of childhood are printed in small type—a fact which should prove helpful to the time-harassed student. The illustrations are a very valuable asset. They have been very carefully selected, and from them one can appreciate the truth of the saying: "The ricketty child has the head of a philosopher, the chest of a greyhound, the legs of a grand piano, and the 'tummy' of a poisoned pup."

In the chapter on blood, Dr. Paterson classifies anæmia as either deficiency or hæmolytic. The perusal makes one wonder how much do these repeated classifications of various diseases help us; they certainly add to the burdens of the student. The chapter on diseases of the circulation is rather summarily dealt with—a slight defect in an otherwise good book. Other features demanding attention are:—A series of recent examination papers on diseases of childhood, a chart showing the dosage of certain drugs for children at various ages, and a table of normal data concerning the cerebro-spinal fluid, fæces, and blood. One feels sure that this book will prove very popular both with the student and the general practitioner.

PRACTICAL METHODS IN THE DIAGNOSIS AND TREATMENT OF VENEREAL DISEASES. By David Lees. Revised by Robert Lees, M.B., F.R.C.P.Ed. Third Edition. Edinburgh: E. & S. Livingstone, 1937. pp. 608; figs. 85, coloured plates 8. Price 15s. net.

The third edition of this well-known book has been brought up to date by Dr. Robert Lees, with the aid of a number of the late Dr. David Lees's colleagues. He is to be congratulated on the result of his work, for he has succeeded in improving even the last edition. Much of the text has been rewritten, notably the chapters on Syphilis of the Nervous System and on the Cardio-vascular System. The chapter dealing with chancroid, phagedena, inguinal bubo, etc., is practically new material, and the chapter on Vulvo-vaginitis of Children has been largely rewritten. The pharmacopœia of the last edition has been condensed with great advantage, and two useful appendices have been added. Appendix I contains a list of the commoner drugs used in the treatment of syphilis, with their trade names, sources of supply, etc. Appendix II contains a list of clinics for the treatment of venereal diseases throughout the world. This list will be of great value for reference by doctors in the treatment of travellers, seamen, and others, so that information may be given them where clinics are available, and so help in securing that continuity of treatment which is so desirable.

The printing and publication of this book is equal to the high standard set in previous editions, and the illustrations, many of which are in natural colours, are well chosen. Indeed, nothing but praise can be offered in any notice of this book, and even the most hypercritical reviewer would have difficulty in finding any faults to criticize.

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