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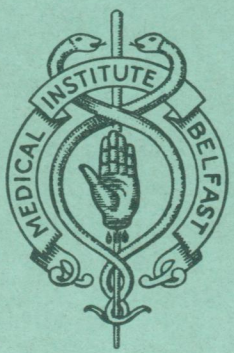

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ULSTER MEDICAL JOURNAL

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Some Aspects of Myocardial Disease

Presidential Address, Ulster Medical Society

By ROBERT MARSHALL, M.D., F.R.C.P.I., D.P.H.

LADIES AND GENTLEMEN,

The subject about which I should like to talk to you this afternoon is one to which there has been devoted a great deal of patient and diligent research, both clinical and pathological, not only in these islands, but perhaps to an even greater extent on the Continent of America.

It appears to have been tacitly agreed that the word myocarditis should be restricted to purely inflammatory conditions and their sequelæ, and that it should not include the degenerations, and the changes in heart-muscle which are thought to be the result of disease of the coronary vessels themselves. From a strictly etymological point of view this restricted application is open to criticism, because the suffix "itis" is (I am informed by my friend the Reverend Principal Davey, for I, like the Vicar of Wakefield, have very little Latin and less Greek) a Greek ending of feminine nouns and adjectives, and means belonging to or concerned with, as in ἡ γυνὴ ἡ Σαμαρεῖτις , the woman belonging to Samaria.[32] In Greek medicine it was used originally as an adjective with νόσος , the word for disease, and then this noun was left out and understood, so that such words as arthritis and nephritis mean disease of the joints or disease of the kidneys, and etymologically there is no ground for taking the word as implying inflammation in particular. Nevertheless, this narrower connotation has its advantages, and it has obviously come to stay.

In an attempt to approach the problem, I have studied the post-mortem reports of almost seven hundred routine necropsies performed in the Queen's University Pathology Department, under the direction of Professor J. H. Biggart, from 1938 to 1942. These reports give not only the naked-eye appearances, but the results of histological examination of the principal organs of the body. I found that 155 cases had shown evidence of pathological change in the heart, and with the kind help of Professor Biggart, I have considered these in detail and have tried to classify them in the light, not only of their pathological findings, but with reference to the clinical data available. It was not always easy to be certain of the reason why death had taken place, or how the case should be classified; and it was particularly difficult in many of the cases which showed coronary disease. This has been well expressed by Kaufmann,[18] who said that "a pathologist looking at two hearts similarly involved in coronary sclerosis with secondary myocardial fibrosis cannot tell in which case there has been a stormy clinical upset and in which case the symptoms have been mild and latent." Sometimes there was an embarrassment of richness of pathological change, so that one wondered why the patient had lived so long, and sometimes very careful search failed to show why the patient died. The table which follows shows how the cases were distributed :—

Hospital In-Patients.		
Coronary arterio-sclerosis		Cases
(a) with infarction	14	
(b) with ventricular failure	6	—20
Hypertensive disease		18
Rheumatic carditis		
healed	15	
active	1	—16
Toxic myocarditis		
(a) in goitre	1	
(b) in respiratory disease	9	
(c) in septic surgical conditions	5	—15
Acute bacterial endocarditis		12
Endocarditis lenta		12
"Brown atrophy degeneration"		8
Fatty heart		5
Syphilis of aortic valves		3
"Monckeberg" disease of aortic valves		2
"Beri-Beri" heart		1
"Carried in dead"		43

It will be seen that almost one-third of these cases were carried into hospital dead, and as they present some points of interest, I shall consider these separately.

The ward cases do not, of course, represent in true proportions the incidence of myocardial disease in the community, for at least three reasons :—

(a) The hospital does not take cases of the infectious fevers.

(b) Relatively few children are included, and

(c) Because of the prejudice which still exists amongst the public, post-mortem examinations are not made in every case, but naturally are more frequently obtained in doubtful or difficult cases, and conversely when the clinician is confident that he knows exactly what happened, he is less likely to press for a necropsy.

The Classification of Myocardial Disease.

Various classifications of myocardial disease have been suggested. One of the most satisfactory is that given by Madelaine R. Brown of Boston in 1932,[6] based on one thousand consecutive post-mortems in which 110 showed myocardial fibrosis.

Madelaine Brown's Classification.

(1) Focal infectious myocarditis.
  (a) Acute.
  (b) Chronic.
(2) Toxic myocarditis.
(3) Interference with blood-supply.
  (a) Thrombosis or embolism.
  (b) Ischæmic necrosis from slow reduction of blood-supply.

Before reading Dr. Brown's article, I had attempted a classification on similar lines, but with more details.

Classification of Myocardial Disease.

Infective.

(a) Specific : 1. Rheumatic.
2. Tuberculous. } Rare.
3. Gummatous. }

(b) Non-specific : 1. Toxic, e.g., diphtheria and other fevers.
2. Septic, e.g., in septicæmia and in association with bacterial endocarditis.
3. "Isolated" myocarditis.

Degenerative.

Fatty infiltration.
Fatty "replacement."
Brown atrophy.
Endocrine (e.g., myxœdema).
Avitaminosis ("beri-beri" heart).

Vascular.

Coronary : 1. Ischæmia.
2. Infarction.
3. Fibrosis.

Myocarditis.

Of the true myocarditides much the most important is the rheumatic type, of which the Aschoff body is the pathological trade mark. It was present in its various phases in each of the cases classified as rheumatic in this series. In one case of thyroid disease with toxic changes in heart-muscle there was mitral stenosis, but there were no Aschoff bodies. (In three other "thyroid" deaths no recognizable changes in heart-muscle were found, and they were therefore excluded.)

In the two cases of death from tuberculosis which showed myocardial change there was nothing "specific" of tuberculosis found. No case of syphilitic myocarditis without aortic, valvular, or coronary disease was encountered. Diphtheria is notoriously associated with cardiac symptoms and signs, at first apparently of toxic type, giving rise to necrosis of muscle fibres, and later causing chronic inflammatory changes of perivascular distribution. Many other fevers may produce myocarditis, but apart from transient toxic effects true myocarditis is apparently not very common.

In septic conditions the heart may suffer infection: in the cases here recorded this seemed to have happened most frequently in abdominal sepsis, a point of some importance to surgeons.

Under this heading may be classified acute bacterial endocarditis and subacute bacterial endocarditis. In the former the heart-muscle typically shows multiple minute abscesses often with clumps of bacteria; while the latter often shows the Aschoff nodules and fine fibrosis of an antecedent rheumatism with a varying degree of infiltration by inflammatory cells, embolic in origin.

A very full account of myocarditis is given by Otto Saphir of Chicago in the Archives of Pathology.[30] In this he makes a convincing case for the existence of "Isolated" myocarditis, "a term which denotes more or less diffuse inflammatory changes in the myocardium of wide variety and of various causes, having in common principally an isolated involvement of the myocardium by a non-specific lesion without inflammatory changes of the endocardium or pericardium." The changes are non-specific, and therefore pure rheumatic myocarditis without endocarditis or pericarditis is excluded. It may be rapidly progressive and culminate in sudden death, but there appear to be no characteristic clinical criteria.

Degenerative Diseases of the Myocardium.

In the degenerative group, five cases showed fatty heart: these were regarded as fatty infiltration where there were heavy deposits of fat between the muscle-cells, and two showed apparent replacement of muscle-cells by fat. It is not only the obese who may have this latter change, as in wasting diseases the cardiac fat is late in being sacrificed.

Brown atrophy is not regarded as being of great significance, but is a common finding in wasting diseases; six of the eight cases occurred in the cachexia of cancer, one in severe anæmia, and one in a case of duodenal ulcer. This again may be of importance to the surgeon who is contemplating operation on a debilitated subject.

Myocardial Disease of Vascular Origin.

Patients who died in the wards with evidence of coronary or hypertensive disease in whom a complete post-mortem examination had been made, numbered thirty-eight, and I have classified them as follows:—

HOSPITAL ADMISSIONS.

Cardiac Infarctions.

Multiple infarcts - - - 9 cases.

Of these, one heart showed evidence of syphilis and one showed typical "Aschoff" rheumatic lesions. Eight were large hearts: average weight 20 oz. In three cases there were slight arterial renal changes, but arteriolar changes were *not* a feature. One heart (not weighed) was "of normal size"; the kidneys showed arteriolo-sclerosis.

Single acute infarct - - - 2 cases

In neither case was renal arteriolo-sclerosis found.

Cardiac infarction with death from heart failure - 3 cases.

One was a diabetic with a history of past hypertension, and renal arteriolo-sclerosis was present. In the other two, the arterioles were normal; in one of these a pulmonary infarct determined death.

Coronary arterio-sclerosis without infarction - 6 cases.

It is probable that death took place from left ventricular failure. Of these six, four had diabetic histories.

Hypertensive Disease.

Death from cardiac defeat - 11 cases.

Nine hearts showed coronary sclerosis, but no actual occlusion or infarct. Two showed no coronary change. All had large hearts; the average weight was 19½ oz. One heart showed evidence of syphilis. All showed definite renal arteriolo-sclerosis. (In one case there were renal calculi with gross destruction of renal tissue.)

Death from cerebral catastrophe - 6 cases.

The coronary arteries showed slight atheroma. All six hearts were large: average weight 21 oz. All cases showed renal arteriolo-sclerosis. (One case was diabetic.)

Death from renal defeat - 1 case.

The blood-urea rose from 107 to 471 mgm. per cent. before death from uræmia.

It will thus be seen that the relationship of disease of the blood-vessels to disease of heart-muscle presents several problems, but before considering them I should like to tell you more about the pathological findings in those persons who were already dead when brought to hospital. Unfortunately, in this group we have no clinical histories apart from such bald statements as "dropped dead at work" or "felt weak and died in a few minutes." I make the suggestion that hospital authorities should try to obtain clinical histories from the relatives in such cases. It would have been helpful too if the bodies had been weighed, because the weight of the heart is normally proportionate to the weight of the body as a whole. This relationship is shown in Muller's table, here reproduced from Hewlett's textbook[13] and corrected into pounds and ounces.

MULLER'S TABLE.

BODY-WEIGHT IN KILOGRAMS.		ABSOLUTE WEIGHT OF HEART IN GRAMS.	
10 Kilograms	= 22 lb.	28.9 Grams	= 1.01 oz.
20 ,,	= 44 ,,	78.0 ,,	= 2.73 ,,
30 ,,	= 66 ,,	133.5 ,,	= 4.67 ,,
40 ,,	= 88 ,,	193.3 ,,	= 6.76 ,,
50 ,,	= 110 ,,	230.2 ,,	= 8.05 ,,
60 ,,	= 132 ,,	264.3 ,,	= 9.25 ,,
70 ,,	= 154 ,,	297.2 ,,	= 10.4 ,,
80 ,,	= 176 ,,	322.3 ,,	= 11.28 ,,
90 ,,	= 198 ,,	359.0 ,,	= 12.56 ,,
100 ,,	= 222 ,,	376.3 ,,	= 13.17 ,,
110 ,,	= 242 ,,	358.5 ,,	= 12.54 ,,

In the tabular statements which follow I should like to draw your attention to the weights of the hearts and to the presence or absence of renal arteriolo-sclerosis.

Only three bodies were female; of the males one was a boy of 13 years; of the remaining males the average of the ages recorded in twenty-three cases was 58, but in the remaining cases the age was not known, and the bodies were described as middle-aged or elderly. No case of death obviously due to injury was included. In twenty-nine of forty-three cases coronary disease was the cause of death. The other deaths were as follows :—

CARRIED IN DEAD.

Cases with no evidence of coronary disease.

	Cases
Acute diphtheria (heart showed no microscopic pathological change) -	1
Monckeberg type of aortic disease with L.V. hypertrophy. Heart weighed 18 oz. - - - - - - -	1
Dissecting aneurysm of aorta - - - - - -	1
Hypertensive disease with cerebral thrombosis. Heart weighed 16 oz.	1
Cardiac hypertrophy of unknown origin. Valves, coronary arteries, and renal arterioles normal, but heart weighed 20 oz. - -	1
No cause of death found - - - - - -	2

CARDIAC SYPHILIS.

Aortic aneurysm - - - - - - - -	4
Aortitis with narrowing of coronary ostia and cardiac fibrosis -	2
Aortitis with multiple small cardiac infarcts of various ages -	1

CARDIAC INFARCTION.

Multiple infarcts of various stages old and recent - - -	13

All hearts were above normal weight of 11 oz. or 310 gm., except one of 10 oz. (283.5 gm.). The average heart-weight was 20 oz. In two cases an infarct had led to rupture of the left ventricular wall. Only one body showed arteriolo-sclerosis

of renal vessels. Usually one could distinguish clearly which had been the latest and fatal lesion, but in some cases it was less easy because of the number of infarcts and the extent of the resultant myomalacia.

Cardiac infarction of a single vessel - 7 cases.

Of these hearts, five were of normal size; two showed hypertrophy, but one had mitral stenosis. No case showed renal arteriolo-sclerosis.

CORONARY DISEASE, BUT MODE OF DEATH UNCERTAIN.

	Cases
(a) Gross atheroma of coronaries without complete occlusion or thrombosis; renal arterioles normal. Heart-weights 16 oz. and 15 oz.	2
(b) Gross atheroma of A.D. branch of L.C. artery; renal arterioles normal. Heart-weights 12 oz. and "slightly enlarged"	2
(c) Gross atheroma of A.D. branch of L.C. artery; renal arterioles normal. Heart-weights 10 oz.	2
(d) Gross atheroma of R. and L. coronary arteries, with almost complete occlusion. Renal arterioles normal. Heart-weight 8 oz.	1
Hypertensive disease	2

Heart-weights 24 and 18 oz. One heart showed an old healed infarct. Both cases showed typical renal arteriolo-sclerosis and some atheroma of the coronary arteries. It is presumed that death took place by acute ventricular failure.

The carried-in-dead cases may be summarized as follows :—

	Cases
Non-coronary	7
Cardiac syphilis	7
Multiple infarcts	13
Single infarcts	7
Coronary disease with mode of death uncertain	7
Hypertensive disease	2

Even on this relatively short series of cases it may be argued :

(a) That coronary disease is the commonest cause of sudden death.

(b) That many persons sustain repeated attacks of infarction before the fatal one.

(c) That a first and only infarct may be immediately fatal.

(d) That death may occur before a patient can reach hospital without an actual infarct being detected even on careful search at necropsy. The mechanism of this process is uncertain; presumably it may be due to acute anoxæmia, with or without the development of ventricular fibrillation. It has been suggested that hypertrophied muscle may demand a greater blood-supply than can be delivered by the narrowed arterial system, and alternative possibilities are chemical changes in glycogen or in potassium metabolism, or that death has occurred by peripheral vascular failure.

(e) That renal arteriolo-sclerosis was rarely found in association with coronary disease.

(f) That hypertrophy of the heart, particularly of the left ventricle, is present in most but not in all cases. The cause of this hypertrophy is considered by several authorities to be hypertension. For example, Clawson[7] considered hypertension to be the most common condition associated with coronary sclerosis, although he found that sudden death was commoner in his non-hypertensive group; he found that hypertrophy in coronary disease was apparently the result of hypertension. In collaboration with Bell,[1] he found that two-thirds of all clinical cases of coronary disease were associated with hypertension. Similarly, Parkinson[24] found that in two hundred cases of coronary thrombosis, the heart was enlarged in 64 per cent., and of these 128 cases, hypertension was the predominant or single cause of the enlargement in 106 (or 82.8 per cent.). He found, however, that in 8.6 per cent. no proof of antecedent hypertension could be made, and that it was probable that the cardiac enlargement was due to cardiac infarction. It is manifestly impossible, in almost all cases, to say whether persons carried in dead to hospital have had high blood-pressure readings or not, and one is tempted to regard cardiac hypertrophy without valvular disease as conclusive evidence of antecedent hypertension. There is, however, another pathological criterion, for Fishberg[10] states: "Lesions of the arterioles are far more closely associated with protracted hypertension than is arterio-sclerosis of the large vessels. Isolated cases of chronic hypertension with neither arteriolar nor renal lesions have been described by various authors. But it is evidently very rare for such a case to come to necropsy, and it would seem . . . that the existence of hypertension for any considerable period can usually be read in the arterial walls." In his own cases of death from hypertensive disease, he found arteriolo-sclerosis of the kidney in 100 per cent. and of the other organs in varying incidence from 3 per cent. in the myocardium itself to 66 per cent. in splenic arterioles. Bell and Clawson (loc. cit.) found that renal arteriolo-sclerosis was present in 89.4 per cent. of cases of hypertension: they stress that it should be sought in the afferent glomerular arterioles, and suggest that Fishberg "included as arterioles somewhat larger vessels than these."

It is difficult to offer any acceptable explanation of the marked hypertrophy in these cases if it was not due to hypertension. Clawson (loc. cit.) considered the problem and mentions, but only to condemn, two possibilities:

(1) That a compensatory hypertrophy may follow myocardial fibrosis, and

(2) That hypertrophy may follow ischæmia.

Is it not possible that true arterio-sclerosis, not confined to the coronary arteries, but diffusely and often apparently erratically distributed throughout the body, may offer sufficient and prolonged overwork to the heart-muscle to account for hypertrophy, even without achieving the very high readings of 200 or more systolic and 130 or more diastolic pressure, which characterises essential hypertension; and that it is the cases with arterio-sclerosis with slight or moderate hypertension, but sufficient to cause cardiac hypertrophy, who develop *coronary*

arterio-sclerosis and infarction, rather than the arteriolo-sclerosis group with very high pressures and cardiac hypertrophy, but with death more often by ventricular failure, which may be either sudden or gradual?

J. H. Palmer,[22] in a series of 212 patients who survived an attack of coronary thrombosis by at least three months, found that 73 per cent. showed evidence of hypertension before or after the attack. (He regarded as hypertension pressures of 160 mm. systolic and/or 100 mm. diastolic.) In sixty-six patients the blood-pressures before the attack were known, and the averages were 170/100. In forty-five, hypertension was found, and in sixteen cases the systolic pressure was 200 mm. or higher. Thus, of the sixty-six persons, 32 per cent. had no hypertension, 44 per cent. had systolic pressures between 160 and 200, and 24 per cent. had systolic pressures above 200.

J. T. King[19] expresses the view that the "incidence of coronary disease and thrombosis amongst patients with marked hypertension is not striking," but suggests that "the coincidence of moderate hypertension and coronary disease is such as to suggest a common ætiologic background for the two conditions."

As I have said, the mechanism of coronary catastrophe is not always easy to reconstruct even after death, and, as Henry Moore[20] has proved by his researches on bundle branch block, the painstaking search of serial microscopic sections may be required. The sequence of events may be outlined as follows: One or more branches of the coronary system undergo sclerosis. This may be part of a generalised arterio-sclerosis, but not infrequently the radial and retinal vessels are unaffected and renal function is unimpaired. One coronary branch may be so severely sclerosed as to be completely occluded, with little or no change in the others; the vessel most commonly involved in our series was the anterior descending branch of the left coronary artery. (In four cases this vessel was double from its source, and one branch was much more sclerosed than the other.)

No case of auricular infarction was found such as has been described by E. H. Cushing and others.[8]

When coronary sclerosis becomes established in any part of the heart two things happen: first, the muscle supplied by that vessel undergoes a fine fibrosis; and secondly, there begins to be opened up an alternative anastomatic vascular system, but only when the affected vessel is inadequate to supply blood to its original allotment of heart-muscle. This anastomosis is not apparently a natural age change (unless you regard arterio-sclerosis as a natural age-change rather than a pathological process).

Blum, Schauer, and Benson[3] have shown that in experimental ligation in dogs' hearts, anastomoses arise in less than five weeks. With sclerosed arteries, the patient may develop anginal attacks analogous to the intermittent claudication of an arterio-sclerotic leg. Or a thrombus may form in one or other of two ways, either at the edge of an atheromatous plaque or by hæmorrhage into the intimal layer of the vessel. The latter was found by Nelson[21] to have been common in the same cases as are here reviewed, and he reminds us that the initial hæmorrhage

may be associated with exertion, and that symptoms may not arise until some hours later when the patient is at rest.

Horn and Finckelstein[14] found that the thrombus had formed on an arterio-sclerotic plaque in 37.5 per cent. and by intramural hæmorrhage in 62.5 per cent. of their cases.

Not every subject of coronary arterio-sclerosis develops either angina or the syndrome of coronary thrombosis. The fibrosis which results from vascular change may involve the conducting mechanism, giving rise to various forms of cardiac arrhythmia or to heart-block, or it may impair the efficiency of the ventricle, causing congestive heart-failure.

The pathological possibilities may be briefly summarized thus :—

(1) Sclerosis with transient ischæmia.
(2) Infarction with or without involvement of special conductile tissue. This infarction may be repeated.
(3) Fibrosis of muscle, with or without involvement of special conductile tissue, but leading to heart-failure.

Clinical Classification.

The symptoms and signs of coronary disease may often be correlated to the three main pathological groups, but one must remember that the pathologist sees a final state, while the clinician is frequently concerned with a stage of disease. The three stages may be linked in the same patient and the transitions read in his history, but many factors influence the process. Very briefly to consider each in turn :—

(1) *Coronary sclerosis with angina.*

It is interesting to trace in the cardiological literature of the last thirty years the gradual recession of Allbutt's theory of aortic changes and the increasing acceptance of coronary ischæmia as the essential cause of angina pectoris, and it is now generally accepted that true angina does not occur in persons with normal coronary vessels. But angina pectoris is a disease which derives its name from a symptom, and interpretation of a symptom is not always easy. This is notoriously true in the case of the patient who minimizes his symptoms in the hope of a favourable verdict and also in the case of him who, often possessed of a dangerous amount of knowledge, exaggerates or misconstrues his symptoms. A diagnosis of angina pectoris should not be made lightly. As was said many centuries ago: "Things not known to exist should not, unless it is absolutely necessary, be postulated to be existing."[33] It is unfair to postulate disease of the coronary arteries unless the full facts make it necessary. There are other causes than angina of chest pain; and conversely, Spillane and White[31] remind us that Heberden, Mackenzie, Osler, and Allbutt all recorded cases of pain in fingers, hands, or arms without substernal pain, and they themselves record twenty-five cases where chronic pain in one or both shoulders (usually the left) preceded or followed the onset of angina or coronary infarction. Physical signs may be misleading, but X-ray evidence of hypertrophy without valvular cause may confirm other evidence

of arterio-sclerosis or essential hypertension. Electrocardiograms were found to be normal in one-third of Bourne's cases,[4] and Parkinson and Bedford,[27] Riseman,[29] and, recently, many others have found that during, and soon after an attack of pain, the electrocardiogram may approximate to that of coronary infarction.

Trinitrin has been used for many years, and the clinical researches of Hoyle and Evans[16] have shown :—

(a) That the tablets must be fresh.

(b) That they should be chewed quickly for the relief, and slowly for the prevention, of an attack; and

(c) That repeated doses are not injurious.

It is sometimes helpfully confirmatory, but it is not completely reliable as a means of diagnosis : when a patient says that his pain is relieved by trinitrin, it is not proof that he has angina pectoris. I have for many years advised at least a month's complete rest in bed, and this is advocated by Hoyle and Evans[15] and by Fishberg.[11] But I think that one should refrain from the facile diagnosis of "a tired heart," even if one prescribes rest.

(2) *Coronary sclerosis with infarction.*

The angina of effort may be a forerunner of infarction or may follow in its train. The characteristic difference in the two syndromes were clearly outlined by Parkinson and Bedford[26] in 1928.

These differences depend mainly on the fact that the former is a transient if recurrent phenomenon, and the latter is due to acute structural change, the manifestations of which vary in different individuals. Pain is almost invariably present : it may be agonizing, or it may be relatively slight and masked by the predominance of another symptom or attributed to another cause. Thus it may be blamed on flatulence or "acute indigestion," or on the strain of vomiting. It is also possible that the morphia administered for its relief may blot out the memory of the pain, and thus cause the patient to deny or minimise it afterwards. J. B. Herrick[12] gave an interesting explanation of those cases in which it is absent in these words : "At autopsy, fresh infarcts are sometimes found associated with multiple areas of fibrosis that speak for previous obstruction of small branches, yet no pain has been noted, no pain even announcing the present infarction. There has evidently been a very gradual and progressive narrowing of the artery by sclerotic processes. The area irrigated by the artery has become relatively inactive, relatively anæsthetized by the destruction of vessels, nerves, and functioning muscles, so that a painful response to a new obstruction is lacking. The final complete obstruction comes without any sudden shock, the element of surprise is lacking, as the heart is in a sense prepared for the supreme insult." Abrupt heart-failure may be present, but pain is absent, and dyspnœa may be the pain equivalent.

An infarction not infrequently produces auricular flutter, or fibrillation, or even ventricular fibrillation, or heart-block, or bundle-block, and the underlying cause

may be overlooked. Conversely, paroxysmal flutter or fibrillation, which are of more benign prognosis, may be thought to be due to an acute infarction, but here the history of the patient and the absence of collapse are useful.

When the pain is epigastric or even abdominal, the presence of liver-dulness and the absence of true abdominal rigidity may prevent a mistaken diagnosis of perforation of a hollow viscus. Only in one post-mortem case in the Royal Victoria Hospital series of coronary lesions was a diseased gall-gladder found, but the gall-bladder may occasionally simulate or exacerbate pain of coronary origin. Acute pneumothorax may be detected by careful examination and confirmed by the X-ray screen. Pulmonary embolism presents a most difficult problem, and as Wood[34] has shown, may be distinguished by electro-cardiograms with special chest-leads.

In the case of dissecting aneurysm the onset is even more abrupt, the pain is still more severe and more resistant to morphia; it extends to the back and the abdomen, and frequently leads to obliteration of the pulse in the limbs.

Coronary infarction usually presents electrocardiographic changes typical of the condition. There are two main types indicating anterior and posterior lesions. Serial electrocardiograms show a tendency to revert to normal, but commonly the patient is left with an inversion of a T wave. Katz[17] has catalogued the list of causes of inversion of T, including coronary lesions, experimental and clinical, toxæmias of specific fevers, uræmia, and the effects of quinidine, digitalis, epinephrin, and insulin. Another cause is pericarditis. Occasionally the standard limb-leads may show no change after an infarction, but chest-leads show typical changes.

Blood-pressure does not always fall during an attack, but when it does it may remain deceptively low. Thus, hypertension may be followed by pressures which are apparently normal, a condition which led Donzelot[9] to an apt phrase when he spoke of "le cœur camouflé."

The treatment of the syndrome of infarction is rest and morphia. The late J. E. MacIlwaine taught that the patient's period of maximum danger is during the pyrexia which follows the onset (and which is of diagnostic significance). We were formerly taught that a daily enema was better than laxative medicines, but it is safer to neglect constipation during this early stage. Oxygen is grateful to some patients, even when cyanosis is slight. Digitalis is indicated when auricular fibrillation is present or when congestive heart-failure occurs, and must be given cautiously. As a general rule, it may be said that the patient should be six weeks in bed and four months on the same floor.

Parkinson[25] estimates that the chances of recurrence are one in four, and Palmer[23] found that of patients who survive three months or more after the first attack, almost 75 per cent. may be expected to be alive five years later, and almost 40 per cent. ten years later. The average death-rate from year to year was, in the cases he reviewed, 6 per cent. for the first five years and 12 per cent. for the second five years.

(3) *Coronary sclerosis with fibrosis of muscle.*

Patients with coronary sclerosis may develop multiple areas of fibrous tissue as the result of repeated infarcts, which may not have been recognised during life; or the process may be a fine fibrosis diffusely involving the area irrigated by the branches involved. In either case the patient's symptoms are those of myocardial inefficiency, with breathlessness as the herald of congestive failure. Of recent years, increased attention has been given to left ventricular failure with its sequence of nocturnal dyspnœa, cardiac asthma, and pulmonary œdema, and the dramatic effect of morphia in this condition has been more widely recognised.

Many cases which begin as left ventricular failure rapidly merge into "combined" failure with congested liver and distended veins.

When the disease-process has involved special conductile tissues, there is interference with normal cardiac mechanism. Auricular fibrillation is common and is frequently of less grave prognosis when it arises from this cause. Heart-block of its various types, including bundle-branch block, may occur. This last form is interesting: first, because of the changes in nomenclature; in recent years what was thought to be right bundle-block has been proved to be right; and secondly, because a less gloomy view of its prognosis has been expressed by various writers. For example, Bishop and Carden[2] say that the character and degree of the attendant heart disease are the principal factors in determining prognosis, rather than the presence or absence of bundle-branch block.

No such alleviation has been offered in the presence of two physical signs which are more easily recognised. The first of these is gallop-rhythm, which, as Bramwell[5] has shown, occurs most commonly when a feeble ventricle is beating rapidly against a peripheral resistance which is too high for it, and tends to disappear when the pulse-rate subsides. The other is pulsus alternans, which is demonstrable with the sphygmomanometer. It has been suggested that the greater the gap in the pressure-levels of alternate beats, the worse is the prognosis (Reginer[28]).

In conclusion, may I remind you that the pathological evidence here reviewed serves to emphasise the importance of disease of the arteries as a cause, not only of sudden death and of the syndromes of angina pectoris and cardiac infarction, but also of fibrosis of the myocardium. But it offers no explanation of the cause of arterial disease or the hypertension which so frequently accompanies it. In this field of medicine, as in many others, diagnosis has outrun therapy. It is a solemn thought that if Queen Anne's army had had the distinguished services of our modern R.A.M.C., a young officer called John Churchill might, I am afraid have been invalided out with a diagnosis of essential hypertension, to languish in Bath or Cheltenham on half-pay. Thus they would have robbed him of Blenheim and the dukedom of Marlborough, and Britain of her greatest general.

Finally, I thank you for your patience, and my colleagues, especially Professor Biggart, for their help and access to their records.

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REVIEW

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This edition represents a revision of the previous popular handbook of children's diseases. It is even enriched by several coloured plates illustrating the rashes in scarlet fever, measles, chicken-pox, and German measles, two nutrition charts, which subserve an important need of the times. The place of sulphonamide therapy in the modern treatment of infections has been fully given.

The book contains something about everything, and whilst it in no sense replaces the standard textbook, it will remain a useful reference book for the pocket or medical bag, giving, as it does, sufficient for the diagnosis and treatment of practically every condition which the practitioner of medicine may encounter. In spite of conforming to the restrictions imposed by war, the publishers are to be congratulated on the format of the publication.

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Effect of M&B 693 and Uleron on the Blood

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Whilst there is little known about the pathology of agranulocytosis, little doubt can be entertained as to the part played by the sulphonamide compounds in its causation. Bigler, Clifton and Werner (1938), Britton and Hawkins (1938), and French (1939), amongst others, have demonstrated that sulphanilamide causes a considerable fall in the number of white blood-cells without the actual appearance of agranulocytosis, whilst, unfortunately, numerous cases of granulocytopenia have been recorded following the use of this drug.

With the advent of M&B 693 it was hoped that there would be less likelihood of similar damage to the blood-cells of the body. Early reports seemed to promise fulfilment of this hope : Evans and Gaisford (1938) found no difference in white-cell counts performed on patients treated for pneumonia with the drug as compared with those treated by routine methods, despite the fact that very heavy dosage of M&B 693 had been employed. Fleming (1938) likewise found that the drug had no deleterious action on the leucocytes, at any rate in vitro. Lloyd, Erskine and Johnston (1938), however, noted a slight but definite depression of the total white blood-cell count with polymorphonuclear leucopenia and a relative lymphocytosis in a few of their patients who were being treated for gonorrhœa. Somewhat similar observations were made by Batchelor et al. (1938), Brown (1939), and Melton and Beck (1939). The latter workers state that M&B 693 did not appear to affect the red blood-cells : Long (1939), however, found that two cases of acute hæmolytic anæmia occurred during administration of the drug at the Hospital of the Rockefeller Institute. Unfortunately, as with sulphanilamide, a number of cases of agranulocytosis following the use of M&B 693 have been recorded.

Following the introduction of M&B 693, heavy dosage of the drug was recommended especially in the early stages of treatment, with the result that many "minor" toxic manifestations (i.e., nausea, vomiting, headache, depression, etc.) were reported. The possibilities of more serious though less obvious toxic manifestations became apparent, and the desirability of evolving a scheme of dosage which would give the optimal clinical results with minimal toxic reactions presented itself. This was of particular importance not only generally, but in view of the fact that many of the patients treated were attending hospital as out-patients. An investigation was accordingly carried out personally with these objects in view. The cases investigated were chiefly out-patients being treated for gonorrhœa. The following are some of the results of this investigation.

The reaction of patients on Uleron therapy was also studied in a smaller series of cases.

PROCEDURE.

Sixty-one male patients were investigated: fifty-nine were suffering from gonorrhœa and two from staphylococcal urinary infection. Of these, fifty were patients treated with M&B 693, seven were treated with Uleron, and four were normal controls. The fifty patients on M&B 693 were divided into three groups A, B, and C :—

Group A.—This consists of forty-four out-patients who had the same dosage over a period of seven days (with occasional slight variations); during the first day they were given 3g. of the drug, whilst 2g. per day were administered thereafter for a further six days.

Group B.—Group B consists of four patients to whom heavier dosage over a more prolonged period was administered as follows :—

(I). Pt.Sh. 42.5g. in thirteen days (in-patient suffering from epididymitis).

(II). Pt.L. 17.5g. in ten days (in-patient suffering from staphylococcal urinary infection and para-urethral abscess).

(III). Pt.B. 24.0g. over a period of twenty-five days, which included seventeen days' interval (out-patient suffering from gonorrhœa)

(IV). Pt.Sc. 45.0g. over a period of twenty-three days, which included three days' interval (out-patient suffering from gonorrhœa).

Group. C.—In two cases, a daily or bi-daily blood investigation was performed over a period of six days following single doses of M&B 693 of 4g. and 2g. respectively.

The patients on Uleron were given 3g. of the drug per day for four days, followed by a period of seven to eight days' rest, when a second "stoss" similar to the first was administered, and, after a further interval of rest as before, a third "stoss" was given. The normal controls were four out-patients who were being treated by routine methods of urethral irrigations and mixed gonococcal vaccine.

Serial total and differential white-cell counts and red-cell counts were made with ordinary standard pipettes, the hæmoglobin being estimated by the Sahli method. In order to lessen the known daily fluctuations in the cell counts as much as possible, the counts were performed as nearly as possible at the same time each day, whilst to ensure the maximum degree of accuracy in the actual white-cell counts themselves, the following points were observed :—

(I). In the estimation of total leucocytes, four preparations were made, and the four counts thus obtained were averaged.

(II). In the estimation of the differential count, at least four hundred unselected white blood-cells were examined, and in many cases considerably more than this number were counted.

Normal readings were taken as follows :—

Hæmoglobin - - - -	99—100 per cent.
Red blood-cells - - - -	5,100,000 to 6,350,000
Total leucocytes - - - -	5,000 to 10,000

Differential Counts :—	Total per cmm.	Percentage of Total Leucocytes.
Neutrophil polymorphonuclear leucocytes -	3,000—6,000	60—70
Lymphocytes - - - -	1,500—2,700	25—30
Monocytes - - - -	350— 800	5—10
Eosinophil polymorphonuclear leucocytes -	150— 400	1— 4
Basophil polymorphonuclear leucocytes -	0— 100	0— 1

Anything above or below these figures was considered to be abnormal.

In the patients taking M&B 693, blood investigations were performed whilst the drug was being taken and for a varying period thereafter up to the end of thirty-two days from the commencement of chemotherapy (and occasionally for an even longer period). In order to ascertain as nearly as possible the exact day on which the maximum effects, if any, were seen, the investigations were carried out on different days on different patients, so that a fairly complete daily series was obtained during the period of examination. As the majority of blood counts were performed up to and including the twenty-second day from the beginning of chemotherapy, the results will be considered in detail only up to that day, but reference will be made to results obtained at an even later period. In the case of Uleron patients, blood investigations were performed before the beginning and at the end of each "stoss" and finally a week after the end of chemotherapy. Investigations were carried out at frequent intervals over a period of two weeks on the control cases.

RESULTS.

Blood Cell Changes with M&B 693.

Group A—Forty-four Patients on the Same Dosage.

Total Leucocytes.

The average total leucocyte count for the forty-four patients showed a distinct drop both during chemotherapy and for some considerable time after discontinuing the drug, reaching its lowest point on the sixteenth day (i.e., nine days after the end of chemotherapy). After this the count rose again. Though the average figure did not reveal a leucopenia at any time, eight individual cases (or just over eighteen per cent. of the series) gave a total leucocyte count of less than 5,000 per cmm. on one or more occasions. Of these, the lowest count coincided with the third day after commencing chemotherapy in one case, the fourth day in two cases, the fifth day in one case, the eighth day in four cases, and the eighteenth day in one case, so that, though the difference was small, the greatest number of cases of leucopenia occurred after the withdrawal of the drug, the maximum number being seen on the day immediately following the end of chemotherapy. The lowest figure recorded was 4,062 on the eighth day on a patient whose original white-cell count had been 9,687.

Differential Leucocyte Counts.

Polymorphonuclear Neutrophil Leucocytes. (Neutrophils).

It became evident that the downward trend in the average total leucocyte count was due to a fall in the number of the neutrophil leucocytes. Here again the lowest total count occurred on the sixteenth day, when a figure of 2,888 cells per cmm. was recorded, so that an actual average neutropenia was observed on that day. Actually approximately thirty-two per cent. of the series showed a neutropenia on one or more occasions, the lowest figure recorded being 1,960 cells per cmm. on the eighth day, on the patient mentioned before as having the lowest total leucocyte count : this was the only occasion on which a count of below 2,000 cells per cmm. was recorded in this series.

Whilst a definite neutropenia was thus observed, the most striking feature in the investigation of the white cells was not the changes in the total neutrophil counts so much as a marked variation in the percentage of neutrophils present.

It was observed time after time that the percentage of neutrophils decreased, and again it was found that the maximum effect appeared on the sixteenth day. Actually approximately eighty-three per cent. of the cases in this group showed a fall in neutrophils on one or more occasions to below sixty per cent. of the total leucocytes : 36.6 per cent. showed a fall to between forty and fifty per cent. of the total leucocytes, whilst 9.7 per cent. of cases actually fell to below forty-five per cent. of the total white cells. The lowest figure recorded was 41.75 per cent. on the eighth day in a patient whose neutrophils had been 64.5 per cent. of the total leucocytes before chemotherapy was commenced.

Lymphocytes.

The average total lymphocyte count showed a fairly steady level throughout, though actually 36.6 per cent. of cases showed a slight lymphocytosis of more than 2,700 cells per cmm. on one or more occasions. 24.4 per cent. were above 3,000 cells per cmm. at some time during the investigation, the highest figure reached being 3,811 in one case on the nineteenth day.

As was to be expected, as a result of the changes in the neutrophils, a marked variation in the percentage of lymphocytes present was seen, increasing as the neutrophils decreased. Thus 76.6 per cent. of the cases showed more than thirty per cent. of lymphocytes in their differential counts on a number of occasions, 24.4 per cent. of the total having more than forty per cent. of lymphocytes at some period. The highest percentage recorded was 45.25 in one case on the sixteenth day.

Though variations in the number of lymphocytes are usually relative, and depend merely on the number of polymorph cells present, absolute increase is not unknown. It is difficult to state where an absolute increase in lymphocytes has occurred in the present series. French (1939), in her investigations on the action of sulphanilamide on the blood, considered that all cases showing a total leucocyte count of 10,000 or more per cmm., and in which the lymphocytes numbered thirty or more per cent., represented a true lymphocytosis. On this basis, 9.7 per cent. of cases in this present series showed an absolute lymphocytosis, though 7.3 per cent. also had a neutrophil count of less than sixty per cent. at the same time.

Mononuclear Leucocytes. (Monocytes).

Though the average number of monocytes present tended to show a slight fall, there was a considerable variation in the findings recorded, and the average number kept well within the limits of normality throughout. Actually in 29.5 per cent. of cases a monocytosis of over 800 cells per cmm. was found, the greatest number being 1,291 on the fourth day in one patient.

Here again, greater variation was seen in the percentage of cells recorded. In forty-five per cent. of the patients in the series, a reading of over ten per cent. of monocytes was observed, the highest being 14.75 per cent. in one case on the fourth day.

Eosinophil and Basophil Polymorphonuclear Leucocytes.
(Eosinophils and Basophils).

Neither the eosinophils nor basophils showed any constant change. The highest recorded figure of the series for the eosinophils was 12.75 per cent. or 1,187 cells per cmm. on the eighth day in one case who, however, tended to show a high eosinophil count throughout.

Hæmoglobin and Red Blood-cells.

Little variation was seen in the hæmoglobin throughout the entire series, though several cases showed a slight fall at some time or another; this was most marked in one patient whose hæmoglobin fell from ninety-one per cent. before chemotherapy was started, to eighty-one per cent. on the sixteenth day. Five days later, however, it had risen to eighty-five per cent. A slight but significant fall was noticed, however, in the average red blood-cell count, and again this was most marked at the fifteenth and sixteenth days, when average counts of less than 5,000,000 red cells per cmm. were recorded. Actually 37.5 per cent. of cases showed a count of less than 5,000,000 red blood-cells at some time or other during the period of investigation. The lowest recorded red-cell count was 4,170,000 on the eighth day on a patient whose count before chemotherapy had been 5,010,000 per cmm. In the majority of cases, the reduction in the number of red blood-cells was of a much more transient nature than that of the white cells.

Group B—Four Patients on Heavier Dosage.

In view of the findings recorded above, it was interesting to note that whilst the patient who had the largest dose of the series (45g. over a period of twenty-three days) showed somewhat similar changes in the white cells to those already observed, these changes were much less pronounced than one would have expected, and the blood picture had returned to normal several days before the end of chemotherapy. There was no subsequent fall in the number of cells during the following eighteen days, and in fact the neutrophils increased to over seventy per cent. of the total leucocytes and remained high during the period of observation mentioned, following the withdrawal of the drug. This patient had not responded to chemotherapy, and it was tempting to believe that possibly the drug was being poorly absorbed (unfortunately, the absorption and excretion were not investigated), and subsequently had little deleterious effect either on the organisms causing the disease, or on the blood-forming organs of the body.

An examination of the effects of the drug on the blood in five patients in Group A who either did not respond to chemotherapy or who showed subsequent relapse, revealed somewhat similar changes in four cases to those noted in the majority of patients; in three of these, however, the changes were of a transient nature only. The fifth patient showed no decrease in the number of the blood cells at all.

An investigation was consequently made in those patients in whom absorption and excretion of the drug had been simultaneously studied with the blood-cell changes, in order to see whether or not the changes in the blood cells varied in proportion to the concentration of the free drug in the blood. There was no constant relationship found between the two (see Table).

The patient who received the second largest dose (42.5g. in fifteen days, Pt. S. in Table) again showed similar changes to those in Group A, the maximum effect on blood cells being noticed eleven days after withdrawal of the drug, when the neutrophils fell to 40.5 per cent. of a total leucocyte count of 5,625, the lymphocyte count rising to 48.25 per cent.

Very similar effects were observed in both of the other cases in this group. It was interesting to note that the effects with the larger doses were not necessarily more pronounced than with the small dosage which had been used for the patients in Group A.

Group C—Two Patients on a Single Dose of M&B 693.

In both of these cases variation was slight, though in one (following 2g.) there was a tendency to irregularity. As this patient's blood-cell counts were just on the border-line of normality at the beginning, it was difficult to be sure that any subsequent change was due to the drug.

Blood Cell Changes with Uleron.

Whilst the number of cases of Uleron-treated patients which was studied was admittedly smaller than those on M&B 693, it was clear that Uleron had an even more marked toxic effect on the white and red blood-cells than M&B 693, and that this effect was more noticeable at the end of the third "stoss" and continued for some days after withdrawal of the drug. The effect on the leucocytes was again chiefly due to a fall in the number of neutrophil polymorphonuclear cells, though the monocytes also showed a greater numerical reduction than with M&B 693. Seventy-one per cent of cases showed leucopenia at some time or other, the lowest figure being 3,437 leucocytes per cmm. at the end of the third "stoss" in one patient where the original leucocyte count had been 8,125 cells per cmm. An absolute neutropenia was seen in forty per cent. of cases, whilst another twenty per cent. showed relative neutropenia, the lowest figures being respectively 1,873 neutrophils per cmm. at the end of the third "stoss" in one case where the original count had been 5,545 neutrophils per cmm., and 41.75 per cent. of the total leucocytes at the end of the first "stoss" in another case, where the original percentage had been 59.75.

No marked changes were seen in the lymphocytes except those consequent upon the neutrophil variations, whilst the basophils and eosinophils varied little: the latter cells were rather low throughout.

The fall in the number of red blood-cells was again evident, but as before, these changes were of a more transient nature than those observed in the leucocytes. Sixty per cent. of cases showed a decrease in the number of the red cells to below 5,000,000 per cmm. at some time or other.

Normal Controls.

No abnormal variations were seen in the blood-cell count or hæmoglobin in the control cases.

DISCUSSION.

An examination of the results obtained in this series of cases leaves little room for doubt that even comparatively small doses of both M&B 693 and Uleron cause considerable damage to the blood-cells of the body. That the red cells do not escape the destructive process is demonstrated by the results obtained in the red-cell counts. This is rather at variance with the observations made by Melton and Beck (1939). Dolgopol and Hobart (1939), however, in a fatal case of agranulocytosis following M&B 693 described by them, found that, whilst the action of the drug on the bone-marrow apparently consisted mainly in the arrest of maturation of the leucopoietic elements, the erythropoietic elements were also considerably affected. It has been mentioned that at least two cases of acute hæmolytic anæmia have been described by Long (1939). The toxic effect, however, would appear to be more marked on the white-cell elements : that there is a definite tendency to a lowering of the total leucocyte count, and that this is due to a fall in the number of neutrophils, has been shown. That a similar phenomenon is observed after the administration of sulphanilamide has been recorded by Britton and Hawkins (1938) and French (1939), so that the action of M&B 693 on the blood cells would appear to be essentially similar to that of sulphanilamide. Whilst the fall in the number of the total leucocytes and the absolute neutropenia in the present series is rather less than that recorded by Britton and Hawkins (1938), the dosage of M&B 693 is considerably smaller than that of sulphanilamide in the investigation made by these two workers. French (1939) found that only 33.3 per cent. of her sulphanilamide-treated cases gave a neutrophil-count below sixty per cent. of the total leucocytes. That M&B 693 has an even more toxic action on the white cells than sulphanilamide would seem to be indicated by the fact that eighty-three per cent. of cases in the present series exhibited a drop at some time or other in the neutrophil-count to below sixty per cent. of the total leucocytes. This relative neutropenia, together with an accompanying relative lymphocytosis, was so marked that one almost came to regard it as a usual feature in patients who were being treated with M&B 693. Lloyd and his associates (1938) noted a slight but definite fall in the total white blood-cell count with polymorphonuclear leucopenia, and a relative lymphocytosis in a few of their patients who were being treated with this drug : unfortunately, they do not state the number of patients in whom the investigation was carried out, nor the percentage showing this phenomenon.

It is difficult to see just why this toxic effect on the red-cell elements on the one hand and the white-cell elements on the other should be more marked in some patients than others, and why in some cases it should proceed to acute hæmolytic

TABLE.—

The relationship between the concentration of free M&B 693 blood, the percentage of acetylated drug present in the blo blood-cell changes.

Patient	Average Conc. of Free M&B 693 in the Blood (Mgms. %)	Average Percentage of Acetylated Drug in the Blood	Blood-Counts Before Chemotherap			
			Total Leucocytes per cmm.	Total Neutrophils per cmm.	Percentage Neutrophils	P per
Group A						
M1238	2.98	18.1	13,750	8,594	62.5	
M1373	4.1	20.0	10,625	7,836	73.75	5,6
M1038	3.66	20.7	10,312	6,085	59.0	5,1
M71	3.02	14.4	9,867	5,982	61.75	5,92
L707	2.5	27.6	10,625	6,481	61.0	5,0
Group B						
Pt. L	2.2	18.3	16,250	12,317	75.8	6,1
Pt. S	3.67	28.2	7,500	5,362	71.5	5,090,

NOTE.—
Absorption and Excretion of M&B 693 was studied by Werner's (1939) method.

BLOOD-COUNTS AFTER CHEMOTHERAPY				RESULTS	REMARKS
Lowest Total Leucocytes per cmm.	Lowest Total Neutrophils per cmm.	Percentage Neutrophils	Lowest R.B.C. per cmm.		
7,187	3,054	42.5	5,200,000	Failure	Showed a decrease in number once only (4th day).
9,187	4,061	56.5	5,420,000	?Relapse	Showed a decrease twice only (4th and 8th days).
6,562	3,248	49.5	—	Cure	Decrease on the 3rd day from beginning of chemotherapy.
4,062	1,960	48.25	6,600,000	Cure	Decrease once as here, slight on 20th day again.
6,875	3,139	45.66	5,000,000	Cure	Decrease five times —most marked on 14th day.
11,625	4,312	46.0	5,120,000	Cure	Decrease several times, including once beyond the 23rd day from commencement of "693."
4,625	2,278	40.5	5,380,000	Cure	Decrease on 11th day after finishing chemotherapy

anæmia or agranulocytosis. That it unfortunately does, however, has already been mentioned. This disturbance does not seem to depend upon the concentration of the drug in the blood, as patients with low blood concentrations may show an even more marked blood-cell disturbance than those cases where the concentration is comparatively high (see Table). In the fatal case recorded by Dolgopol and Hobart (1939), the highest blood concentration was ten milligrammes per hundred c.c., but other patients have shown concentrations of a much higher standard even than this without apparent ill-effect. Most of the patients in whom agranulocytosis has been observed, have had comparatively high dosage of the drug, and it would seem that this plays an important part in the pathological process. A comparison of an analysis of a number of reports of recorded cases of granulopenia following chemotherapy with M&B 693 with those following sulphanilamide reveals the fact that, whilst the average dose of M&B 693 administered in these cases is similar to that of sulphanilamide, the average period of administration is rather less than for the latter drug : it is suggestive that the total dosage of M&B 693 is of even more importance than the period of administration. This finds support in two cases of granulopenia recorded by Briggs (1939) : M&B 693 was given over an equal period of nine days to each patient; one case, however, had 60g. of the drug, whilst the other had 49g. : the patient with the larger dose manifested the more severe symptoms. It is possible that an undue sensitivity to the drug is exhibited in these cases, whilst the toxic action of the causative organism on the blood-forming tissues undoubtedly plays a part in some of the more serious conditions treated (Colebrook, 1939).

It appears to be impossible to foretell just which patient is liable to develop a serious blood dyscrasia and which is not. That the onset of agranulocytosis has been of such dramatic suddenness that even repeated blood-cell counts have failed to indicate its approach has, unfortunately, been recorded with sulphanilamide (Young, 1937). Nevertheless, a repeated blood-cell investigation should form an integral part of sulphonamide chemotherapy, especially where a dosage of 20g. or over (Pringle et al., 1940) is being given to a patient suffering from a condition likely itself to damage the bone-marrow. A number of other factors are significant in recorded cases of agranulocytosis, and in particular it would seem to be of first importance to keep a close watch on the blood-cells of those patients who show undue signs of toxicity or an atypical response to the drug. That patients who do not show a rapid response to chemotherapy are unlikely to respond at all has been the experience of most workers. In such patients, it seems evident that chemotherapy should be stopped and other means of treatment instituted.

With regard to the cell-counts themselves, it has been demonstrated that the detrimental effect of M&B 693 continues for some days after withdrawal of the drug, and that the maximum toxic effect is often seen during this period : in the investigation described, the greatest effect was witnessed about nine days after cessation of chemotherapy and sometimes even later. This delayed effect has been the experience of other workers also (Barnett et al., 1939), (Graham et al., 1939), (Agranat et al., 1939, and Briggs, 1939). It is important, therefore, that where

large dosage of the drug has been employed, and especially if there have been any signs of undue toxicity or unusual response to chemotherapy, the blood investigations should be continued for at least ten to fourteen days after the drug has been stopped.

SUMMARY.

(1) M&B 693 and Uleron, in common with other sulphonamides, cause a fall in the number of the red and white blood-cells of the body. The effect is greatest on the neutrophils and is more marked with Uleron.

(2) This effect continues after withdrawal of the drugs and may reach its maximum during this period.

(3) The effect on the blood-cells is not proportional to the concentration of the free drug in the blood, and differences must often be attributed to individual variations in the susceptibility of the blood-forming tissues.

(4) Repeated blood-cell counts should be performed on patients taking these drugs, both during chemotherapy and for ten to fourteen days after withdrawal of the drug, especially where large dosage has been employed or where toxic symptoms or atypical response to chemotherapy have been observed.

I am indebted to Dr. J. C. Rankin of the V.D. Clinic, Royal Victoria Hospital, Belfast, and to Professor E. B. C. Mayrs of the Department of Pharmacology in Queen's University, Belfast, for their helpful advice and criticism. My thanks are also due to Messrs. May & Baker Ltd., and to Messrs. Bayer Products Ltd., for free supplies of much of the material used in the earlier part of this work.

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A Review of the Treatment of Concomitant Squint

By J. R. WHEELER, M.B., F.R.C.S., D.O.M.S.

REVIEWING a series of sixty-odd cases of concomitant squint upon which I have operated, two points were brought out very clearly :

1. The high percentage of amblyopic eyes found due to neglect in starting treatment early and in carrying it out efficiently.
2. That the operation is as a rule successful and gives real satisfaction to the patient.

Next, the value of orthoptic training (eye exercises) in our treatment of these cases. In America some years ago some enthusiasts told us they could cure congenital nystagmus by this method, while other leading authorities said "the whole business was all bunk."

I, therefore, propose in this short paper to offer you a considered opinion of the present-day treatment of concomitant strabismus. Some hundreds of cases have been reviewed, and during the past four and a half years suitable cases have been referred to our orthoptic centre.

One has three quite definite aims in view in treating a case of concomitant squint :

1. To obtain two good seeing eyes.
2. To have the eyes cosmetically straight.
3. To obtain good binocular vision.

In the analysis of our cases there were two points brought out forcibly which I want to stress strongly, and it was really this reason that tempted me to write this paper.

The first point is that over fifty per cent. of the operation cases showed a considerable degree of amblyopia exanopsia (that is, a healthy eye which has lost its normal function of good sight due to neglect).

The tragedy of this neglect was brought to my notice early in my career when I had to deal with a motor-bicycle accident case. One eye had a ruptured optic nerve, with the result that it was blind. The other eye was uninjured, but its vision was only 1/60, due to amblyopia resulting from squint—a man thus doomed to relative blindness as the result of neglect. Thus the first axiom in treatment of concomitant squint is to obtain good vision in both eyes.

The second point I wish to make is that the majority of these cases come to us too late—the average history is of the squint having been present for varying times up to some years. I would like to stress now that all cases of squint or ?squint (especially if family history of squint is present) should be seen by an ophthalmic surgeon at the earliest possible moment.

The reason for this is obvious when one considers the factors which produce the lesion. In the great majority of people co-ordinated movements of the eyes and binocular vision are the rule. Like all other co-ordinated movements of the body, this faculty develops with the general development of the child, and at about the

age of six is firmly established. Thus one finds that it is during these first six years of life that some factor or factors may cause a child to develop a concomitant squint, but after that age it has a relatively uncommon beginning.

It is difficult to say at what age a baby really begins to appreciate objects, but probably between six months and two years the sense of sight and binocular co-ordination is being developed. All the factors which may upset this state of affairs are not yet fully understood, but four main groups of causes can be stated definitely :

1. Physical-defect group.
2. Fusion-defect group.
3. Errors-of-refraction group.
4. Psychological group.

1. *Physical-defect group.*

This group includes those cases where one or both eyes show some pathological state such as corneal opacity, congenital cataract, or fundus defect. The child is unable to see clearly, so has no real stimulus to develop fusion, which is essentially the cerebral blending of two slightly dissimilar pictures.

2. *Fusion-defect group.*

A limited number of people seem to be wanting in the normal inherent sense of fusion. Probably all cases of squint which develop under the age of two years belong to this class. It is obvious that it is almost impossible to "make bricks without straw," but one can at least aim at getting good vision in each individual eye, and maintaining it with each eye working independently. Let me here stress that it is never too young to begin treatment—a baby will tolerate some simple occlusion device very well. Experience shows that if these 'baby' cases are allowed to develop a unilateral squint, the resulting amblyopia exanopsia is difficult to overcome. The cosmetic defect of the squint may be corrected by operation later on.

3. *Errors-of-refraction group.*

This group accounts for the vast majority of cases of concomitant squint. Binocular vision is probably always present, but not firmly developed, as the age incidence of development of the squint is from about two to six years.

Simple hypermetropia or hypermetropic astigmatism is the common error of refraction. These children, as a result of this hypermetropia, always have to keep their ciliary muscles (the muscle of accommodation) in action in order to see even distant objects clearly. When they come to play with toys and look at books they must further accommodate, as well as converge both eyes to see this "near" object distinctly. Thus it is the correct co-ordination between accommodation (which focuses the object clearly) and convergence (which brings the visual axis of the two eyes to the one point) which is essential to prevent a squint developing. And so an upset in this co-ordination will result in a squint. The underlying hypermetropia is probably the predisposing cause of the upset in this co-ordination, but there is probably always some other physical or psychological element also present.

Treatment consists in estimating immediately and accurately the refractive err (the ciliary muscles having been paralysed by atropine for some days beforehand Suitable glasses are prescribed, and the child wears them for some weeks and th reports again. At the same time any physical general defects should be remedi as far as possible. This is what one might term stage one in our effort to resto binocular co-ordination, and will cure a certain percentage of cases.

Those cases which do not respond must be watched carefully for a number years, the main point being to keep or restore good vision in each eye by means occluding the master eye (i.e., forcing the weaker eye to work). It is nature defence to suppress the vision in the squinting eye so as to avoid diplopia. Ou attack must be directed against this suppression to prevent amblyopia. Our case show all too frequently that no treatment had been sought for from months t years after the onset of the lesion, with the result that there is marked amblyopia which is difficult to overcome. If seen early, it is obvious response will be much better—the longer the delay the poorer the prognosis.

This occlusion may be carried out in babies by means of tying on a cloth patch over the eye (splinting the arms if necessary), in young children by means of a plaster patch, and later on by various types of opaque shields worn on the glasses. This is stage two in our effort to cure the lesion.

It is during this stage that neglect is apt to take place—the child does not report on account of living a long distance away, on account of various domestic difficulties, or perhaps through sheer carelessness.

The amblyopia may swing to the occluded eye if it is occluded too long, so these children must be observed about every six weeks during the "occlusion" period. If we can steer the child to 6-8 years with two seeing eyes, amblyopia will not then develop to any serious extent. The converse is, alas, also true: that if amblyopia is still present at 6-8 years, it will probably remain in spite of treatment, though it may occasionally be improved to a certain degree.

At the age of four to six years, when the child is old enough to give some intelligent co-operation, its state of binocular vision is tested in the orthoptic (squint) department. It is now that the orthoptist starts collaborating with the surgeon in an endeavour to exercise the cerebral function of binocular vision. This is the third stage in our line of treatment.

Before commencing orthoptic training it is essential that the refractive error be fully corrected with glasses, and that no amblyopia of consequence is present. The child must have some "sense of fusion" if this line of treatment is to be successful, but it is often only after a trial for a short period that this fact can be ascertained.

Our experience of over four years shows that, if after a few weeks' training the child shows no signs of reasonable fusion, it is useless to continue a long course of expensive training. If one has never had binocular vision, one will not miss it; so just concentrate on getting two seeing eyes which can be "straightened" later, if necessary, by operation.

The best age to operate on these cases of alternating squint is a debatable point—I personally suggest between 10-14 years (i.e., before serious schooling or work begins). Of course, one can operate up to any age that the patient desires the operation.

Those cases which show a good response to training should have further treatment, as our results show that a fair percentage of the small-angle squints (under 10°) can be cured by this method. The larger-angle squints will need a straightening operation to aid the orthoptist in getting a cure. This operation should be undertaken early—at about the age of 6-8 years, so that further orthoptic training after the operation can complete the job while the child is still young and receptive to training.

The advantage of establishing strong binocular vision is that the eyes will never develop a squint and that it may be possible to discard glasses.

In these days of fast-moving aeroplanes, motor-cars, machinery, etc., one's sense of quick and accurate judgment of distance is greatly enhanced with good binocular vision. Without good binocular vision it will be almost impossible to take a front-rank place in any fast-moving ball-game, such as tennis, cricket, etc.

The psychological group.

Imitative squints, jealousy squints, and squint resulting from fright, are a definite entity. The treatment is the same as for other types, but results are very variable, as we are dealing essentially with a somewhat unstable general nervous system.

The residue of neglected cases with that squinting amblyopic eye should certainly have the advantage of a "straightening operation." The social and commercial disability of a marked squint can be very great. Therefore, wherever possible the cosmetic blemish should be rectified.

Over fifty per cent. of my operation cases had amblyopic eyes, and practically all were converging squints (only two diverging).

The technical details of the operation I do not wish to bore you with, except to say that I, personally, prefer general anæsthesia to local anæsthesia, and that I find catgut sutures very satisfactory (as no sutures have to be removed later on). To-day the operation of recession of the internal rectus (i.e., cutting the muscle close to its insertion and sewing it to the globe more posteriorly) is usually the one of choice. If the angle of squint is large, this may be combined with a partial resection of the external rectus (cutting a piece of muscle out and suturing the ends). For a very large-angle squint it may be necessary to operate on both eyes in order to get a good cosmetic result.

And now to sum up my remarks: When a squint is first noticed (1) the eyes should be examined immediately under atropine mydriasis to exclude any physical defect and to ascertain the refractive error; (2) correcting glasses must be worn and amblyopia treated so as to maintain two seeing eyes; (3) orthoptic training should be commenced when child is old enough to co-operate, provided it is found to be a suitable case; (4) operation should be undertaken when necessary.

Sarcoidosis of Beock

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THE disease known as Boeck's sarcoidosis was first recognised in the form of skin lesion by Jonathan Hutchinson in 1869. In 1881 Ziegler described the lesion in lymph nodes as "large-celled indurative hyperplasia." Besnier in 1889 describe a skin manifestation and called it "lupus pernio." Further descriptions of sk lesions only were published by Tenneson (1892), Hutchinson again (1898), a Boeck (1899). Boeck noted enlargement of superficial lymph nodes, and followin clinical and histological studies of further cases (1905, 1916), came to the conclusio that it was a generalised disease which might affect lymph-nodes, mucou membranes, internal organs, and bones. As he had thought that the histologic changes in the skin resembled sarcoma, he had called the condition "multipl benign sarcoid of the skin," hence the name Boeck's sarcoidosis. He finall considered it to be an infectious process closely related to tuberculosis and possibl due to the tubercle bacillus. Schaumann was probably the first to describe it a a generalised disease in 1914, and in subsequent papers he called it "lympho granulomatosis benigna." Numerous accounts of cases have been given since especially on the Continent, and in America and England notably by Longcop and Pierson (1937), Snapper (1938), and Bodley Scott (1938).

Boeck's sarcoidosis is now recognised to be a generalised chronic disease o adult life affecting a multiplicity of tissues, but accompanied by relatively littl constitutional disturbance, with a relapsing course and a tendency to spontaneou remission. The lesions are characterised histologically by follicular mesenchyma hyperplasia. In the cases described in the literature, few organs have escaped the disease, but the lesions are most constant in lymphoid tissue, bone marrow skin, lungs, spleen, liver, eyes, and salivary glands, and at some time in the course of the disease there is a localised or generalised enlargement of lymph nodes. The histological appearance and to some extent the distribution of the lesions resemble those of tuberculosis, but there is no caseation, the tuberculin reaction is usually negative, and the tubercle bacillus has never been demonstrated. It has also been suggested that the condition is a reticulosis (Bodley Scott and Robb-Smith, 1936).

The tendency for the disease to involve the skin in different ways and to attac certain groups of tissues has given rise to a number of clinical pictures, which have acquired the names of their describers. The skin manifestations, which are present in about half the cases, are divided clinically into five types: Multiple benign nodular sarcoid of Boeck, benign miliary lupoid of Boeck, lupus pernio of Besnier, angio-lupoid of Brocq and Pautrier, and érythrodermie sarcoïdique of Schaumann. The bone lesions in the hands and feet, which produce typical punched-out shadows radiographically, are known as ostitis tuberculosa multiplex cystica of Jüngling, and the simultaneous involvement of the parotid gland and

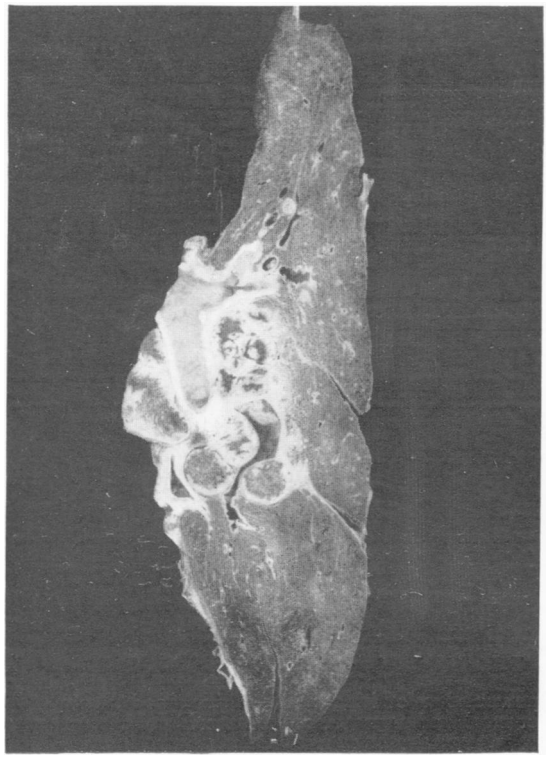

FIG. 1.

Section of right lung, x 2/3. Note collapse, enlarged bronchial lymph glands, distortion of lumen of pulmonary artery containing coiled thrombus, thrombi in smaller vessels, and very small white miliary nodules throughout lung, most numerous in the base.

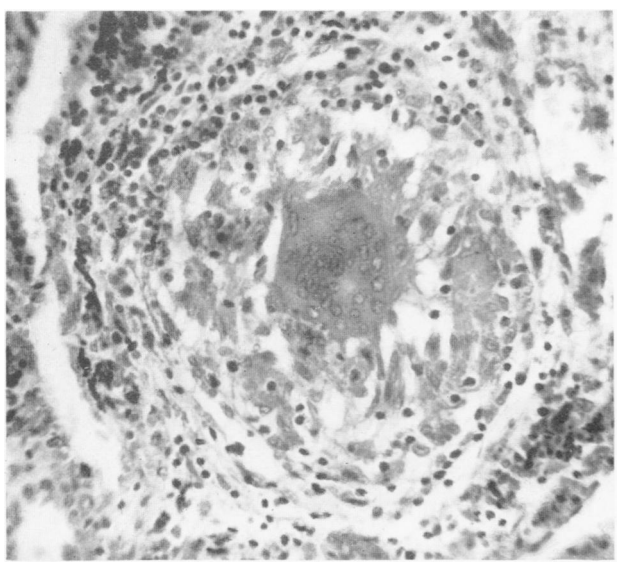

FIG. 2.

Sarcoid follicle in pulmonary lymph vessel. Note giant cell and epithelioid cells with branching cytoplasm, and zone of lymphocytes outside the endothelium of the vessel.

H. and E. x 280.

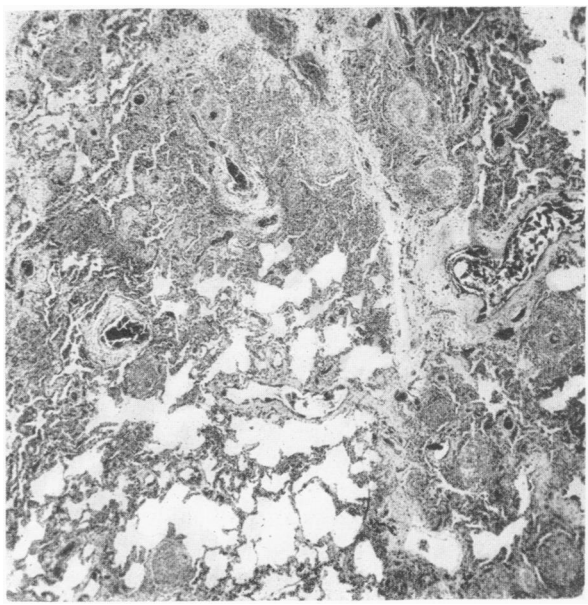

FIG. 3.

Low power view of lung to show thickened pleura (top left-hand corner) and aggregations of sarcoid follicles in subpleural and perivascular lymphatics. H. and E. x 20.

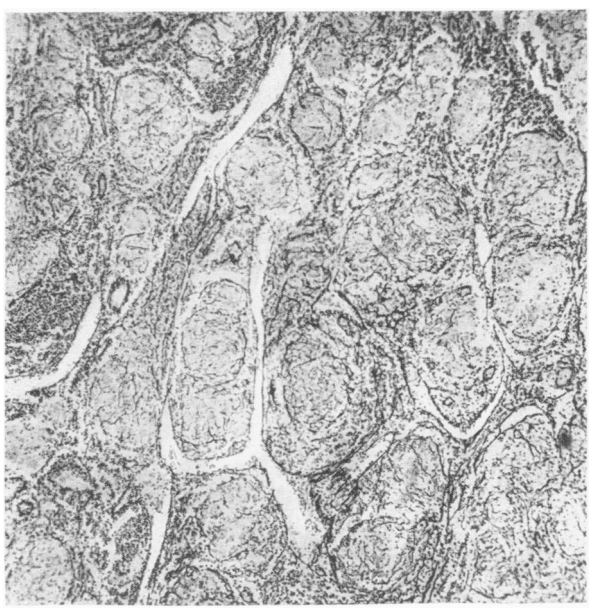

FIG. 4.

Foot's silver carbonate impregnation of lymph node, showing concentration of reticulin round the sarcoid follicles. x 60.

the uveal tract (iridocyclitis) is called uveoparotitis subchronica of Heerfordt. These conditions are different clinical expressions of the same pathological process.

A case has recently been reported in Ireland by Mitchell (1942). The diagnosis was made following biopsy from the skin and a lymph node, and was supported by negative tuberculin reactions and animal inoculation. The case was remarkable for the presence of lesions in the retina.

The following is an account of a case discovered at autopsy, in which the only lesions were in the lungs, bronchial lymph nodes, liver, and spleen.

Clinical History.

The patient was a stoutly built woman of 52 years, married, with two children. She was admitted to the Royal Victoria Hospital, Belfast, on 2nd April, 1941, complaining of severe pain in the right side of the chest. The pain came on suddenly, with shivering fits, and she had a slight cough with very little sputum. There had been a similar attack three weeks previously, and she gave a history of pleurisy nine years before. There was no family history of tuberculosis. She had been losing weight and was not sleeping well. Her menses had ceased six years before.

The pulse rate was 96 per minute, temperature 99.4°F., and respirations 28 per minute.

On examination, the only abnormal findings in the chest were fine crepitations on auscultation at both lung bases, especially posteriorly. Apart from tachycardia, there were no physical signs of disease in the heart, and examination of the alimentary, genito-urinary, and central nervous systems resulted in no abnormal findings.

A radiograph of the chest was reported as showing elevation of the right diaphragm and slight pleurisy in the right costo-phrenic angle, with congestion of the right base. Bacteriological examination of the sputum revealed Friedländer's bacillus, pneumococci, and micrococcus catarrhalis. No tubercle bacilli were found on direct examination or on culture. An electro-cardiogram showed tachycardia, flattening of T wave in lead ii, and inversion of T wave in lead iii—"Myocardial change." The urine was acid, of specific gravity 1020, and contained no albumen or sugar. A catheter specimen was sterile.

A diagnosis of broncho-pneumonia and pleurisy was made, and four grams of sulpha-pyridine administered daily. The temperature fell from 100.2°F. on the second day to normal in three days, but rose again to the previous level, and the drug was discontinued after six days. The pain and the pleurisy slowly disappeared, but the crepitations persisted, and the temperature fluctuated slowly between 99°F. and 101°F. The pulse rate remained fast, between 100 and 130 per minute, and was reduced by digitalis from an average of 116 to 80 per minute.

A further radiograph of the chest one week before death was reported as showing slight general enlargement of the heart of the aortic type. The pleurisy had disappeared, but the elevation of the right diaphragm persisted.

The patient was feeling very well until on the morning of 13th May, 1941, she sat up in bed after breakfast, collapsed suddenly, and died in a few seconds, six weeks after admission to hospital.

Autopsy.

The post-mortem examination was carried out three hours after death.

The body was that of an elderly female of stout build and good nutrition, a
was still warm. There was no jaundice, œdema, enlargement of superfi
lymph nodes, nor disease of the skin.

The pericardial sac contained a small amount of clear yellow fluid. The l
pleural cavity was entirely obliterated by fibrous adhesions. The right pleu
sac was bridged by three or four fleshy adhesions over the lower lobe, the b
was adherent to the diaphragm, and the lung considerably collapsed. There w
no excess of fluid. The abdominal cavity contained neither free fluid nor g
and the organs occupied normal positions.

The neck organs, heart, and lungs were removed en bloc, and on sectioni
the hilum of the right lung, the right pulmonary artery was seen to contain a ma
of coiled thrombus. This thrombus also filled the main pulmonary artery and t
left branch, and extended through the pulmonary valve into the right ventricl
The embolus when uncoiled was about eight inches long and much branched, a
the main stem at its widest was one centimetre in diameter.

The femoral, internal and external and common iliac veins were examined f
the presence of thrombus, but none was found. The circumference of the low
limbs was measured at different levels from the ankle to the thigh, and was fou
to be everywhere equal on both sides. The source of the embolus was n
discovered.

The heart weighed 11 ounces. There was no thrombus in the auricul
appendages. The endocardium and valves were normal. The right ventricle w
hypertrophied, the wall being one centimetre in thickness. The myocardium w
brownish-red in colour and appeared healthy throughout.

The right lung was small and collapsed (see fig. 1). The pleura was smoot
greyish-purple in colour, and semi-opaque, and over the lower lobe was mu
thickened by the attachment of several fleshy fibrous bands. Widely scatter
beneath the pleura were many small greyish-white nodules averaging one mil
metre in diameter. They felt slightly firmer in consistency than the surroundi
lung tissue. In the upper lobe, near the apex posteriorly, there was a firm reddis
purple area about four centimetres by three, which was raised above t
surrounding lung and well demarcated, having the gross appearance of an infar
The overlying pleura was dull and slightly thickened.

The hilum lymph nodes were greatly enlarged, discrete, and of the consisten
of firm rubber. A number were normal in size and consistency. The bronch
mucosa was pink, moist, and rugose. The main branches of the pulmonary arte
contained pale ante-mortem blood clot. The enlarged lymph nodes, on sectio
were firm and markedly anthracotic, the central parts being black or greyis
black in colour, surrounded by a fairly regular outer rim of greyish-white tissu
about three millimetres wide.

The cut surface of the lung was brownish-red in colour, and scattered throughou
were many small grey, almost bluish-white, nodules one or two millimetres i

iameter, similar to those seen beneath the pleura. Many of the smaller blood-essels contained firm blood clot.

The left lung.—The bronchial lymph nodes, blood-vessels, and alveolar tissue ere similar in appearance to the right, except that there was no infarct, the arietal and visceral layers of pleura were closely adherent, and there was less llapse.

The liver was enlarged and weighed four and a half pounds. The capsule was mooth, and, on section, brown liver cells could be seen against a pale yellowish-rown background. The organ was soft and friable. No nodules similar to those the lung were detected. The gall-bladder and portal vein were normal.

The spleen weighed five ounces and was not enlarged. The capsule was smooth, nd just beneath it, at the lower pole, there was a small greyish-white nodule ne millimetre in diameter, similar to the sub-pleural nodules seen in the lung. o similar lesions could be detected on the cut surface, which was dark red in olour. The pulp was very soft and the capsule did not retract from the cut edge. he Malpighian bodies and trabeculæ were clearly visible.

The alimentary and genito-urinary tracts revealed no abnormality, and no lesions ere found in the thyroid, parathyroids, adrenals, nor pancreas. There was slight heromatous change in the intima of the aorta. The brain and bones were not amined.

Microscopical Examination.

Only the essential pathological lesions are described.

Lungs.—Scattered throughout the alveolar tissue of both lungs were numerous rcular or oval cellular follicles. Their structure was everywhere similar. They ere composed of large pale epithelioid mononuclear cells with slightly eosino-ilic cytoplasm and large clear nuclei, which contained one or two tiny chromatin odes. The nuclei were round, oval, or slightly irregular in shape. In most of e follicles there were one or more multinucleate giant cells of the Langhans pe containing any number of nuclei up to fifty. As many as ten giant cells were en in one follicle. Their cytoplasm was often branched, extending radially tween the nuclei of the epithelioid cells, whose cytoplasm was also frequently anched, so that among the cells of the follicle there were irregular clear spaces ross which stretched thin pink-staining cytoplasmic bridges (see fig. 2). Some the follicles contained a few lymphocytes and eosinophils. Nearly all of the llicles were inside lymphatic vessels, being enclosed by at least one layer of ttened endothelial cells, which in turn were surrounded by lymphocytes. The ra-lymphatic situation of the follicles was apparent also from their distribution. ey were most concentrated just beneath the pleura in the sub-pleural lymphatic xus, and in the depths of the lungs were always in a perivascular or peribronchial mph channel (see fig. 3). Some were in the walls of bronchioles, splitting up the scle-coats beneath intact mucous membrane.

The pleura overlying areas in which the follicles were present, was thickened fibrous tissue containing dilated and engorged capillaries. Beneath the adhesions the right lower lobe the follicles were particularly numerous and infiltrated tensively by lymphocytes. The adhesions consisted of bands of fibrillar fibrous

tissue containing capillaries and a few lymphocytes, such as might be forme
the organisation of a fibrinous exudate. There was nothing in their histolo
appearance to suggest a specific ætiology apart from the sub-pleural concentr
of follicles.

A section of the hæmorrhagic infarct at the periphery of the lung showed
it was of some standing, and its central portion had undergone necrosis.
overlying pleura was much thickened by fibrous tissue in which there were di
and engorged capillaries, many small hæmorrhages, and scattered foci of l
pale mononuclear cells and lymphocytes. The sub-pleural lymphatics were di
and their endothelium swollen. They contained large mononuclear cells
ingested red blood-corpuscles and carbon particles.

A smaller hæmorrhagic infarct deep in the lung was completely walled o
cellular fibrous tissue infiltrated with large mononuclear cells and lymphoc
and containing epithelioid follicles. At its edges organisation of the infarct
ingrowing capillaries and fibroblasts had begun. In the same section there
a small artery containing an organised thrombus. Throughout the remainde
both lungs there were many small and occasional large vessels containing thro
in various stages of organisation.

In sections from the bases of the lungs the alveoli contained much œdema fl

Bronchial lymph nodes.—Some of these were not enlarged and presented nor
architecture. In the enlarged nodes the lymphoid tissue was almost c
pletely replaced by follicular collections of cells similar to those seen in
lung. There were fewer giant cells and more lymphocytes than in the lung lesi
There was no necrosis nor caseation. Where the enlarged glands pressed u
the pulmonary artery there was considerable thinning of the media, and Ha
elastin stain revealed that the elastic tissue at this point was reduced to a qua
of its width in the rest of the vessel.

Liver.—The liver cells had undergone extensive fatty degeneration which
mainly periportal in distribution. There were several follicles or small group
follicles composed of epithelioid cells with giant cells, similar to those in the l
and lymph nodes. The follicles had no predilection for any one part of the lob
being present in all parts. In two of the larger groups there were small area
pink-staining necrotic material. In these liver lesions there was a relatively la
number of eosinophil polymorphonuclear leucocytes, with a few lymphocytes
the periphery of the follicles.

Spleen.—The red pulp was very congested. The Malpighian bodies were diff
and composed in their peripheral parts largely of plasma cells. Plasma cells
surrounded many trabeculæ, indicating a reaction to infection. There w
several epithelioid follicles in the spleen similar to those in the lung,
there was nothing remarkable about their distribution in relation to spl
architecture.

No other organs on microscopic examination showed lesions of any kind.

The resemblance of the lesions described to tuberculous follicles was immediat
apparent, but nowhere was there any evidence of caseation, and only two ve

mall areas of necrosis were seen in the liver lesions. Staining by Ziehl-Neelsen's ethod of numerous sections of lung, lymph nodes, liver, and spleen failed to veal any acid-fast bacilli. Van Gieson's stain and Masson's trichrome stain owed that each mesenchymal follicle was partly surrounded by a few thin llagen fibrils such as would normally be present in any tissue, and there was evidence of a fibroblastic reaction as in miliary tubercles. Impregnation by ot's silver carbonate (fig. 4) demonstrated that each follicle was almost enclosed strands of reticulin, with many fine branching inter-cellular fibrils in the centre.

Anatomical Diagnosis.

Chronic pulmonary embolism; collapse and infarction of right lung; final fatal embolus:

Boeck's sarcoidosis of bronchial lymph nodes; miliary sarcoidosis lungs, liver, and spleen:

Hypertrophy of right ventricle:

Atheroma of aorta.

Discussion.

The diagnosis of Boeck's sarcoidosis on histological appearance, even without gative tuberculin reactions and animal inoculations, seems justified, and is pported by the absence of demonstrable acid-fast bacilli. The distinction from engel-Wolbach sclerosis or giant-cell histiocytic sinus reticulosis (Robb-Smith) in the absence of fibrosis; also, in the sarcoid the greatest concentration of iculin is at the periphery, whereas in Stengel-Wolbach's sclerosis it is among cells in the centre of the follicle. The presence of extensive lung lesions also cludes the reticulosis.

t is generally accepted that the lesions of Boeck's sarcoid are clinically benign, d seldom, if ever, cause the death of the patient. There is no reason to believe t the present case departs from this dictum. The attack of pleurisy nine years ore death was probably on the left side, where the pleural cavity was obliterated firm adhesions. Nothing remains to show its ætiology. The cause of the two cks, nine and six weeks before death, was undoubtedly pulmonary infarction, onic embolism, perhaps with the help of the sarcoid lesions, having produced pre-requisite venous congestion. The patient was brought to bed by the last ck of pleurisy, and the decubitus resulted in stasis. This was a factor in sing the thrombosis, from which the final fatal embolus was set free.

here is no evidence that the sarcoid lesions alone could have produced the risy. The age of the sarcoids is difficult to judge. It is said that they ogress slowly, retaining their cellularity for several months before undergoing us replacement. The lesions in this case were cellular, and none showed any ence of fibrosis. It cannot be assumed, however, that even at their inception he presence of a possible inflammatory agent, they could have caused a pleural date.

he radiographs of the lungs in this case showed features which have been tantly described in pulmonary sarcoidosis. The hilum shadows were prominent, ading towards the bases; linear shadows in the lung fields presented a slightly ulate appearance, sometimes called "marbleisation," and there were many

small circular shadows three to five millimetres in diameter, especially in the l which resembled those of miliary tuberculosis. There is a definite pathol basis for each of these appearances in the enlargement of hilum glands an presence of perivascular and peribronchial sarcoids in linear and circular gr Slight cough as the only symptom, and limitation of physical signs to l crepitations, are also constant findings.

As regards the ætiology of sarcoidosis, no deductions can be drawn from case, and general impressions are vitiated by the co-existence of the em phenomena. The prevailing view is that the disease is a peculiar form of be tuberculosis, caused by a filterable form of the bacillus or by the products o growth. The absence of caseation and of skin sensitivity is explained by theory of anergy. In the present case the scattered miliary sarcoids in the l and spleen appear to be blood-borne, and the fatty degeneration of the completes a likeness to miliary tuberculosis. Some of the cases reported as he or chronic miliary tuberculosis may be pulmonary sarcoidosis (Bödeker, 193

Another suggestion is that it is a systematised disease of the reticulo-endoth system (a reticulosis), comparable to Hodgkin's disease, and likewise of unkn ætiology. The resemblance of the sarcoid lesions to those of "chronic prolifera tuberculosis," Crohn's disease (regional ileitis), tuberculoid leprosy, Leishmani of the skin, and to lesions produced by injections of paraffin, oils, fats, an phosphatide fraction of the lipoids of the tubercle bacillus, suggest that sarcoid may be a non-specific tissue response to a variety of pathogenic agents. It difficult, however, to accept a non-specific ætiology for such a characteristic well-defined pathological process.

Summary.

(1) An account is given of a case of Boeck's sarcoidosis discovered at auto in a patient dying of pulmonary embolism. The lesions were in the lungs, bronch lymph nodes, liver, and spleen.

(2) The literature, the pathological histology, the radiographic findings in lungs, the biological effects of sarcoidosis, and the ætiology of the condition briefly discussed.

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Recurrent Dislocation of the Ankle-Joint, due to Rupture of the External Ligament

By Lt.-Col. N. Heath, M.A., F.R.C.S., L.R.C.P., R.A.M.C.

The sprain of the external ligament of the ankle-joint is due to the sudden inversion of the joint, with adduction of the fore-foot, whilst the force is the combination of momentum and body-weight. The injury to the ligament may range from the tearing of a few fibres to the complete rupture of the fasciculi. Unrecognised, or classed as a simple sprain, such an injury leads to chronic instability of the ankle-joint, and dislocation of the astragalus from the mortice of the joint occurs on slight provocation. The normal range of movement at the ankle is antero-posterior. Inversion takes place at the subastragaloid and mid-tarsal joints.

Ordinary X-rays of the ankle will show no abnormality, but if the ankle be held in forcible inversion, the mortice of the joint will be seen to have opened out. This injury is one especially likely to be seen during war, when severe inversion sprains are common under active service conditions in the field.

Case Report.

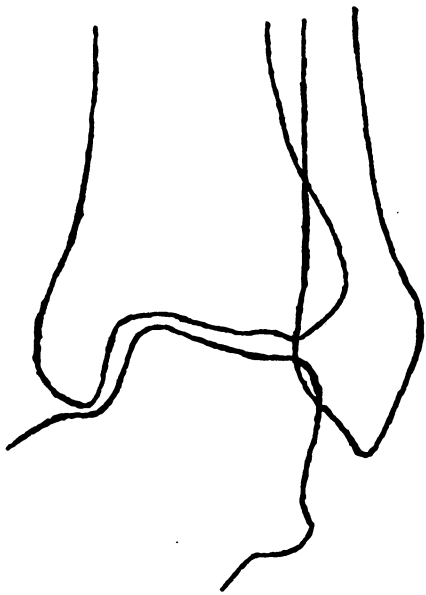
The following case report is typical, and illustrates the clinical signs of the condition :—

Sergeant J., aged 33 years, regular soldier, R.A., described an accident ten years previously, when he twisted the left ankle violently playing hockey. He was obliged to leave the field, and was treated by rest and bed for four days and cold compresses.

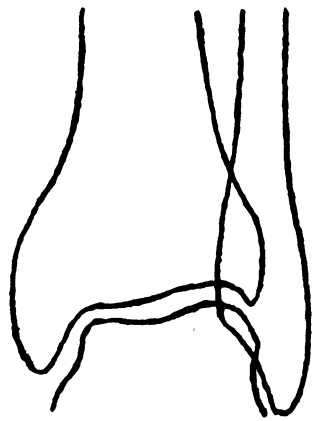
No X-ray was taken, and the ankle was previously stable. He stopped playing games for some weeks, and then tried again, wearing an elastic stocking. He found that the ankle gave out on slight provocation, but that the after-effect of these sprains was never as severe as after the first occasion. He limited himself to ordinary duties, but suffered much inconvenience. In 1940, whilst acting as a cannery instructor, the condition became habitual, and he was unable to hurry over rough ground or to walk in the dark. He reported sick on several occasions, but was never X-rayed, and was finally sent to hospital with a note stating that he was of no use to his unit, and a thinly-veiled inference that he was considered a malingerer.

Examination.

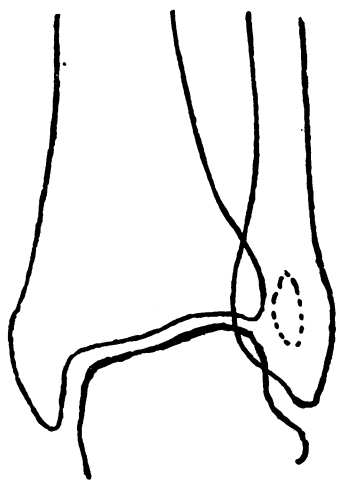
The foot was well-shaped and free from defects and deformity. There was no peroneal spasm. The foot was extremely mobile. On inversion, it could be appreciated that the astragalus was sliding away from the external malleolus. X-rays were taken in the normal manner and then with the foot in inversion.



I
NORMAL ANTERO-POSTERIOR VIEW
Pre-operative



II
ANTERO-POSTERIOR VIEW
In Inversion



III
ANTERO-POSTERIOR VIEW IN INVERSION
Post-operative

Operation.

The man expressed himself anxious to have anything done to improve the condition.

24th July, 1941.—An operation was performed to reconstruct the external lateral ligament in the manner described by Mr. Watson Jones. The procedure is carried out through an incision extending one hand-breadth above the malleolus to one inch below, and immediately behind the shaft of the fibula. The tendon of the peroneus brevis is dissected from the muscle-belly, and freed distally as far as the annular ligament. The divided muscle is sutured to the peroneus longus. A quarter-inch hole is drilled through the malleolus in the line of the fasciculus, and another vertically downwards through the outer edge of the neck of the astragalus into the sinus tarsi. The tendon is threaded forward through the malleolus, downwards through the astragalus, and firmly secured to the periosteum of the tip of the malleolus. The incision is covered by a layer of tulle grass, and the limb plastered with the ankle at a right-angle. The limb is elevated for a couple of days in bed, and active exercise of the toes begun at once. The operation is performed in a bloodless field.

After-Treatment.

The plaster was maintained for two weeks with the patient in bed, then removed together with the skin sutures, and replastered. A walking-iron was fitted, and he was sent to the convalescent depot as an ambulatory case. The second plaster was worn for a further six weeks, and within a couple of weeks of this period, he was actively engaged in supervising a physical training class, employed as an sergeant, and attending the depot dances. After removal of the plaster, he remained employed at the depot, and was able to continue his physical treatment. This provided me with the opportunity, so often lacking, of following the case to its conclusion.

Review.

The case was reviewed on 15th February, 1942.

The joint was completely stable. He could walk fourteen miles without difficulty, and demonstrated the stability of the joint by climbing up a steep slope of one thousand feet.

Conclusion.

Any case of chronic instability of the ankle-joint should be investigated to demonstrate the integrity of the external lateral ligament.

The operation of the tenodesis, devised by Mr. Watson Jones, is suitable for practice in military hospitals under war conditions.

My thanks are due to Colonel Hedley Whyte, D.S.O., R.A.M.C., for interest taken, and permission to publish this case; and to Major J. P. Bostock, R.A.M.C., West Africa Force, for production of the diagrams.

West Africa Force, June, 1942.

Goitre in School Children

By MARY ERSKINE, M.B., D.P.H.

THE incidence of simple and sporadic goitre has been studied in many parts of the world, with the object of finding causes of the condition, and if possible preventing them from becoming serious in later life by early recognition and treatment. An interest has been taken in the subject from early times. Dr. S. I. Turkington remarks in his historical survey of medicine, that when John Evelyn rode over the Simplon on his way from Padua to London, he noticed a people with large wens and he quotes Tacitus on the point, thus showing that the Romans had noticed the condition 1,500 years earlier. It has since been investigated in the so-called goitre belts, the Great Lake Regions in America, the Cascade Mountains in North America, the Andes in South America, the Himalayas in North India, the Alps in Switzerland, Derbyshire in England, and elsewhere.

GEOGRAPHICAL DISTRIBUTION.

The work of Kerzman[2] in Switzerland is well known. He found fifty-eight per cent. cases in boys and sixty-seven per cent. cases in girls in schools. His work was followed up in New Zealand by Hercus and Baker.[3] They compared the incidence in inland and coast districts, and found an average of 60.9 per cent. enlarged thyroids in 14,916 children in Canterbury and on the west coast. (There were fewer cases on the sea-coast.)

In England Dr. Percy Stocks[4] made a critical analysis of the results carried out by six hundred school medical officers, who examined 375,022 children in different parts of the country. He suggests that a gauge should be used to measure the thyroids of children aged 11 to 14 years. He found the incidence was low on the sea-coast (.7 per cent. in boys and 2.9 per cent. in girls) with exceptions on the south-west coast, and it was high in some rural areas. He thinks that an average normal value would be of one per cent. in boys and four per cent. in girls. His suggestions have been carried out as far as possible in this paper, and much the same results were found.

In Canada Dr. Griffith Binning[5] made a survey of simple goitre in April, 1934, in Saskatoon Public Schools. He found 718 cases, or 12.3 per cent., in 5,80[illegible] children aged 6 to 24 years. A great number of these were in children aged 9 to 11 years, and they became larger and more prevalent as the children grew older. The greatest number of moderate cases were seen at the age of thirteen.

He collected data as to age, sex, race, and social position, and he considered race and social position to be factors of great importance, as food and water supply was the same for foreigners on out-door relief as for the other children. He considered slight cases should be treated medically, and severe surgically.

Dr. Oswald Taylor[6] found no goitre among Jewish children in Manchester, which he attributes to their varied diet, which contained sufficient iodine, vitamins, and roughage. He found 9.7 per cent. goitre in other children; there was a gradual increase up to 14 years, and then a rapid decrease. In Pennsylvania Dr. John

Quigley[7] made a study of preventive treatment in a school in Akron. He treated his cases with one-sixth grain sodium iodide, first in water, and then made up with a chocolate base. This dose was given once a week for forty weeks, with no untoward effects and no large thyroids developed, as happened in the untreated cases.

On the Atlantic coast Dr. Israel Bram[8] reported 832 cases of simple sporadic goitre; six per cent. were in children under 10 years. These cases were collected during twenty-five years ending in 1934, and would represent a slight annual incidence, but it is important, as the children live where iodine is abundant. He attributes the enlargements to tonsillitis, infectious diseases, and errors in diet, and he treats them with one-tenth grain desiccated thyroid gland, as he found iodine unsuitable. Many of his cases recovered in six weeks, but he considers that they should be followed up for six to twelve months.

Similar surveys have been made in Germany by Hamburger, Wallis, Aschoff, and Wieland, and in Italy by Corda.

Incidence of Simple Goitre in School Children aged 5 to 14 years in South County Antrim in Spring and Summer, 1934.

There were 626 cases of simple goitre in 15,653 children, or 3.9 per cent.—1.3 per cent. boys and 2.6 per cent. girls. The sex distribution in the schools was equal. There was in no case a preponderance of older girls in any district.

The Type of Goitre, the size and variation in different age groups and areas.

The percentage of goitre in sea-coast and urban sea-coast areas is below .7 per cent. There is a slight increase in girls as compared with boys in some groups, but the incidence in the sexes is more uniform, and there is no rise in the percentage of the older girls as in the inland urban and rural areas.

In the urban inland districts the percentage is higher in group II girls, but again the rise is not maintained in the older girls as it is in the rural areas, where the girls are definitely in the majority, and these cases do not clear up as they do in the sea-coast districts, or tend to disappear as in the case of most of the enlarged thyroids in boys.

The type of goitre described as slight is 4.2 mm. diameter, and is plainly seen; the next size is larger, firmer, and would be noticed as goitre easily by any observer; the third type colloid is larger and more diffuse, and with these are included some hard adenomatous goitres found in rural areas. Some were noted in families in which grandmother, mother, sisters, and brothers were similarly affected.

Environment in South County Antrim.

The areas are rural districts with some small towns and villages situated on the main roads, at harbours on the coast, and inland on the River Lagan and near to Lough Neagh. They are bounded by the Atlantic Ocean, Belfast Lough, the River Lagan, Lough Neagh, and the northern portion of the county.

Iodine is said to be most abundant in the air from the Atlantic Ocean, and t carried inland to a distance of three miles from the coast. It is also foun mesozoic rock—basalt, trias marl, fosilliferous limestone, which form the c round the coast, and the mountain ridge which runs from north to south of district. The rivers flow down the slopes of the water-shed into the sea, R Lagan, and loughs. It is on the slopes, valley, and lowlands near the River La and Lough Neagh that the greatest number of cases of goitre are found.

The classification followed in most goitre surveys in school children refer the size of the thyroid gland; slight, moderate, or large; to the condition of gland—soft diffuse colloid, or hard nodular adenomatous swelling. Also accompanying signs; exophthalmos, tremor, or tachycardia; and to type of dist urban or rural.[4]

Pathology.—In most cases the swelling is in the nature of an hypertrophy colloid infiltration due to decrease in the iodine store. The basal metabolic-r is normal, there is no clinical evidence of hyperthyroidism—Crile.[13]

Morphology.—Quigley[7] notes, if a thyroid enlargement is irregular and nodul it is said to be due to different rates of growth of the foci of cells of differ physiological ages. Woefflen designated these foci as fœtal rests. These nodu growths may not be affected by the administration of iodine or by natural phys logical recovery, which occurs in some other cases when the [7]normal amount iodine (equal to 0.2 per cent. of the dried gland) is restored; but if 0.1 per ce is present, no hypertrophy will take place.

Etiology.—The fundamental or essential cause of goitre is unknown, b Marine[9 18 21] states that the essential causes appear to resolve themselves in determining the causes of relative rather than absolute iodine deficiency. T simplest way of increasing the need of the thyroid for iodine, is by depressi the utilisation of oxygen in the tissues.

Chesney and Webster found that prolonged feeding with cabbage, which co tained a goitregenic agent due to cyanides, caused thyroid hyperplasia in rabbi Marine made further experiments, and he found that this was due to the increas demands of the thyroid for iodine caused by the goitrogenic agent, and that iodi administration will prevent it, as it prevents enlargements due to over-fat di meat diet, anterior pituitary extracts, or partial removal of the gland.

Dr. E. H. M. Milligan of Glossop remarks that lack of vitamin C (ascorbic ac appears to cause depression of the process of oxidation.

Sir Robert Carrison[10] found that *drinking water* with sufficient iodine conte if contaminated with bacteria from goitrous patients, caused thyroid hyperpla in rabbits. Professor W. J. Wilson[11] examined several samples of water fr rural areas in County Antrim in 1933. He found bac. coli in 3 c.c—0.1 c. Conditions are still similar.

Dr. Donald Hunter[12] (and Marine[9]) states that a low iodine intake may not le to thyroid hyperplasia, if the method for detoxicating goitrogenic substances sufficient. Therefore it cannot be disregarded, that some have a diathesis or

born liability to develop goitre, as pointed out by Sir Archibald Garrod in his uxley Lecture in November, 1936; nor can the inter-relationship of the thyroid ith other endocrine glands,[13] and events in the sex life. Sex: as girls are more ten affected than boys, psychic and developmental stresses are of undoubted portance. These influences are increased by the detrimental effects of infectious eases, influenza, acute and chronic tonsillitis, infections of the nasal sinuses, cayed teeth, and digestive upsets, and constipation which may destroy the power the intestine for assimulating iodine in a form in which it can be used by the yroid.

Under-nourishment may be a precipitating cause, as mentioned by Dr. Saul ertz[14] in his review of hyperplasia due to slimming cures.

Lack of rest,[8] sleep poor in quality and quantity, probably mean increased etabolism; therefore the organism needs more iodine, which the thyroid tries to ovide by hyperplasia.

The age of onset.[5]—9 to 11 years, or puberty in girls and occasionally in boys.

Heredity.—Bram[8] states that even on sea-coast one-third of the cases were reditary, and most observers[18] agree that it is a factor in endemic areas and sewhere.

Environment.—Few or no cases are found on the sea-coast. They are most evalent in the goitrous areas where iodine is relatively deficient,[13] which are und in varying degrees in most countries. McCarrison[17] states the condition is sentially a place disease.

Diet.—Lack of food containing vitamins[15] A and C, minerals and iodine; the otective foods, which are expensive, and instead of these cheap substitutes are ught.

In County Antrim an excessive amount of fried food[9] and tea are used in or-class families.

Associated defects noted in County Antrim children with enlarged thyroids, ich have been commented on by many observers[8]:—

25.0 per cent.—Decayed teeth to such a degree as to cause digestive upsets, sore throats, or enlarged cervical glands.

18.5 per cent.—Defective tonsils (some inflamed and septic, others showing evidence of past sepsis).

18.0 per cent.—Under-weight.

15.8 per cent.—Over-weight.

50.0 per cent.—Infectious disease— 8.0 per cent., three or more.
18.3 per cent., two.
22.2 per cent., one.

9.0 per cent.—Backward in school work.

0.6 per cent.—Mentally defective (including cretins).

5.7 per cent.—Rickets.

2.7 per cent.—Tachycardia (no tremor was noted).

2.0 per cent.—Nervous symptoms—chorea, habit-spasm, disseminated sclerosis, and early hyperthyroidism.

0.9 per cent.—Nephritis.

3.0 per cent.—Anæmia.

1.0 per cent.—Cold cyanosed extremities.

There are a few cases of deaf-mutism, four in one family, two in another, and one in some others.

The cases of disseminated sclerosis were noticed during routine inspection of eyesight in girls aged 9 to 11 years. They were in the same district, except one case. Treatment was given to them in the Benn Ophthalmic Hospital; on recovery they returned to school until leaving age; one case died soon afterwards.

Cases of hyperthyroidism are rare. One is reported from Paris by Dr. Heuyer in a boy aged eight years; he was nervous and restless, so his mother brought him to the psychiatric clinic.

Dr. Lehman of Philadelphia[18] writes of other cases in children which, unrecognised or neglected, have a high morbidity and mortality rate.

In Belfast a girl aged eight years was treated by Dr. Malcolm Brice Smyth in the Children's Hospital, another case was treated in the extern at the Royal Victoria Hospital, Belfast. Adolescent goitre in a girl aged fifteen was treated medically and surgically in the spring of 1937 by Dr. Marshall and Mr. McConnell.

Summary.

The incidence of simple goitre in school children varies in different countries with the amount of iodine in environment. It is seldom seen on the sea-coast. More cases are noted in rural than in urban districts; this may be due to the greater prevalence of an hereditary factor, to a larger amount of some goitrogenic agent or other defect in diet, or to defective water supplies and sanitation. The latter are not found in urban districts.

A greater incidence is noted in girls than in boys, in children aged 9 to 11 years (due to stress of development and insufficient rest—increasing metabolism), and in girls at puberty.

The majority of children, except in endemic areas, do not develop any enlargement of their thyroid glands, therefore it is possible that the minority may have a diathesis which makes them more susceptible to any excessive demand on the thyroid gland. Sex, other endocrine glands, diet, hygiene, diathesis, and social status may have an influence in causing goitre.

My cordial thanks are due for valuable advice to Professor W. J. Wilson, Professor J. H. Biggart, Professor J. K. Charlesworth, Dr. S. I. Turkington, and to the secretary of the section of Public Health at the Belfast British Medical Association Meeting in 1937.

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REVIEW

MIESON'S ILLUSTRATIONS OF REGIONAL ANATOMY. Edinburgh: E. & S. Livingstone. 1942. 7 volumes, £3. Separate sections: C.N.S. 8/6; Head and Neck 15/-, Abdomen 7/6, Pelvis 5/-, Thorax 5/-, Upper Limb 8/6, Lower Limb 10/6.

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The Future of the Hospitals

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

By FRANK P. MONTGOMERY, M.B., D.M.R.

I MAKE no apology for choosing as the subject of my address to you to-day "T Future of the Hospitals." All thinking members of the profession realise t some form of National Health planning for the future is essential, and that whate system is evolved, it must be based on a reorganised National Hospital Service.

Let us look for a moment at the development of hospitals. Apart from the t famous religious foundations of St. Bartholomew and St. Thomas in Lond which managed to survive the destruction of the Reformation, the modern hospit as we know them date back little more than two hundred years. Thomas Guy, t founder of the hospital bearing his name, was one of the first philanthropists found a hospital, which was opened in 1725. It would be unfair, however, to gi Guy and his immediate successors all the credit for the endowment of a pub hospital at their own expense. This honour strictly belongs to Ireland, where n only was the general public more interested in the health of the people, but t Irish Parliament, unlike the English Parliament, passed special measures f hospital purposes. The actual pioneer was Dr. Richard Steevens of Dublin, w bequeathed at his death in 1710, real estate to the value of £600 a year for t establishment and endowment of a hospital "for the relief and maintenance curable poor people." This phrase is significant, because most of what we called general hospitals always excluded "incurables," and here again Ireland l the way. The first hospital for incurables was founded in Fleet Street, Dubli in 1744.

Dr. Steevens' bequest did not become operative until the death of his siste and the hospital was not therefore opened until 1731. In 1720 the people of Cor inspired by Dr. Steevens' munificence, founded an infirmary by public subscriptio

Jervis Street Hospital was founded in Dublin in 1728, thanks to the efforts several prominent medical men, and the year after the opening of Steeven Hospital, another benefactress gave her name to Mercer's Hospital, so th hospital-founding might be said to have been a general movement, with Dub and London pre-eminent.

The solitary example of a voluntary hospital which was directly due to t initiative of a medical corporation is supplied by Edinburgh, in which city t scheme of supplying the sick with advice and treatment free of expense had be adopted by the College of Physicians in 1682. In 1726, under the auspices of t College, a subscription was raised for the provision of a public infirmary—whi was opened in 1729.

And what of Northern Ireland? In 1765 the Irish Parliament established the county infirmaries by direct act. Under this Act the Grand Jury of each county was allowed to found a county infirmary and to pay towards its upkeep sums not exceeding seven hundred pounds a year, with one hundred pounds a year and other advantages to the surgeon.

This Act, according to Surgeon-General Evatt, who paid a visit of inspection to Ireland in 1903 as Special Commissioner for the British Medical Association, is regarded as one passed in the interests of the landlords. By it they were enabled to form a hospital for their bailiffs, game-keepers, and employees. They succeeded, however, in placing in every Irish county an efficient medical man receiving a grant from the State. This infirmary surgeon, with an income of £250 a year all told from the State funds, did not deal primarily with the necessitous poor, but was rather a physician to the landlords and their families. There are six of these County Infirmaries to-day in Northern Ireland: at Lisburn, Derry, Omagh, Downpatrick, Armagh, and Enniskillen.

The next step was the establishment of the Poor-Law System. Its watchwords were "abolish outdoor relief," "all paupers into the workhouse," and "all sick poor into the workhouse infirmary." In theory the doctor was appointed to the newly-constructed workhouse infirmary, in practice he was the doctor of the country town receiving a State salary and therefore able to a certain extent to survive in Irish medical practice, with its unending distance factor always awaiting solution by some help from national sources.

Over the door of all Irish workhouses is the date 1841, just one hundred years old, the year which marked the introduction of one of the most unpopular institutions in Ireland.

To counteract the lack of State support for hospitalisation, private charity came to the rescue, and during the eighteenth and nineteenth centuries many voluntary hospitals were founded and endowed by public subscription and private charity.

The eighteenth century had been chiefly characterised by the rise of the general hospital movement. The nineteenth was to be characterised by the progress of the specialist movement; while the chief characteristic of the twentieth century is now the belated but definite recognition by the State of its duties in anticipating disease by the employment of preventive hygiene.

While the State has been parsimonious to the point of folly in its support of the hospitals, the public has been generous to a degree which has amazed all visitors to this country. While Government has made provision for infectious diseases, mental diseases, and venereal diseases, it has never, except through its workhouses, attempted to deal with the ordinary medical and surgical cases requiring hospital treatment until twenty years ago. As a result, the main hospital accommodation up to 1920 was provided by voluntary hospitals, supported by the generosity of the public.

Under the Local Government Act of 1898, Ireland, authority was granted for the conversion of poor-law institutions into district hospitals for the treatment of

all cases within the area. The powers conferred under this Act were not utili until the end of the last war, and then Strabane, Lisburn, and Antrim Poor-L Infirmaries were converted into up-to-date district hospitals, in rapid successi Since that time nearly all similar institutions have been converted into mod hospitals, except in some towns where a county infirmary already existed. authorities in Northern Ireland are to be congratulated on taking the advice their medical advisers to rebuild all the old workhouses rather than adapt th without much structural alteration. As a result, Northern Ireland possesses a ch of district hospitals which are fully modern and fully equipped for almost ev type of general and specialised work. These hospitals are administered committees of the local boards of guardians, together with a few co-opted membe and are a charge on the rates. All of them have private and semi-private war and everyone in the area has a right of admission, subject to paying the cost maintenance, if able to do so. Had it not been for the existence of these distr hospitals at the beginning of the war, the disposal of air-raid casualties outs the Belfast area would have been well-nigh impossible.

The Six-County infirmaries are now in fact voluntary hospitals, though they subsidised by grants from the County Councils, with representation on the boar of management. The rest of the funds are raised by voluntary effort and payment from the patients.

There are also in Northern Ireland a number of cottage hospitals, many of th very well managed and efficiently run.

The total beds for ordinary medical and surgical cases in Northern Ireland about 5,300, or 1 for every 246 people, a dangerously low level of hospit accommodation.

War-time developments are provoking an extraordinary amount of discussi amongst doctors and all who work in the health services as to the purpose, scop and organisation of the medical services. Numerous groups to discuss post-w planning have come into existence, the most important of which is the Medic Planning Commission, composed of medical men representing all the major medic interests and set up on the initiative of the British Medical Association. Th British Hospitals Association, Political and Economic Planning, the Nuffie Provincial Hospitals Trust, and the Socialist Medical Organisation, are all workin out plans for the general reorganisation of the health services, including, of cours hospital services. So far, opinion is generally united on only one point, as far the hospitals are concerned, viz., that post-war hospitals and specialist servic must be controlled and planned on a regional basis. But how the hospital regio are to be planned, what type of regional hospital authority is required, in wh way voluntary and public hospitals are to fit into the regional scheme, are sti undecided issues.

Let us consider briefly some of the plans and recommendations which have bee put forward for the future organisation of the hospital services.

BRITISH MEDICAL ASSOCIATION.

HOSPITAL POLICY. *Sub-Appendix.*

(1) *Social and Scientific Changes.*

Everyone who has given serious consideration to hospital problems will be aware of two fundamental changes which have taken place in recent years. The first is a change brought about by social and scientific factors, the second one is imposed by legislation.

All who have watched the evolution of the voluntary hospital system in the past thirty years have noticed the striking change in the clientele appearing for treatment. Before the last war, the hospitals were treating the charitable poor, for whom they were built and endowed. To-day it is rare to see the poor and needy in our wards or out-patient departments, while the facilities of the hospitals are available to practically the whole community. With this widening in the scope of the hospital service there has also come a change in the type of service given. Whereas the "sick poor" looked to the hospital for any type of medical attention which they needed, general as well as specialist, the modern hospital is mainly concerned with the provision of consultant and specialist facilities.

Not the least important cause of this change is the elaborate nature of modern scientific methods, and the increasing art of their practical application. Many of the most modern and elaborate methods of diagnosis and treatment cannot be employed to best advantage except within the walls of a hospital. Moreover, they are expensive and can only be used economically when employed on a large scale.

As the community has come to expect a complete medical service, so the hospital has concentrated to an increasing extent on those aspects of a complete medical service such as cannot be secured elsewhere.

The position of the hospitals has also been affected by changes in general practice. Until quite recently there were sections of the population unable to obtain the services of a general practitioner or a family doctor. There existed under the Poor Law a system of domiciliary medical service for the destitute poor, but many declined to use this service on account of the social stigma which they felt attached to it. The lower-paid workers, too, were often unable to obtain general practitioner service owing to their inability to pay for it, and their reluctance to make use of the Poor Law service. The hospitals were the salvation of these classes, and provided a complete institutional service for this section of the community because they could not afford to obtain medical service of any kind.

The situation has now changed. Under the National Health Insurance Acts nearly twenty million persons obtain a domiciliary medical service from their own chosen medical practitioners. This two-fold development requires in the public interest that the hospital, whether voluntary or municipal, shall devote itself exclusively to that form of service which it alone can provide for the bulk of the community.

To sum up, hospitals should confine their activities to the essential services which hospitals alone can provide, insisting that all other necessary attention should be

obtained elsewhere. Out-patient departments should be consultative cent
accepting, save in emergency, only those cases recommended by their own doct

Co-operation.

Co-operation there must be, not only between the voluntary hospitals and
local authority, but between voluntary hospitals themselves. All too freque
voluntary hospitals have grown up in an atmosphere of parochialism, with
contact or co-operation with neighbouring institutions of the same kind. In s
areas there exist several voluntary hospitals, including a number of small spe
hospitals. Between these there should be unification, even if, in some cases
means absorption or combination of one or more hospitals. Such co-operation
already been secured in certain towns, notably Liverpool, Manchester, and Oxfo

In such consultations all interests should be considered, including those of
practitioner, whether general, specialist, or consultant. In some areas, lo
authorities will prefer to make substantial contributions to voluntary hospitals
the performance of certain work; in others they will prefer to make their provis
direct. No spirit of wasteful competition should appear between agencies concer
with one purpose—the provision of the necessary hospital accommodation for
area. It is legally possible to make arrangements whereby members of contribut
schemes are admitted to local authority as well as to voluntary hospitals. Bear
in mind that local authorities must charge costs, it is clear that this provision
only makes financial co-operation between the local authority, the volunt
hospital, and contributory schemes desirable, but emphasises the need for separat
contributory schemes from particular voluntary hospitals.

The Association strongly supports the recommendations in the report of t
Voluntary Hospitals Commission, published in 1937, for the regional developme
of voluntary hospitals, under the guidance of a strong, central co-ordinating bod
A regional hospital committee should co-operate with the local authorities in t
establishment of a joint hospital body or board, to secure the co-ordination
in-patient facilities, as regards admissions and necessary transfers and also of t
ambulance service in the area.

The Pay Bed.

The Association recognises that there is, in many areas, a shortage of hospit
accommodation for the people belonging to the middle classes. Although his incom
is above that accepted for hospital purposes, it is usually insufficient to cover t
cost of a privately-established nursing-home. The development therefore
pay-beds in association with hospitals at fees within the capacity of such patien
is to be welcomed. There are now in existence a number of provident associations
which enable the subscribers to insure against the contingency of illness whic
requires hospital treatment. These insurance schemes attract subscribers
moderately-priced beds, and cover, within reasonable limits, the cost of hospit
accommodation and consultant and specialist services. I feel, however, th
pay-beds in hospitals should be available to all classes of the community and th
there should be no income limit applied. The institutional and professional charge
would simply vary according to the status of the patient.

ontributory Schemes.

The Association supports the recommendations of the Voluntary Hospitals ommission on the subject of contributory schemes.

(1) Schemes should be regional in organisation and in the provision of hospital benefits.

(2) The benefits of schemes should be confined to wage-earners and others within prescribed income limits.

(3) The administration of schemes should be in the hands of a committee independent of any hospital in the area.

(4) Hospitals should be free to refuse cases unsuitable on medical grounds. Acceptances at hospital, except in an emergency, should be on the recommendation of the patient's doctor.

(5) No contributor should have preferential consideration over other patients as regards admission to hospital.

(6) Contributory scheme funds should be utilised for payment to council hospital authorities in respect of services to contributors at council hospitals.

There has been a marked tendency in recent years for the representatives of ntributory schemes on boards of management to attempt to dictate the policy voluntary hospitals and to demand that subscribers should receive preferential atment, both as regards admission to hospital and in the out-patient departments. his policy ought to be resisted vigorously by the medical staffs and by the boards management.

The attempt to include in hospital contributory schemes members whose incomes e far beyond the prescribed limit, should also be fought. Such patients can be ovided for by provident insurance, and the contracting field of private practice ould be maintained as far as possible.

luntary Hospitals.

The voluntary hospital system embodies a principle—that of voluntary service—ich is deeply ingrained in the traditions of this country. In its atmosphere of edom an efficient system of medical education has been developed, and medical earch of the highest quality has been fostered. The combined annual income all the voluntary hospitals exceeds their aggregate expenditure, though the lance of one hospital is not available to meet the deficit of another.

Whatever the modifications in form that it may undergo to meet the changing cumstances of the times, the voluntary hospital is certain to play a large part the hospital life of the country for a long time to come.

The Association recognises a dual policy regarding voluntary hospitals :—

(a) That the purely charitable side should be continued, wherein the whole cost of the patient is met by the gratuitous gifts received by the hospital and on whose behalf the services of the visiting medical staffs are given gratuitously.

(b) That patients, other than free patients, may be received for treatment at voluntary hospitals, and that for them payment should be received, either from the patients themselves or from the local authority referring them to

the hospital, and that on account of their treatment, suitable method remunerating the visiting medical staff should be arranged.

Applicants for hospital benefit, not being free patients, whose income does exceed a specified local scale, should be provided with hospital service on te appropriate to their financial position. Where such payments are in respect both maintenance and treatment, the visiting medical staff should receive from hospital authorities remuneration for their professional services by salary, honorarium, or by agreed payments, to a staff fund placed at their disposal. strictly charitable basis of the voluntary hospital exists only to the extent tha very small number of their poor patients now receive free treatment. The gr majority of persons now obtaining treatment are those who can pay, desire to p and do in fact pay, directly or indirectly, towards their maintenance and treatme Although the medical profession will gladly give its services gratuitously, as alwa to those who cannot afford to pay for them, it is inequitable to require it to g its services without remuneration to voluntary hospitals which treat patients a to pay, and which in practice collect payments amounting in the aggregate very large sums from these patients. The field of private practice has contract with the result that consultants, and particularly the young consultants, are findi it increasingly difficult to make a living.

It is in the public interest that there should be available in every area sufficie consultants and specialists to satisfy the needs of the community outside t hospitals. In the view of the Association, there should be remuneration of t medical staff in respect of all medical services in hospital for which payment made, directly or indirectly, by patient, employer, local authority, or contributo scheme.

The method of remuneration adopted in a particular hospital will depend local conditions. If the method of remuneration in relation to contributory patien is by a payment of a percentage of moneys received to a medical staff fund, th the percentage paid by a hospital with a resident medical staff should be not le than twenty per cent.

NUFFIELD PROVINCIAL HOSPITALS TRUST.

Co-ordination of Hospital Services.

The question how best adequate hospital facilities could be provided has exercise the minds of many during the past few years. It has also occupied the attenti of numerous committees, both official and unofficial. For a long time little progre was made because there was a pronounced cleavage of opinion between those, o the one hand, who saw a co-ordinated state hospital as the only effective remed for the admitted chaos, and those, on the other hand, who knew our great voluntar teaching hospitals, had seen the strides in medicine and surgery for which the organisation had provided facilities, and who could not regard their passing a anything but a calamity. From this clash of ideas gradually emerged a plan fo the regionalisation of hospital services, a plan which provides for the ordere

development of both the existing types of hospital within the framework of an area organisation upon which all hospital and kindred interests would be represented.

Hospital regionalisation as a method of providing an efficient hospital system was first put forward with authority by the Sankey report, which is a report of the Voluntary Hospitals Commission of the British Hospitals Association. This Commission sat under the chairmanship of Lord Sankey and reported in 1937. The principal recommendation of this report was in three parts :—

(*a*) The division of the country into hospital regions.

(*b*) The formation of Regional Councils, and

(*c*) The formation of a Central Hospitals Council to co-ordinate the work of the regional councils.

Although the terms of reference of the Commission limited their findings to voluntary hospitals, they did nevertheless advise that local authorities should be asked to collaborate in the work of the regional councils.

With the setting up of the Emergency Hospital Service public recognition was given to one of the principles enumerated in the Sankey Report, viz., that all the hospitals in each natural service region should co-operate, and that county boundaries did not represent the natural and convenient limits of such regions. The Emergency Hospital Plan for war services was necessarily largely imposed by the State, and has seriously limited the effective control both of voluntary hospital boards and of local authorities over their own hospitals.

It is inconceivable that, after the war, we could return to the haphazard pre-war hospital arrangements, and some form of planned hospital system is inevitable. The choice, therefore, is between a State hospital service perpetuating the main features of the Emergency Hospital Service, and an alternative scheme of regionalisation based on voluntary co-operation in regional and divisional councils, in which the local authorities and the voluntary hospitals would be partners. The encouragement of such a scheme is the primary task of the Nuffield Provincial Hospitals Trust.

In November, 1939, Lord Nuffield, appreciating the desirability of proceeding with the regional organisation of hospital services in Great Britain and Northern Ireland, created the Nuffield Provincial Hospitals Trust with an initial donation of one million shares in Morris Motors Ltd., valued at £1,250,000.

What is Hospital Regionalisation?

In general terms, hospital regionalisation may be explained as the voluntary co-operation of all hospital and kindred services organised in areas separated by natural rather than by artificial administrative boundaries.

The key hospital of a region, wherever possible, will be a hospital associated with a university medical school.

The centre of the hospital organisation in the divisions will be a large hospital possessing facilities for diagnosis and treatment of most types of disease, to which the other hospitals in the division can refer cases of special difficulty and which can in turn refer patients back to the smaller local hospitals when adequate

facilities for a particular case are available there. This is one instance of the
in which co-operation can help. Other examples can be given. For exampl
region or division may expect to be able to provide adequate and efficient pa
logical and other laboratory services for the benefit of all participating hospit
and eventually for all medical practitioners. And again, the divisional organisa
will, in many cases, make available for the small hospitals the services
consultants and specialists attached to the key hospital. Indeed, it may
happen that, alternately, a system will be evolved whereby some consultants
specialists will be appointed to a region or division rather than to a single hospi

A National Hospitals Board or Council.

When regional organisations have been established, it is intended that t
should nominate representatives to a National Hospitals Council; a body,
functions of which would include the co-ordination of hospital services throughe
the country, and liaison with Government departments.

Functions of the Nuffield Provincial Hospitals Trust.

It will be appreciated that the Trust has not been formed to undertake region
sation of hospitals in any particular area, but to encourage and support that wo
where invited to do so. It will have at its disposal an income of about one hundr
thousand pounds per annum, which it is hoped to augment by donations from oth
supporters of the hospital services.

Medical Advisory Council of the Trust.

Administrative reconstruction is not enough. The ultimate problem of t
hospital service of the country, even when properly organised, with all hospita
working in co-operation, must be concerned with the treatment of the sick—
essentially a medical problem. The trustees have, therefore, set up a Medic
Advisory Council, comprising representative leaders of the medical profession unde
the chairmanship of Sir Farquhar Buzzard. This Council has been in touch wit
medical faculties and public medical officers in all the chief centres of population.

Conditions arising out of the war have necessarily affected the activities of th
Trust. In some areas war conditions have made it impossible to organis
conferences, while in others there has been some disinclination to proceed activel
with the co-ordination of the hospital services during the war. On the other hand
there has been, in many provincial areas, a realisation that economic condition
and service requirements are undergoing considerable transition as a result o
the war, and this has stimulated interest in the scheme for the regionalisation o
hospital services which is being developed by the Trust.

Already conferences have been held at Bristol, Edinburgh, Guildford, Leeds
Liverpool, Manchester, Newcastle, Plymouth, Sheffield, and Truro. Thes
conferences were attended by representatives of voluntary hospitals and loca
authorities, and the regionalisation scheme was approved on each occasion. I
Scotland, an Advisory Committee on the Regionalisation of Hospital Services ha
been formed, and some useful progress has been made.

Northern Ireland has been visited twice by the chairman of the Regionalisation uncil (Mr. S. P. Richardson) and the chairman of the Medical Advisory Council r Farquhar Buzzard), and their visits have stimulated interest in the scheme of ionalisation for hospitals in Northern Ireland.

Only last week a further meeting representing the hospitals was addressed by . Richardson, and the Vice-Chancellor was empowered to co-opt a committee draw up tentative plans for the regionalisation of hospitals in Northern Ireland.

WHITHER MEDICINE?

PREPARED BY A COMMITTEE OF THE SOCIALIST MEDICAL ASSOCIATION.

December, 1939.

a synopsis of present systems and future plans, there is a short account given the present position and future requirements of the nation.

It is maintained that under the present system of private practice the general ctitioner suffers many disadvantages, of which the chief professional defects are :

Lack of specialist facilities for all his patients;
Separation from the hospitals and clinics;
Inability to follow up his cases when admitted to hospitals;
Lack of guidance on new therapeutic measures.

It is proposed to remedy this state of affairs by dividing the whole country up o regions, which may include a number of existing local authorities and in ich hospitals, personnel, etc., will be pooled for the common use of the whole ion. Hospital centres may require to be established according to transport ilities, and uneven distribution must be smoothed out. Subsidiary clinics will grouped around the larger hospitals, and from these domiciliary services of tors, nurses, midwives, health visitors, etc., will operate, while at the clinics oratory, radiological, and other consultant services will be available. The ncial burden will be divided between insurance contributions, rates and taxes, many feel that health is a national asset and that the medical services should a national responsibility, of which the main cost is borne by taxation.

e Lancet's Plan for Hospitals.

n October, 1939, stimulated by the changes produced by the Emergency dical Service, The Lancet published "A Plan for British Hospitals."

The scheme is based on the Ministry of Health's Emergency Hospital Service visualises a regional co-ordination of all hospitals, preserving certain features the voluntary system, such as medical control by a medical committee and a tem of staff firms, combined with the decentralisation and regionalisation which racterise the Emergency Medical Service. Since decentralisation makes Harley eet practice an impossibility, all staffs would require to be on a full-time basis.

A new idea in The Lancet plan is, that the control of the hospitals should not in the hands of the Ministry of Health, but in those of a new organisation, National Hospital Corporation, controlled by a board of governors, of whom at

least one-third should be doctors. This Corporation would be appointed c
charter to be reviewed by Parliament every five years, and it would take ove
hospitals, voluntary and municipal. This would include all hospital endowme
investments, site values, etc., but the Corporation would also require a Governm
loan to finance developments.

Current expenditure would be met by patients' contributions, provident sche
direct taxation, or compulsory hospital insurance.

HOSPITALS IN WAR-TIME.

BRITAIN entered the present war with over three thousand hospitals and no hosp
system. There were not even two hospital systems, one for voluntary and one
municipal hospitals. The thousand or more voluntary hospitals were a
administered, somewhat jealous of their independent status, and only very loos
associated with one another. The municipal hospitals were controlled by hundr
of individual local authorities under the remote supervision of the Ministry
Health and the Department of Health for Scotland.

A similar state of things existed in Northern Ireland except that, in addition
voluntary and municipal hospitals, there were other hospitals partly volunt
and partly subsidised.

In the absence of any unified hospital system, the threat of war and all that
was thought to imply in terms of civilian as well as military casualties, made
imperative for the Government to take a hand in hospital planning. The res
has been the Emergency Hospital Scheme and the Emergency Medical Servi
Viewed against the background of pre-war hospital organisation, the scheme mu
be regarded as a considerable achievement in improvisation, but it cannot be tak
as a model for post-war organisation. Amended and improved in certain respect
it should continue to serve reasonably well under the exceptional circumstanc
of war-time, while in the post-war world, some of its features may well serve
a starting point for more far-reaching reforms.

The bombing plane, by transforming the nature of warfare, has forced on
the transformation of our medical services. Air-raids have compelled us to crea
a system of casualty services for the rescue and immediate aid of air-raid victim
and to reorganise the hospital services for their effective treatment. For casualti
requiring hospital treatment an Emergency Hospital Scheme has been brough
into being in England and Wales with 225,000 casualty beds, staffed by ov
1,700 full-time doctors, with 5,150 other doctors on call for work when needed
This work cost £15,700,000 in 1940-41. The first attempt at national hospit
planning was the inevitable result of three facts:—

(1) That an unco-ordinated hospital system could never have stood the strai
of Nazi bombing.

(2) That hospital services had to be largely removed from towns into the countr
areas, where patients can be treated without constant fear of bombs.

(3) That the Government rightly decided that "cases of injury or illness attributable to, or connected with, war operations must be a charge on national funds."

Pre-war estimates expected anything from 30,000 to 150,000 casualties, following e big air-raid, and the Ministry of Health planned to make 300,000 beds available the outbreak of war for civilian and service casualties. Britain's public and ivate hospitals contained at most 567,000 beds (153,000 in mental institutions), e great proportion of which were in target areas. Outside the large towns in ngland and Wales some two hundred institutions, mainly public assistance stitutions, mental and fever hospitals or sanatoria, were "upgraded" at a cost £750,000 into hospitals capable of first-class work, by the provision of operating eatres, x-ray apparatus, laboratories, etc. These upgraded hospitals had 64,000 w casualty beds.

At the outbreak of war, 100,000 patients were discharged, and 71,000 beds out 98,000 in the London area were reserved for Emergency Medical Service cases. most large towns there were not enough beds to make any reduction possible, e peace-time supply being so inadequate that more beds had to be provided r casualties.

From August, 1940, to May, 1941, when air-raids occurred night after night, e scheme only began to work efficiently after many weeks, and the organisation d not stand up to the test of bombing as well as the personnel. The number of sualties never approached the figures expected, and the peak of 7,500 civilian sualties in Emergency Medical Service beds in November, 1940, was never ceeded.

There have been many special services established in connection with the mergency Hospital Scheme. There are nine centres for neurosis, ten neuro-rgical units, ten maxillo-facial, and nine chest centres. Children's units have so been formed in all the London sectors, while the Medical Research Council s established an emergency public health laboratory service to facilitate early agnosis of infectious diseases and to distribute vaccines and sera. There are any laboratories throughout the country, and the central laboratories in Oxford, mbridge, and Cardiff are controlled by the Medical Research Council. Since ly, 1940, the Ministry of Health has built up the blood transfusion service into national scheme, each region having its own service. Serious fractures are ated at twenty Emergency Medical Service centres in Britain and six in Scotland. ch has a physio-therapy department and facilities for remedial games and cupational therapy.

The outstanding merit of the Emergency Medical Service is that it has begun process which total war makes absolutely imperative: a pooling and reasonable tribution of medical resources and scientific skill. A planned system of special atment centres and pathology services is coming into being in every region the country. Attempts are being made to move surgeons, specialists, and search workers around as required. As a result, patients everywhere have a

better chance of first-class treatment, and the special centres provide opportun for improvement in medical knowledge and skill.

The Emergency Medical Service in Northern Ireland is under the contro the Ministry of Home Affairs and directed by the Hospital Officer, who is the Ministry's permanent staff. Three assistant hospital officers resident in north-western, western, and southern areas of the country are responsible to Hospital Officer for a certain number of hospitals in their districts. All hospi in the Emergency Hospital Scheme retain their pre-war standard of s government.

Considerable expansion has been necessary and is still being planned to m current and potential demands for accommodation. In peace-time the total num of beds in voluntary, district, county, and cottage hospitals and union infirma was 5,337, and an additional 1,557 beds have already been installed. A furt plan whereby 2,125 extra beds will be made available for hospital purposes is active contemplation. With this increase in bed capacity, extensive up-grad has been carried out and a large amount of equipment has been provid Emergency theatre equipment has been supplied to some hospitals, and porta x-ray units have been established. It has also been necessary to undertake prot tive works in hospitals, which have benefited by the advice of the Ministr architects as to the best means of guarding against injuries from blast and gl among patients and staff; and the fire-fighting facilities of hospitals have a received careful attention. A fleet of bus - ambulances has been acquired f transferring casualties from urban to rural hospitals and for the evacuation convalescent casualties, and aged and infirm patients, to the centres which ha been established. Those hospitals undertaking casualty work are paid in f according to their individual cost of maintenance.

Each hospital has its roll of Emergency Medical Service members attached f the treatment of casualties, and in all there are 242 members of the Service Northern Ireland. Recognised consultants can be called to any hospital in t scheme, and, in addition, there are five Mobile Surgical Teams ready to opera where they are most urgently required. There are no salaried appointments the Emergency Medical Service, members being paid on a capitation basis an consultants on a sessional basis.

An agreement between the civil and military authorities allows the military t take advantage of civil hospitals in appropriate areas, and urgent cases can b treated there. Service medical officers may also avail themselves of members the Emergency Medical Service in a consultant capacity.

An Emergency Blood Transfusion Service has been organised, and its function are divided into two regions, each having its own panel of blood-donors. Casualty receiving hospitals have been provided with refrigerators to hold a supply o blood-plasma, while sub-depots of plasma are also established at selected point for emergency use. The bleeding and typing of donors is being carried o unceasingly, and increasing stocks of whole blood and plasma are becomin available.

To assist in hospitals where heavy demands are made upon the nursing staff, the Civil Nursing Reserve has been established, consisting of part-time and whole-time volunteers. These nurses can be called upon by any hospital, and the terms of service are on the same lines as in Great Britain. The Civil Nursing Reserve has become increasingly useful to hospitals since the term "casualty"—originally defined as "air-raid casualty"—has been accommodated to include many other categories.

Gas-cleansing units have been established at selected hospitals in provincial towns, a member of the Emergency Medical Service taking charge as gas officer. The established nursing staff is reinforced by members of the Civil Nursing Reserve for the working of the unit. A complete service in relation to gas warfare has come into being by the appointment of a clinical consultant to work in co-operation with a pathologist and gas identification officer, whereby contact with the authorities in Great Britain and with the military authorities is easily available.

Government Policy.

The latest statement on the future of hospitals has just been made recently in Parliament by the Minister of Health, Mr. Ernest Brown. According to "The Times" of 10th October, 1941, he stated: "It is the objective of the Government as soon as may be after the war, to ensure that by means of a comprehensive hospital policy, appropriate treatment should be readily available to every person in need of it. It is accordingly proposed to lay on the major local authorities the duty of securing, in close co-operation with the voluntary agencies working in the same field, the provision of such a service by placing on a more regular footing the partnership between the local authorities and the voluntary hospitals on which the present hospital services depend. The Government recognise that to achieve the best results and to avoid a wasteful duplication of accommodation and equipment, it will be necessary to design such a service by reference to areas substantially larger than those of individual local authorities." On the financial aspect the Minister continues: "It is the intention of the Government to maintain the principle that, in general, patients should be called upon to make a reasonable payment towards the cost, whether through contributory schemes or otherwise. In so far as any new burden may be thrown upon local authorities in providing and maintaining hospital accommodation or in contributing towards the expenditure of voluntary hospitals, a financial contribution, the extent of which will be a matter for further consideration, will be made available from the Exchequer. Special arrangements for dealing with the teaching hospitals by way of increased educational grants are in contemplation." He then stated that he was instituting a survey of hospitals in London and the surrounding area to provide information for future planning, and he referred to the admirable preliminary work of the Nuffield Provincial Hospitals Trust in the provinces.

The substance of these remarks seems to be that the Government in Great Britain visualise a post-war hospital service planned on a regional scale, in which both voluntary and municipal hospitals will play their part. He states that financial

assistance will be given to voluntary hospitals by local authorities. And, fina
he commits local authorities to bearing the financial burden of the scheme, w
Government will make a grant from the Treasury to local authorities, the ext
of which might well vary between one per cent. and one hundred per cent.
the cost of the hospitals. This is scarcely satisfactory, but it gives offi
recognition to the value of the work of the voluntary hospitals and expresses
hope that a partnership between the voluntary and municipal hospitals may re
in an efficient hospital service for all who need it.

It is scarcely necessary to remind a medical audience that health affairs
Northern Ireland are divided between the Ministries of Home Affairs, Labo
Education, and Public Security, without any co-ordinating authority, such as
Ministry of Health in England and the Department of Health in Scotland. T
there is no central authority for public health affairs is not only regrettable, b
has resulted in an overlapping of various health services, and a lack of c
ordination between the various ministries responsible.

Reasearch in agriculture has been subsidised by the Government for many yea
but, so far as I am aware, not a penny has been spent in medical research, wh
the only Government grant to a teaching hospital has been for the training
midwives.

It seems to me that the time is long overdue for the establishment of
Department of Health for Northern Ireland, with a Government official of at lea
the status of a Parliamentary Secretary in charge. This Department should b
entrusted with all the health services and should, in co-operation with the medic
profession, make plans for a comprehensive and complete regional health servic
in the immediate post-war period. Nothing less will be effective in dealing wit
the present chaotic condition of affairs, and it will require a central Governmen
department to initiate and co-ordinate the regional organisation of a comprehensiv
hospital policy.

On the purely medical side, I should like to mention briefly certain problem
with which we must deal ourselves in order to supply a better hospital service.

Fractures.

Fracture clinics have come into favour at many hospitals in Britain, and in 193
the British Medical Association instituted a report on fractures, which criticise
the unsatisfactory proportion of cures at a large number of hospitals, as compare
with organised fracture clinics. The opinion of surgeons seems to be divided o
this point. My own view is that the poor results are the outcome of dischargin
fracture cases from hospitals just at the time when they need help and instructio
most. These cases require re-education in the use of their injured limbs, and th
establishment of physio-therapy departments where remedial exercises and occupa
tional therapy under a surgeon should be carried out would revolutionise th
results. This work could best be organised on a regional basis.

There are a number of large medical problems which at present await a satisfactory solution. These include the establishment of a centre for orthopædics in Northern Ireland, though a beginning has already been made.

Northern Ireland is the only part of Great Britain which has not yet instituted special cancer services on a regional basis. This problem was considered by certain members of the Government as long ago as 1929, but so far no active steps have been taken to secure adequate facilities for the treatment of this ubiquitous disease.

The treatment of both pulmonary and surgical tuberculosis should also be established on a regional basis, with large central country hospitals where all cases could be treated. The haphazard treatment of small numbers of patients in isolated districts should be abandoned.

Chest and brain surgery are very special fields of surgery and should be dealt with by well-organised teams working in a central hospital, to which all such cases should be transferred.

Plans should also be made to provide accommodation in a convalescent home or homes for aged and infirm people who are not seriously ill, but who cannot be looked after in their own homes, or who have no home. The workhouses are not a solution of this problem, nor are they suitable for the reception of cases of incurable disease, which cannot be kept in the general hospitals.

Medical Teaching.

In Northern Ireland the teaching of medical students has been completely ignored by the Government. In spite of official indifference the medical school continues to flourish, but if we are to keep the best of our young graduates at home, it would seem essential that more full-time teaching appointments, both in the University and the hospitals, must be provided. Such posts would enable young men to earn a living while engaged in post-graduate study and research, and would tide them over that difficult period before they can make progress in their chosen branch of the profession.

A medical school and its hospital will eventually die unless research is kept alive and the younger men encouraged to enter this field. I believe it would also be a great advance to appoint certain of the younger consultants and specialists on a whole-time basis to a group of district hospitals, where their work would be valuable and where they would gain experience and knowledge, while helping to raise the general standards of professional efficiency throughout the country. This plan has already achieved much success in Great Britain under the Emergency Medical Service scheme.

Hospital Staffs.

I should like to add a word regarding the position of nurses and permanent staffs of hospitals. It seems to be a recognised procedure in voluntary hospitals to pay the nursing and lay staffs the minimum. While realising that money publicly subscribed must not be wasted, I consider that the permanent staffs

of hospitals are, as a rule, grossly under-paid for the work they perform. S
improvement has come about in Great Britain as a result of the war, but so
the new scale of nurses' salaries has not been applied to Northern Ireland. W
Trades Unions demand and receive higher wages and war bonuses, hosp
personnel are expected to acquiesce in receiving the same pay as in pre-war d
regardless of the rise in the cost of living. Pension schemes for all hosp
employees should be compulsory, and nurses' pension schemes should be lin
up with these in Great Britain. I hope that something will be done to impr
the conditions of a most loyal and industrious body of men and women wh
great services are too seldom recognised.

Out-Patient Department.

The types of cases for which the out-patient department should properly
utilised fall into three groups :—

(1) Casualty cases.
(2) Consultation cases, including those retained for special treatment.
(3) Discharged in-patients.

Casualty Cases.

These include accidents and sudden emergencies. The hospital would not
fulfilling one of its main functions if these patients did not receive prompt attenti
without question. After the first attendance, however, further treatment in
out-patient department should not be given unless such treatment is not availa
elsewhere. If not admitted to the hospital, the patient should be referred to
usual medical attendant.

Consultation Cases.

The main function of the out-patient department should be consultation.
patient, other than an emergency case or a discharged in-patient, should
accepted for consultation or treatment without an accompanying letter from
general practitioner. In many instances all that is necessary is a single consu
tation, the patient being referred back to the practitioner with a letter from t
member of staff of the hospital. Admission to the beds of the hospital will
necessary in some cases. Others requiring some prolonged special treatme
which the patient is unable to obtain elsewhere, will continue attendance at t
hospital.

Discharged In-Patients.

Discharged in-patients may require periodic inspection or treatment, whi
should be continued at the out-patient department or special department.

It frequently happens that such discharged patients continue to haunt the ou
patient and special departments for a time, which cannot be justified either o
medical or economic grounds.

Unsuitable Cases.

There is a fourth category for which hospitals should not be called upon
make provision, namely, the patient who comes, with or without a doctor's lett
suffering from some minor or chronic ordinary ailment, the treatment of whi

would normally be undertaken by a general practitioner. This is the type of case which is responsible for many of the unjustifiable demands made upon the services of medical staffs. The patient should be examined, but no treatment should be given unless it is not available elsewhere. The growth of contributory schemes has been largely responsible for aggravating the misuse of out-patient departments. The British Hospitals Contributory Schemes Association definitely recommends that a person is entitled to out-patient benefit only when, in the view of the medical staff of the hospital, his condition demands it.

Although it has been made clear that members ought not to expect services from out-patient departments, the public has been slow to realise that the out-patient departments are complementary to, and not a substitute for, the medical care obtainable from private practitioners.

It would appear obvious that reform of the out-patient department is urgently needed. The department can be made much more useful to the community by treating it, not as a place for the encouragement of a miscellaneous crowd of chronic patients, but as a consultative department for the provision of a second opinion after a careful examination and diagnosis by the patient's own doctor, and for the provision of specialised treatment.

Nursing Services and Technical Staffs.

Nursing has now become a highly skilled profession demanding high standards of character and intellect. For years there has been a serious shortage of trained nurses, partly because of the unsatisfactory arrangements for training, combined with disgracefully long hours, low pay, bad working conditions, and excessive interference with personal liberty, which the present system frequently entails.

Nurses are obliged to do a great deal of heavy domestic work, which is unessential for their training and would much better be left to ward maids.

If the right type of educated candidate is to be attracted to the profession, measures must be taken to pay salaries commensurate with the importance of the work and to give conditions of service allowing much more leisure and freedom. A step in the right direction has been taken by some hospitals by the erection of good nurses' homes containing comfortable reading and recreation rooms, but much still remains to be done.

The status of the profession should be recognised by the State as of outstanding importance, and made comparable to that of the teaching profession, while the salaries and pensions of nurses should be arranged on a national basis. Shorter working hours should be introduced and four weeks holiday granted yearly.

The technical staffs of hospitals have also suffered much hardship in the past, on the apparent assumption that voluntary hospitals should pay their technicians the lowest possible wages. Radiographers, laboratory workers, engineers, and pharmaceutical chemists should receive much greater consideration than they do at present, while their wages and pension rights should be made secure.

Far too little consideration is given, as a rule, by boards of management to t nursing and technical staffs, and it is not realised that on the loyal and wh hearted co-operation of these devoted servants of the hospitals the real succes the hospitals depends.

Hospital Almoners.

I should like to refer to hospital almoners, as their work seems to be li understood or appreciated even by the medical profession, and they will conti to play an increasingly important part in the hospital system. Almoners consti the link between the hospital and the patients. Apart from their function preventing hospital abuse, they are responsible for arranging convalescent other follow-up services, such as the supply of special instruments and diets. T often intervene in the home-life of patients and induce them to come to hospit They put patients in touch with charitable organisations where necessary, can give the medical staff very useful information on the patients' backgrounds.

In short, the almoner is the hospitals' liaison officer with the public and w the public health, schools, and public assistance authorities. The appointment further almoners in all voluntary hospitals should be encouraged. They are highly-trained women, most of them with university degrees.

Hospital Records and Follow-up System.

One of our greatest needs at the present time is an adequate follow-up syste by means of which patients can be found at any time and brought back to hospit for further investigation or treatment. Certain continental centres, notably Swede have brought this service to a fine art, and there is no doubt of the great ga which is derived from such a system. Adequate records of patients can be ke for years, and the success or failure of any particular form of treatment can b thoroughly tested. Such a service could well be carried out by the hospit almoners in conjunction with the Women's Voluntary Services, who intend t keep going after the war in order to devote their time to social service. At th same time much greater clerical assistance is needed both in the wards and out patient departments of all our hospitals, to keep full and comprehensive notes an records of each patient with a modern filing system for easy reference.

In this brief survey I have endeavoured to indicate the trend of hospital polic after the war, and some of the official and unofficial opinions which have bee expressed to date. With the raising of the Medical Health Insurance maximum income from £250 per annum to £420 per annum, a very large percentage of th whole population will now come under the panel system and will expect to b eligible for hospital contributory schemes. This will generally narrow the fiel for general practitioners and consultants alike, particularly in Northern Ireland and will bring about a large increase in the demand for hospital beds. With th present rate of taxation, which is likely to continue for many years to come, i appears certain that charitable bequests and subscriptions to voluntary hospital will gradually diminish, as they have already done in the past twenty years. An yet, in spite of the inevitable changes which have and will continue to take place

I still believe there is a great future for the voluntary hospitals. The voluntary system is deeply ingrained in British hospital tradition, and it commands a great deal of voluntary effort of great value. It has the flexibility and the atmosphere of freedom in which medical education and medical research flourish, and patients are taken in from any part of the country, irrespective of county or local government boundaries. It would be nothing short of a tragedy if the voluntary hospitals, as such, were to disappear into the limbo of forgotten things, and their fine traditions of voluntary service lost in state-controlled institutions.

In conclusion, may I say that health services, to be effective, must not concentrate solely on curative work. In the past we have perhaps been too much occupied with salvage work, and have not concentrated enough on the large task of boldly creating conditions in which a healthy people can flourish.

The important point is for positive health services to grow up, by the provision of more and better food, housing, recreation, and social and economic security, and then our attitude of conferring the term "health services" on what are really "sickness services" will be left behind.

Basically, health is a problem of education, and it is only through the distribution of knowledge that we shall ever achieve the fitness to which a great people should aspire.

Postscript.

Since the above address was delivered just a year ago, a good deal has happened which justifies the belief that certain of the lines of development indicated in this paper are likely to be put into effect after the war. In the first place, it would appear that the Interdepartmental Committee, under the chairmanship of Sir William Beveridge, has been charged with the duty of examining and advising as to the possibility of a comprehensive State scheme of social insurance, and it is undoubtedly probable that pressure for the inclusion of specialists and hospital treatment will be exerted. This would mean, in effect, compulsory insurance for hospital and specialist services on the same basis as National Health Insurance, and would introduce the State control of hospitals. Certain factors, such as the cost, may be advanced against the possibility of such a scheme, but it would appear essential that some reasonable alternative scheme should be evolved in the near future, on a voluntary basis, if the voluntary hospitals, as we know them, are to retain their present position of eminence in the nation's hospital system.

Secondly, there has recently been formed in Northern Ireland a Regional Hospitals Council under the auspices of the Nuffield Provincial Hospitals Trust. This Northern Ireland Council is representative of all the hospitals in the area: voluntary, district, municipal, and special hospitals. The Vice-Chancellor of the Queen's University is its chairman, and it has as its main objectives the survey and co-ordination of hospital and auxiliary services, the promotion of such legislation as is likely to improve these Services, as well as the consultation on all matters of common interest among all hospital authorities. Its fundamental purpose is to

aim at raising in every possible way the standard of service to the patient throughou the region, and to encourage and initiate research on the detection, prevention, an treatment of disease.

It would seem that a great step forward has been made in the attempt to g all types of hospital working harmoniously together, and with good-will and co operation many of the hospital problems which have been referred to in this addre may be speedily solved.

We feel that a special word of praise is due to the Vice-Chancellor for h foresight and vision in bringing about the formation of this Council, and we hop that all his expectations for its success may be more than fulfilled.

Finally, a Northern Ireland branch of the British Hospitals Association has bee formed within recent months. This Association deals only with voluntary hospitals and it is very satisfactory to note that practically every voluntary hospital in th area has joined.

While more limited in scope than the Regional Hospitals Council, there ar nevertheless many special problems affecting voluntary hospitals in the area wit which this Association can deal, and already the question of nurses' salaries ha been discussed with the Ministry of Home Affairs. The Association hopes t maintain close relations with the Regional Hospitals Council and, jointly, to assi in promoting the best interests of all hospitals and their work for the community.

There are some who deride every attempt at advance in social betterment an in the establishment of a better hospital service in Northern Ireland, and wh wilfully refuse to admit the profound changes which have already taken place i the social and economic life of this country. Greater changes still are in the making and it is our duty to attempt to erect a better and more stable structure on the old and to secure for everyone, and particularly for those in the services, a much bette and more comprehensive hospital service. We must also work to establish an assured position for our service colleagues, who will provide the hospitals with their consultants and specialists after the war.

REVIEW

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OBITUARY

A. B. Mitchell, O.B.E., D.L., F.R.C.S.I., M.P.

The recent death of A. B. Mitchell (affectionately known to all old Queensmen as "A. B.") has severed a link which bound successive generations of medical graduates to Belfast for half a century. Remembered chiefly for his skill as a surgeon, he rendered conspicuous service to the Belfast School of Medicine in many directions. He was one of the first to visualise a hospital colony in the grounds surrounding the Royal Victoria Hospital, and worked and lived to see the accomplishment of his vision. Almost his last achievement as chairman of the Board of Management was to secure an extension of the area originally granted by the Belfast Corporation to the hospital authorities.

Entering Queen's College as a medical student in 1885, he graduated in the Royal University of Ireland in 1890. In the previous year, by winning the Coulter Exhibition, he had proved himself the first man of his year and had given an indication of that ability, industry, and practical knowledge of medicine and surgery which, in later years, placed him in the forefront of the surgeons of his time.

After graduation, he held the post of house-surgeon to the Royal Hospital, as it was then called, in Frederick Street, at a time when there were but two resident medical officers. At once he showed a unique dexterity in the performance of minor surgical operations and in the treatment of fractures, and by conducting a surgical "grind" for final-year students, gave promise of the attractive, if somewhat dogmatic, teacher which remained one of his chief characteristics throughout his surgical career.

In 1893, the Ulster Hospital for Children and Women gave him his first staff appointment, and this was followed in the next year by his election, after a keen contest, as assistant surgeon to the Royal Hospital. This placed him on the first rung of the ladder, which was to take him eventually to the top of a successful career. In both these institutions he had for a colleague William Whitla, for many years his chief medical friend and colleague. Both hospitals had already become antiquated and ill-fitted for the veritable revolution in surgical practice which was to take place within the next few years. In the rebuilding of them, Mitchell took a prominent part, and showed that he possessed other qualifications for leadership besides those of a professional nature.

The time was opportune for the young surgeon. A new era had just been opened by the discoveries of Lister. These inaugurated the study of pathology in the living subject. The abdomen lent itself to this experimental stage, both by reason of the extent of the field and by the relative ease with which abdominal explorations could be carried out. Mitchell was immediately attracted by its problems. His enthusiasm, manual dexterity, gentleness, and quickness gave him initial successes in the diagnosis and treatment of gastric and duodenal perforations (he performed the first successful operation for duodenal perforation in Ulster). Operative treatment of acute appendicitis revealed its true pathology, and explained the clinical

appearances of what had hitherto been known as perityphlitis. It showed, to the necessity for early diagnosis and prompt surgical treatment in acute abdomin conditions generally.

Within a few years the old hospital in Frederick Street, with its single theat obsolete wards, and hampered residents' quarters, closed its doors, and the Roy Victoria Hospital, as we know it to-day, was opened. Here Mitchell found hims in well-designed surroundings, with all the modern equipment which new metho demanded. He took full advantage of these opportunities, and in a brief peri obtained a wide experience of all abdominal diseases, so that from 1903 onwar he contributed papers to the various societies on abdominal subjects and play a leading part in the medical education of the province. In addition, these pape established the position of the rising young surgeon throughout the whole countr notably enhancing the reputation of the Belfast Medical School. At the Belfa meeting of the B.M.A. in 1909, he read a paper on twenty-three consecuti operations for perforations of the duodenum, with one death—a record performan at the time.

The treatment of the "acute abdomen" by surgical methods was soon followe by the operative treatment of less urgent problems. As pathological knowledg increased, attempts were made to anticipate perforations of the stomach, duodenu and appendix. This advance opened up wide areas in clinical diagnosis and treatment, when X-ray assistance was still in its infancy. The operation of gastr enterostomy for pyloric obstruction is an obvious example of this, and few operato in the country equalled Mitchell in its performance.

As always with the expert, he made his task look simple. An incision never to big and yet always adequate, a deft and unerring approach to the organs to b dealt with, no unnecessary exposure, and no traumatism by retractors or heav clamps, rapid handling of the needle, quick and accurate closure of the abdomin wound, and a perfect scar—all in a phenomenally short space of time. No wonde that he attracted the students to his benches and received the praise of some o the leading surgeons of his time.

Whilst the upper abdomen absorbed much of Mitchell's attention, his technica skill afforded him experience in all abdominal diseases, so that prior to 1909 h had contributed important papers on Intussusception, Intestinal Obstruction Cancer of the Rectum, etc.

Mitchell's outstanding position in the surgery of the abdomen in the early year of the century brought with it a rapid increase in his work as a consultant. His advice was sought not only by the general practitioners all over the country, bu by the surgeons in the county and district hospitals, most of whom were brought up on pre-Listerian principles and were eager for him to demonstrate his method in the country. The advent of the motor-car made this possible, and during th ten years before the Great War Mitchell's country work was enormous. It took him day and night to all parts of the Province and beyond, when motor-cars were unreliable and even main roads were pitted by pot-holes. Frequently he had t deal with patients extremely ill, many of them already beyond all human aid, bu

each, at least, afforded material for a clinical demonstration so clearly given, that the practitioner learnt the danger of delay in acute abdominal emergencies and was unlikely to make again the fatal mistake of procrastination. Most of these operations in the early years of the century were performed in private houses, large and small, in kitchens and upper rooms, the general practitioner and perhaps the patient's clergyman the only assistants.

The outbreak of the Great War showed, however, that he was a general surgeon of wide capabilities. In 1915 he was nominated by the Royal College of Surgeons in Ireland for the post of consulting surgeon to the Forces in France, where his colleague, Colonel Thomas Sinclair, A.M.S., was already serving. When the invitation arrived, however, he was in a nursing home, having himself undergone an abdominal operation. He had therefore most unwillingly to decline the offer. Later on, in 1916, Sir Robert Jones put him in charge of the Military Orthopædic Hospital in Belfast, in premises in the grounds of the University belonging to the U.V.F. Hospital. In this post he proved himself a first-rate administrator as well as an expert on the problems presented by the wounded soldiers, who were arriving in great and increasing numbers from the various battle fronts. His daily operation list included nerve sutures, bone-grafting, and amputations. During the War this hospital dealt with over three thousand cases, and after the War his work gained for him the O.B.E.

But Mitchell's interests were not confined to his professional work. When Queen's College became Queen's University in 1908, he was appointed to the Senate, a post which he held almost to the end. For many years he was a member of the Standing and Finance Committees, which determine the policy and carry out much of the administrative work of the University, and chairman of the Athletic Field Committee. The spacious and attractive grounds at Cherryvale are a permanent memorial to his foresight and knowledge of the value of physical health to the student. In 1935 he became M.P. for the University in the Northern Ireland Parliament. He greatly appreciated the confidence of his medical friends which this honour conveyed, for he could never afford time in his very busy professional life for political activities. In Parliament, he attended with regularity and spoke in his own direct and effective manner on all matters of public health, especially when these entailed the improvement and extension of medical services. His early connection with the Ulster Hospital for Children gave him special knowledge of, and interest in, child welfare.

Whatever Mitchell's activities may have been, and they were widespread, he allowed nothing to interfere with his work for the Royal Victoria Hospital. He was a prominent member of the committee which prepared the plans for the new hospital in 1900, and not a few of the features, notably the provision of an operating theatre for each surgical unit, were made at his suggestion. There were few days from the time the hospital was opened in 1903 till he retired from the active staff, following a septic wound of the hand in 1928, that he was not to be found at work in his theatre or visiting his wards. He took an active part in the amalgamation of the Hospital with the Royal Maternity Hospital in 1928, in the erection of the

new Pathological Laboratory within the hospital grounds, in the extension of t wards, in the building of the new Nurses' Home and the Isolation Block. It w in no small degree due to his influence that the funds of Musgrave Bequest wo made available for the erection of the Musgrave Clinic. The new fracture depa ment, at present in process of building, had his constant support. Upon h retirement from the staff, he joined the Board of Management, and for twel years, from 1930 till the end, he held the office of chairman.

Throughout his life Mitchell was keenly interested in all forms of athletics. H attributed his relatively good health mainly to the fact that even when his wo was at its maximum, he took his Saturdays off for open-air exercise. In his ea life he was a brilliant cricketer, a forcing and attractive batsman, and for so years the best slip fielder in the Province. In later years he played golf with handicap at one time in single figures.

His life was not without its tragedies. He lost his first wife from a pulmona embolism within two weeks of the birth of his eldest son, who was to fall to sniper in France in the Great War a few hours after his arrival at the front. H his second wife he had two sons, one of whom is Dr. J. Myles Mitchell of Yeovi and one daughter.

To quote "The Lancet": "Mitchell's greatest asset was the charm of his pe sonality. His enthusiasm covered every detail of pre- and post-operative treatmen He was always in hospital a few minutes before he was expected, wasted no tim but never forgot, nor allowed any of his staff to forget, the essential humanity medicine. He knew his hospital patients as well and esteemed them as highly a his private ones, and took an interest, not only in them, but also—how much rar —in their relatives." Hence it is no exaggeration to say that all his patient adored him. His rapid success in his early surgical career did not fail to caus some jealousy. Most of this, however, was ill-founded, and he lived to gain th undivided esteem and affection of his colleagues on the staff of the Hospital an its Board of Management. He had many friends, too, amongst the leading surgeon of his time. Two of his most cherished possessions were letters of appreciatio from Lord Moynihan and Sir Robert Jones. It would not be possible to includ these *in extenso*. Short extracts from each must suffice. On the 29th July, 190 after the meeting of the B.M.A. in Belfast, the former wrote:—"You have don and are doing a great work for surgery, but you are doing something even highe than that: you are doing a great work for surgeons."

On his retirement from the active staff of the Hospital in 1928, Sir Robert Jone wrote:—"You and I seem to have entered each other's hearts from the first, an your devoted friendship has meant much to me."

And so, on 3rd September, 1942, died Arthur Brownlow Mitchell, a gre Ulsterman, an able surgeon, and a loyal Queensman—beloved by all his colleague in the University and in the Hospital, by hundreds of Belfast graduates of medicin the world over, who enjoyed the privilege of his instruction, and by innumerabl patients on whom he had bestowed not alone the joy of living, but even life itse —of these, not the least grateful is proud to have the privilege of paying thi final tribute to his memory. S. T. I

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